

Rs.10



J I M A

Volume 65 (RNI) ♦ Number 12 ♦ DECEMBER 2021 ♦ KOLKATA

JOURNAL *Of the* INDIAN MEDICAL ASSOCIATION

Official Publication of the Indian Medical Association

Indexed in

INDEX  COPERNICUS
INTERNATIONAL

Scopus®

Index Medicus

Volume 119 (JIMA) ♦ Number 12 ♦ December 2021 ♦ KOLKATA



Largest
Circulated
Medical Journal
in India

ISSN 0019-5847

92ND
YEAR OF
PUBLICATION

Visit us at [https:// onlinejima.com](https://onlinejima.com)

In patients with fast progression of **LUTS** in **BPH**

^{Rx}
Veltam Plus
Tamsulosin MR 0.4 mg + Dutasteride 0.5 mg Tablets

The **smallest size** tablet to **combAT BPH**

In **BPH** for long term relief of **LUTS**

^{Rx}
Veltam
Tablets
Tamsulosin MR 0.2 mg & 0.4 mg

The **first tablet formulation** of **Tamsulosin** in India

In **Urinary Tract Infections**

^{Rx}
Niftas
Nitrofurantoin 100 mg SR Tablets

The **best brand** of **Nitrofurantoin**

INTAS PHARMACEUTICALS LTD.

Corporate House, Near Sola Bridge, S.G. Highway, Thaltej,
Ahmedabad-380054, Gujarat, INDIA • Website: www.intaspharma.com
Email : medical@intaspharma.com

 7227034243



In Recalcitrant Tinea Infections

FDC Proxima

ZOCON[®] 150 MG

FLUCONAZOLE TABLET

1 Tab **DAILY** for 8 weeks

94% Clinical Efficacy with Daily Compliance*

* Data on file, Result of ongoing clinical trial "An investigator initiated, open label, single arm observational study to evaluate the safety, tolerability and efficacy of Fluconazole 150 mg in subjects suffering from Tinea cruris & Tinea corporis"



Achieves highest concentration in Stratum corneum, Epidermis, Dermis

In Tinea Cruris, Tinea Corporis, Tinea Pedis & Tinea Versicolor

ZOCON L

LULICONAZOLE CREAM 1% w/w *Power for Faster Clearance*



Scan QR code to understand
The 7 Reasons to Prescribe Best Topical Anti-fungal



- Dr. Michael H. Gold

Now Available in **60gm** ₹ 400/-

- 1 All Luliconazole Brands are not same
- 2 Vehicle and Viscosity are two important properties of any topical anti-fungal which impacts the efficacy to the tune of 30-40%
- 3 Dr. Gold also encouraged to have (Drug+Vehicle) v/s (Drug+Placebo) clinical trials to establish this most Important factor
- 4 Capric Triglyceride vehicle helps to maintain the skin pH, absorption and ultimately efficacy
- 5 The efficacy of topical agents in superficial mycoses depends not only on the type of lesion & the actual mechanism of action of the drug, but also on the Viscosity
- 6 Brand reputation is very much important to both Doctors and Patients for Retention & Psychology
- 7 Once daily application and short duration of therapy with low relapse rate is why Dr. Gold use LUZU (Luliconazole) in his practice



10gm
₹ 99/-

30gm
₹ 273/-

JIMA COMMITTEE 2021



Dr. J.A. Jayalal
National President, IMA



Dr. Jayesh M. Lele
Hony. Secretary General, IMA



Dr. Kakali Sen
Hony.Jt Secretary, HQs.



Dr. Sanjoy Banerjee
Hony.Jt Finance Secretary, HQs.



Dr. Tamonas Chaudhuri
Hony. Editor, JIMA



Dr. Rabindranath Chakraborty
Hony.Associate Editor, JIMA



Dr. Nandini Chakrabarti
Hony. Associate Editor, JIMA



Dr. Jyotirmoy Pal
Hony.Secretary, JIMA



Dr. Kanai Lal Patra
Hony.Asstt.Secretary, JIMA



Dr. Debasish Bhattacharya
Member,JIMA Committee



Dr. Samarendra Kr Basu
Member,JIMA Committee



Dr. Shambo Samrat Samajdar
Member,JIMA Committee



Dr. Udas Ghosh
Member,JIMA Committee



Dr. Tanuka Mandal
Sub Editor, JIMA

ADMISSION NOTICE

Certificate & Diploma Under UGC Recognised University	UNDER WHO RECOGNISED FOREIGN UNIVERSITY	Eligibility
<ul style="list-style-type: none"> ■ Diabetology ■ Ultrasound ■ Rheumatology ■ Radiology ■ Pediatric ■ Clinical Cardiology ■ General Medicine ■ Critical Care Medicine & Many More. 	<ul style="list-style-type: none"> ☞ MD / MS ☞ Master of Medical Science ☞ MCH ☞ Diploma (In all traditional subjects) 	<h1>MBBS</h1>

NATIONAL INSTITUTE OF MEDICAL SCIENCE

Trunk Road, Near Mawsumi Hospital & Research Centre
Silchar - 788001 Assam

Affiliated By UGC & WHO recognized University

For further details visit our website : - www.nimssil.com

E-mail : nimssiladword@gmail.com / contact@nimssil.com

Mobile - 03842230152 / 09435072209 / 08811935789

Admission forms are available on the website





In this
**NEW
NORMAL**
Coughing is
Abnormal

In Dry and Allergic Cough

Grilinctus[®]
Syrup

(Dextromethorphan HBr 5 mg,
Chlorpheniramine Maleate 2.5 mg,
Guaiphenesin 50 mg and NH₄Cl 60 mg / 5 ml)



Grilinctus-L[®]
Syrup

(Levocloperastine Fendizoate Eq. to
Levocloperastine HCl 20 mg /5ml)



In Productive Cough

Grilinctus-BM[®]
Syrup

(Terbutaline Sulphate 2.5 mg and Bromhexine
HCL 8 mg/5ml)



**SUGAR
FREE**

Grilinctus-LS[®]
Syrup

(Levosulbutamol 1 mg + Ambroxol Hydrochloride
30 mg + Guaiphenesin 50 mg / 5ml)



JIMA Editorial Advisory Board Members (National and International)



Dr. Vedprakash Mishra
Physiology
Maharashtra



Dr. Ravi S. Wankhedkar
General Surgeon
Maharashtra



Dr. T. Nirmal Fredrick
Ophthalmologist
Tamilnadu



Dr. Shiva K. Misra
Minimal Access Surgeon
Uttar Pradesh



Prof Gurmeet S. Wander
Cardiologist
Punjab



Dr. C Palanivelu
Robotic Gastro Surgeon
Coimbatore



Dr Bipin M Patel
Anaesthesiologist
Gujarat



Dr Anil J Nayek
Orthopaedic
Gujarat



Dr Mansukh R Kanani
Paediatrician
Gujarat



Dr Bibhuti Saha
Tropical Medicine
Kolkata



Dr Shashank Joshi
Endocrinologist
Mumbai



Dr Jayanta Panda
Medicine
Cuttack, Orissa



Dr D P Singh
Respiratory Medicine
Bhagalpur, Bihar



Dr Surya Kant
Respiratory Medicine
Lucknow



Dr G Narsimulu
Rheumatologist
Hyderabad



Dr Dilip Gode
Minimal Access Surgeon
Nagpur



Dr Apurba Ghosh
Paediatric Medicine
Kolkata



Dr. Tanu Raj Sirohi
Internal Medicine
Uttar Pradesh



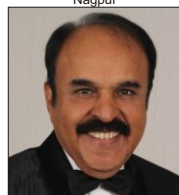
Dr V G Pradeep Kumar
Neurologist
Kozhikode, Kerala



Dr V Amuthan Emeritus
Cardiologist
Tamil Nadu



Dr V Mohanan Nair
Public Health
Ananthapuri



Dr A Muruganathan
Medicine
Tamil Nadu



Dr Alok Pandit
Neurologist
Kolkata



Dr Deepraj Bhandarkar
Minimal Access Surgeon
Mumbai



Dr C Daniala
Radiologist
Shillong, Meghalaya



Dr Anju Grewal
Anaesthesiologist
Punjab



Dr Vikram Kate
Gastro Surgeon
Puducherry



Dr Om Tantia
Bariatric Surgeon
Kolkata



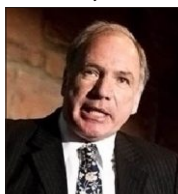
Dr Avijit Hazra
Pharmacology
Kolkata



Dr Yim Heng Boon
Hepatologist
Singapore



Dr Gautamananda Roy
Acute & Stroke Medicine
UK



Dr Colin Robertson
A&E Medicine
UK



Dr Shoahel M Arafat
Medicine
Bangladesh



Dr Narimantas E Samalavicius
Robotic Surgeon
Lithuania



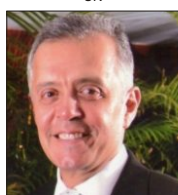
Prof Roman Jaeschke
Medicine
Canada



Dr Partha Sarathi Roy
Neurologist
UK



Dr Fazila TN Malik
Cardiologist
Dhaka Bangladesh



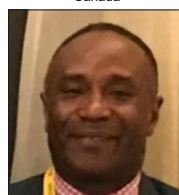
Dr. Ricardo Escalante
Colorectal Surgeon
Venezuelan



Dr SM Mostafa Zaman
Cardiologist
Dhaka, Bangladesh



Dr Serene Perkins
Chief Medical Officer
USA



Dr JWJ Nunoo - Mensah,
Colorectal Surgeon
London



Dr Aminur Rahman
Neurologist
Dhaka, Bangladesh

In Stage I hypertension

Initiate
Olmesar
Olmesartan Medoxomil 10 / 20 / 40 mg Tablets

Best in Class, A Class Apart



In Uncontrolled Hypertension

R
Nexovas T
Cilnidipine 10 mg + Telmisartan 40 mg Tablets

The Next for Uncontrolled to Under Control

For prevention of CV events

RX
ROSUMAC 5/10/20/40
ROSUVASTATIN 5/10/20/40 mg

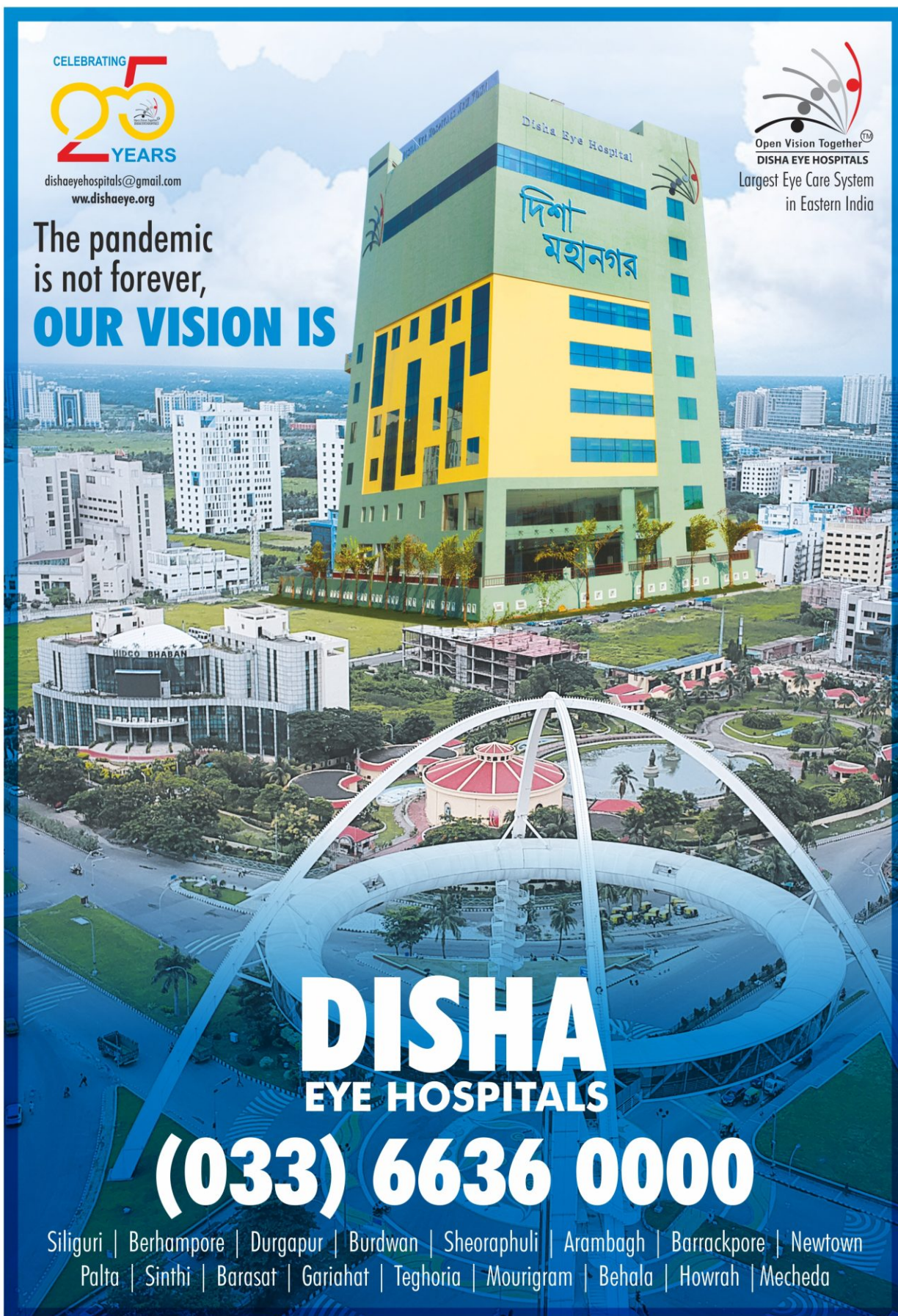
POWERFUL STATIN AT AN AFFORDABLE PRICE

For coverage across the Anxiety spectrum...

R
Etizola
Etizolam 0.25/0.5 mg

Shorter action... **Minimal dependence**

For the use of a Registered Medical Practitioner or a Hospital or a Laboratory only



CELEBRATING
25
YEARS

dishaeyehospitals@gmail.com
www.dishaeye.org

**The pandemic
is not forever,
OUR VISION IS**

Disha Eye Hospital
দিশা
মহানগর

Open Vision Together™
DISHA EYE HOSPITALS
Largest Eye Care System
in Eastern India

DISHA
EYE HOSPITALS
(033) 6636 0000

Siliguri | Berhampore | Durgapur | Burdwan | Sheoraphuli | Arambagh | Barrackpore | Newtown
Palta | Sinthi | Barasat | Gariahat | Teghoria | Mourigram | Behala | Howrah | Mecheda



JOURNAL *Of the* INDIAN MEDICAL ASSOCIATION

Volume 119 (JIMA)
Number 12
December 2021
KOLKATA
ISSN 0019-5847

CONTENTS

12

Editorial

Marching into Metaverse — *Tamonas Chaudhuri*

15

Original Articles

Assay Interferences in HbA1c Measurements : Effect of Hemoglobinopathies and Elevated Fetal Hemoglobin in the BioRad D10 — *Surupa Basu, Subimal Chaudhuri*
[HbA1c or Glycated Hemoglobin, is an invaluable marker in diabetes management and of late in its diagnosis as well. Of the many modalities of testing HbA1c, the High Pressure Liquid Chromatography (HPLC) method maintains wide acceptance and popularity amongst clinicians.]

19

Myriad of Presentation of Scrub Typhus in a Tertiary Care Hospital in North Eastern India — A Prospective study — *Indrajit Debnath, Dwijen Das, Bijush Difoesa, Swapnalika Bhuyan*
[Among the Rickettsial Diseases caused in human, the most wide spread is Scrub Typhus. Scrub Typhus is a re-emerging infectious disease that generally causes Acute Febrile illness, with disease spectrum ranging from mild illness to multi organ dysfunction.]

25

Perception of Foundation Course Curriculum by the Faculty of Medical Colleges — *Rekha Udgiri, Vidya Patil*
[The Foundation course is one of the new curricula the National Medical Council (NMC) of India implemented for the present academic course at the beginning of the MBBS program. It is a month's duration where all the students should undergo this foundation course.]

30

Clinical Profile of Incisional Hernia and Minimally Invasive Approach Using Larger Mesh for Repair — *B S Pathania, Devika Mahajan, Surbhi Abrol*
[Incisional Hernia repair is commonly performed worldwide. Minimally invasive approach for repair using composite Mesh covering the entire previous incision can significantly reduce its most dreaded complication ie, recurrence.]

36

Vitamin D Level in Patients with Juvenile Idiopathic Arthritis : A Study from a Tertiary Care Institute of Kolkata — *Pijush Kanti Mandal, Arindam Bandyopadhyay, Sajeeb Mondal, Rajashree Pradhan*
[Vitamin D insufficiency in children is a major public health concern Worldwide. Many studies have been published on Vitamin D deficiency and its affect in children and adolescents. Vitamin D has an impact on calcium metabolism as well as in bone mineralization.]

40

A Study to find out the Association and Correlation between the Serum Uric Acid Levels with the Patients having Impaired Glucose Tolerance — *Bapilal Bala, Pradip Kumar Chowdhury, Ujjwal Kumar Roy, Aneek Ghosh*
[The Impaired Glucose Tolerance (IGT) is a pre-diabetic condition having high risk of developing T2DM. Hence, the most important measures to prevent development of T2DM are to target the subjects with IGT.]

45

Impact of Lifestyle Modification and Psychological Interventions in Academic Performance of UG Medical Students, Institution Based Prospective, Cross-sectional Study — *Lopamudra (Dhar) Chowdhury, Prakash Mohite, Ranjan Bhattacharyya, Anurag Chaudhuri*
[Mental health is considered as an essential component of health by the World Health Organization. Students may not be able to identify their problem and avoid seeking help often due to reasons of confidentiality or finances.]



JOURNAL Of the INDIAN MEDICAL ASSOCIATION

Volume 119 (JIMA) 51
Number 12
December 2021
KOLKATA
ISSN 0019-5847

Thyroid Autoimmunity in Children and Young Adults with Type 1 Diabetes and Their Siblings — *Janani Ramesh, Sougata Mahato, Anju Seth, Ekta Debnath*
[Type 1 Diabetes Mellitus (T1DM) and Autoimmune Thyroid Disease (AITD) are often associated. AITD is diagnosed by the presence of antibodies to Thyroglobulin (Tg), Thyroid Peroxidase (TPO) and Thyroid-stimulating Hormone Receptor (TSHR).]

55 Review Articles

The Concept of Hypertension Clinic and Hypertensionologist — *A Muruganathan*
[There are more diabetic clinics and diabetologists in India even though Hypertension prevalence, morbidity and mortality is three times more than Diabetes.]

57

Pollution-Induced Rhinitis and Nasal Health in India — *Paramesh H, Ashok Mahashur, Deepak Talwar, Sameer Bhargava, Jayesh Lele, Sarika Verma, Parul Vadgama, Agam Vora, S Jayaraman, C John Panicker, Sachin Pawar, Manan Shah*
[Air pollution-associated respiratory diseases are a major concern among children and adults in India. Online expert round table meetings were recently held to assess the current literature related to pollution-induced upper respiratory tract disorders, explore the current scenario related to the identification and management of pollution-induced Upper Respiratory Tract Disorders in India.]

62

Diagnostic Laparoscopy — A Useful Diagnostic Tool — *Sandeep Verma, Navneet Kumar Chaudhry*
[Diagnostic Laparoscopy (DL) is a minimal invasive surgical procedure for diagnosis of intraabdominal diseases through direct inspection of various intra-abdominal organs and peritoneal cavity. Owing to the lower recovery time, less post-procedural pain, decreased hospital stay and fewer complications compared to open surgery, it is a safer and effective option for both patient and the surgeon.]

67 Case Reports

A Neglected Case of Hirschsprung's Disease Presenting in Adulthood : A Difficult Encounter — *Pankaj Halder, Aheli Ghosh Dastidar, Sandip Kumar Halder, Sagnika Ukil, Ankit Goel, Subhabrata Das*
[Hirschsprung's Disease (HD) is characterized by the congenital absence of Ganglion Cells in all or part of the Colon. Neonate with HD presents with constipation since birth while chronic constipation is prominent in early childhood.]

69

Post Covid-19 Vaccination Fatality with Cerebral Involvement — *Samadhi Dandeniya Arachchi, Rohan Ruwanpura, Ruwan Nanayakkara*
The vaccination is reckoned to be the most appropriate preventive measure to prevent COVID-19 pandemic infection. There are about seven varieties of Anti-COVID-19 vaccines available with relatively limited information about their effectiveness and adverse outcomes. We present a rare fatal case of severe postimmunization complication following COVISHIELD vaccination and is recorded as the first death postvaccination for COVID-19 in Sri Lanka.

73

Acrodermatitis Enteropathica In Adolescence — A Rare Presentation of Malabsorption — *Salma Barlaskar, Bhaskar Kanti Nath, Prithwiraj Bhattacharjee*
[Acrodermatitis Enteropathica (AE) is a rare, inherited or acquired disorder due to Zinc Deficiency. It is characterized by a triad of Acral Dermatitis, Alopecia and Diarrhoea. The acral and periorificial distribution of the rash is considered as a pathognomonic cutaneous marker for Zinc Deficiency.]

CONTENTS

(Continued next page)



JOURNAL *Of the* INDIAN MEDICAL ASSOCIATION

Volume 119 (JIMA) 76
Number 12
December 2021
KOLKATA
ISSN 0019-5847

A Challenging Case of Chest Discomfort and Breathlessness — *S Arulraj, Ramasubramanian, Sundaralingam, Aarathy Kannan, Chandrakumar, Manikandan, M D Faizur Rahman*

[Esophagopleural fistula (EPF) presents with some nonspecific symptoms which may lead you to other provisional diagnosis first but a close workup and considering every differential diagnosis very carefully will take you to the final diagnosis.]

A Case Report on A Very Rare Hernia : Primary Anterior Perineal Hernia — *Sudipta Chatterjee, Satyaprakash Kuila, Ankit Agarwal*

[The entity of primary Anterior Perineal Hernia (APH) is very rare and almost exclusive to female gender. The contributing factors are chronic constipation, prolonged and difficult labour, atrophy of Levator Ani muscle and disease of Pudendal Nerve.]

Computed Tomographic Findings of Invasive Mucormycosis in Covid-19 Patients on Steroid Therapy at A Tertiary Care Centre — A Case Series — *Srijak Bhattacharyya, Raj Saha, Prasun Das, Swadha Priya Basu, Subhargha Mandal, Tanuka Mandal*

[As India continues to cope with the existing rise in COVID-19 infections, Mucormycosis has emerged as a formidable complication in Covid infected Diabetics on Steroid Therapy.]

Pictorial CME

Large Aneurysmal Bone Cyst of Proximal Tibia in A 10 Year Old Child Treated by Bone Graft from Mother — *Santanu Banerjee*

Special Article

Covid Calls for an Urgent Change in UG & PG Medical Examination System in India — *Georgi Abraham, Arjunan Tamilselvi, Sunil Shroff, Tarun K George*

[With 542 Medical Colleges and over seventy thousand aspiring students joining for MBBS yearly, the technological advances in Medical Science is not reflected in the Undergraduate, Postgraduate and sub speciality examinations.]

Drug Corner

Safety & Efficacy of the FLUCOLD Uncoated Tablet in the Treatment of Common Cold and Flu Syndrome : Postmarketing Surveillance Study — *Pankaj Kumar, Rashmi Menezes, Vinay Pinto, Deepak Arora, Bhupesh Tiwari, Harish S, Vinda Z, Tapas D*

[Common cold and flu syndrome generally affects the upper respiratory tract in alliance with a low fever and some systemic symptoms such as sore throat, cough, nasal decongestion headache, etc.]

Image in Medicine

— *Bhoomi Angirish, Bhavin Jankharia*

Student's Corner

Become a Sherlock Holmes in ECG — *M Chenniappan*

Book Review

Letter to the Editor

Index to Volume 119

Thanks to the Hon'ble Referees

CONTENTS



**PROF. TAMONAS
CHAUDHURI**
Hony. Editor
MBBS, MS, FAIS, FMAS,
FACS, FACRSI (Hony)

Editorial

Marching into Metaverse

**“To follow knowledge like a sinking star,
Beyond the utmost bound of human thought”**

— *Ulysses* by Alfred, Lord Tennyson

The above lines from a famous poetry from the Victorian era wrap in a capsule how man foresees future. Rather than allowing time to take its own course, Man resolves to be the equestrian, leaping upon the saddle of galloping time and taming and maneuvering it according to his own wish. Medical science, the indispensable weapon of survival to mankind, also follows the trend inching towards omnipotence and omnipresence. But how? Let us discuss.

Rapid technological advancements have allowed for new and improved devices within the medical field. Specifically, the development of robotic-assisted surgical devices has helped create a push for improved patient care and outcomes. Most robotic technology seeks to assist the human operator in reducing variability and improving accuracy of surgical maneuvers¹.

Fields such as complex gastro intestinal surgery, surgical oncology, urology, and gynecology/oncology have led the way in developing robotic assistance. In these settings, surgical robots have allowed improved optical visualization and improved surgical maneuvering for retraction, exposure, and resection of tissue. Although in its infancy robotics in spine surgery is also opening new frontiers. Remote surgery again widens the horizon of medical treatment. Remote surgery is essentially advanced telecommuting for surgeons, where the physical distance between the surgeon and the patient is less relevant. It promises to allow the expertise of specialized surgeons to be available to patients worldwide, without the need for patients to travel beyond their local hospital. This definitely points towards brighter future since futuristic biotechnology is in the constant process of evolution¹.

Another emerging field is human augmentation surgery. The essence of human augmentation is adding or expanding functions to the human body. Categories

are: replacing limbs or body parts (using prostheses), supporting the body (using for example exoskeletons) or improving physical or cognitive functions. Relying on the trend of advancement a huge improvement in Oncosurgery is also predicted. Less invasive image-guided treatments are under investigation, such as magnetic resonance-guided radiotherapy (MR Linac) and tumour ablation procedures. These techniques allow accurate detection of small peripheral lung lesions that are often difficult to find during surgery, and hence may offer strong competition to the current standard of care. Surgery will also continue to advance and become more technology-driven. Image guidance and surgical navigation are already common practice in neurosurgery and orthopaedics, and will definitely find their way into surgical oncology². In addition, smart surgical tools and probes are being developed with tissue-sensing properties able to detect the difference between tumor and healthy tissue. All these technologies will enable far more precise surgery, even in less experienced hands. The developments in image guidance and tissue sensing will go alongside advancements in surgical robotic systems. Artificial intelligence and machine learning tools have the potential to analyze large datasets and extract meaningful insights to enhance patient outcomes, an ability that is proving helpful in all fields of medicine more so in radiology and pathology. Images obtained by MRI machines, CT scanners, and x-rays, as well as biopsy samples, allow clinicians to see the inner workings of the human body. However, these images often contain large amounts of complex data that can be difficult and time consuming for human providers to evaluate. In future AI tools can augment the workflow of radiologists and pathologists, acting as clinical decision support and enhancing care delivery. In a 2017 study from Case Western Reserve University, researchers found that a deep learning network identified the presence of invasive forms of breast cancer in pathology images with 100 percent accuracy. Researchers at Colorado State University are using machine learning to develop a virtual biopsy tool that will make early detection of melanoma faster and cheaper.

In future AI will impact primary care and its key stakeholders. We define AI broadly as any technology designed to mimic human cognitive functions—including techniques such as classic machine learning, modern deep learning, natural language processing, and robotics. Many companies such as Babylon Health, Health Tap, Ada, Buoy, and Your MD have developed “AI doctors” that provide health advice directly to patients with common symptoms, freeing up primary care access for more complex care. Babylon reported diagnostic accuracy comparable to human doctors. By 2025, the market for these services (using the current telemedicine market and retail clinics market as comparison) is projected to be \$27 billion a year. AI-powered algorithms for diagnosing disease is now outperforming physicians in detecting skin cancer, breast cancer, colorectal cancer, brain cancer, and cardiac arrhythmias. In regions with lack of access to specialty care, these tools in the hands of primary care doctors can provide significant benefit to patients. University of Iowa Health Care is using IDx-DR, an AI capable of detecting diabetic retinopathy to improve care. Aysa, an app from VisualDx, allows patients to take photos of their skin conditions: the AI will generate possible diagnoses and suggest self-care versus a visit to their physician. Google can accurately predict cardiovascular risk using retinal scans, and Tencent’s AI can spot Parkinson’s using smartphone videos—promising tools that can expand access to care and empower primary care physicians to broaden the services they can provide to patients. This could reduce the need for unnecessary referrals, increase continuity with patients, and enhance mastery for primary care physicians³.

Radio Frequency Identification (RFID) is a fast developing technology that utilizes radio waves for data collection and transfer. The use of RFID offers many benefits to the healthcare industry related to patient safety, tracking, efficiencies in patient care, and provider satisfaction. Research shows that RFID can help to improve patient safety. RFID tags provide the ability to reduce misidentification issues in healthcare. Accurate patient tracking using RFID technology can improve patient safety in many instances like errors

in medicine administration. With the volume of population increasing the number of patients seeking medical attention is also increasing manifold. Keeping accurate records of all patients to help follow up treatments is a continuous challenge to the health care sector. Online access to computerized medical records has the potential to improve convenience, satisfaction, and care for patients, and to facilitate more efficient organization and delivery of care. The pandemics of major infectious diseases often cause public health, economic, and social problems. Virtual Reality (VR) and Augmented Reality (AR), as two novel technologies, have been used in many fields for emergency management of disasters⁴. The experience thus gathered can be used in wider fields in the future to reduce patient doctor physical communications at all times during emergencies especially in the remote areas which as a dearth of medical professionals.

The list of future possibilities in the field of medical science can extend indefinitely and is beyond the scope of this limited article. However all said and done the implementation of such technologies and research and development in these sectors requires a hefty sum which is only possible by Government intervention. If not the cumulative cost of technological development added to the usual medical cost can boost the cost of treatment to such astronomical heights that it would be beyond the scope of common man to avail right treatment at the right time. Another question might prop up in the mind. Can automation of medical treatment lead to alienation of the doctors from their patients? Can this become a hindrance to holistic medical treatment where a doctor physically interacts

with his patient and develops a bonding with him? Pandemic has proven that no individual can survive alone. Universal healthcare thus should be the priority of the future medical science. And target of advancement must be focused towards achievement of equal and accessible universal health .

“The old order changeth, yielding place to new
“and it is time for me to pass over the baton of legacy to my capable successor. Team JIMA worked hard and together for betterment. My journey through these last few months as an Honorary Editor has been memorable. In each and every of my editorials I have discussed about issues that are very pertinent to the time which challenges even the existence of humans on this earth. At the least, if these articles have evoked contemplation among the readers I will consider that my efforts have not fallen upon deaf ears. Allow me, the august readers, to sign off with a famous line from the same poetry with which I have started my editorial – ***“To strive, to seek, to find, and not to yield.” Let the quest for onward progress be relentless.***

REFERENCES

- 1 Sayari AJ, Pardo C, Basques BA, Colman MW — Review of robotic-assisted surgery: what the future looks like through a spine oncology lens. *Ann Transl Med* 2019; **7(10)**: 224. doi:10.21037/atm.2019.04.69
- 2 TJM Ruers — The future of surgical oncology. *BJS Society*. 2019; Vol 106 (6): 663-4. <https://doi.org/10.1002/bjs.11207>
- 3 Lin SY, Mahoney MR, Sinsky CA — Ten Ways Artificial Intelligence Will Transform Primary Care. *J GEN INTERN MED* **34**, 1626-30 (2019). <https://doi.org/10.1007/s11606-019-05035-1>
- 4 Asadzadeh A, Samad-Soltani T, Rezaei-Hachesu P— Applications of virtual and augmented reality in infectious disease epidemics with a focus on the COVID-19 outbreak. *Inform Med Unlocked* 2021; **24**: 100579. doi: 10.1016/j.imu.2021.100579. Epub 2021 Apr 27.

Original Article

Assay Interferences in HbA1c Measurements : Effect of Hemoglobinopathies and Elevated Fetal Hemoglobin in the BioRad D10

Surupa Basu¹, Subimal Chaudhuri²

Introduction : HbA1c or Glycated Hemoglobin, is an invaluable marker in diabetes management and of late in its diagnosis as well. Of the many modalities of testing HbA1c, the High Pressure Liquid Chromatography (HPLC) method maintains wide acceptance and popularity amongst clinicians. We aim to specifically elucidate the interferences caused by Hemoglobinopathies in the BioRad D10 HPLC system.

Methods : HPLC chromatograms of a predominantly adult population visiting a tertiary care hospital and tested between September, 2016 and December, 2017 on the BioRad D10 (Short Program) were retrospectively studied. A few representative chromatograms of each variant type were analyzed separately and reported to illustrate the laboratory's experience in dealing with known interferences on the HPLC system.

Results : HPLC chromatograms for HbA1c quantification (n=6015) yielded 151 abnormal or suspected 'abnormal' peaks (2.5%). Abnormal peaks encountered were high P3 peak (n=2), borderline high HbF (n=1), HbS trait (n=5), Unknown/Variant peak (unidentified Hemoglobinopathy; n=140) and no HbA1c (homozygous/double heterozygous condition with none or little HbA; n=3).

Conclusion : The laboratory may encounter several hemoglobin variants depending on the patient population it serves. Careful scrutiny of chromatograms may help identify the presence of aberrant peaks produced by variants. The HbE, HbD, HbS and HbC traits do not interfere with HbA1c results on the BioRad D10 short program. Others can interfere. Patients with a Homozygous Hemoglobinopathy will show no HbA1c result and alternate methods are required to ascertain glycemic control. Laboratorians need to be aware of the limitations and strengths of their methods of reporting HbA1c especially with an increasing workflow of the biomarker. A laboratory – clinician interaction becomes essential for solving cases that do not align to the apparent clinical picture.

[J Indian Med Assoc 2021; 119(12): 15-8]

Key words : HbA1c, BioRad D10, Interference, Hemoglobin variants.

Six percent of the total adult Hemoglobin (HbA) is HbA1, which comprises of HbA1a1, HbA1a2, HbA1b and HbA1c fractions, each attached to a different chemical moiety and each defined by their electrophoretic traits. The HbA1c fraction is the most abundant of these (in health it makes up about 5% of the total HbA), wherein the circulating glucose molecule gets attached to the beta globin chain of hemoglobin. Thereby, analysis of glycated hemoglobin or HbA1c in blood provides information about an individual's weighted average of blood glucose of the past 100 days - roughly the predicted half life of the red blood cells.

The HbA1c test has been included in 2009 by the American Diabetes Association as one of the first line diagnostic criterion of Diabetes Mellitus, as a possible substitute of the fasting blood glucose test. This

¹PhD, BSc, MSc, PhD, Member of Indian Board of Clinical Biochemistry, Deputy Director, Institute of Child Health, Kolkata 700017 and Corresponding author

²MBBS, DCH, MD, Professor, Ex-HOD, Department of Laboratory Medicine, AMRI Hospitals, Dhakuria, Kolkata 700031

Received on : 12/09/2019

Accepted on : 01/10/2019

Editor's Comment :

- Hemoglobinopathies other than HbE, HbD, HbS and HbC traits can interfere in the HbA1c assay on BioRad D10 short program
- Patients with a Homozygous Hemoglobinopathy will show no HbA1c result and alternate methods are required to ascertain glycemic control.
- A laboratory – clinician interaction becomes essential for solving cases that do not align to the apparent clinical picture.

inclusion, along with its established reliability in indicating long term glycemic control and prediction of diabetic complications, has catapulted the single HbA1c test as an invaluable tool to the clinicians, for the care of the general population at large.

HbA1c can be measured by at least 30 different laboratory methods. Each method has its pros and cons. The HPLC system maintains wide popularity and acceptance among-st clinicians owing to its sole use in the Diabetes Control and Complications Trial (DCCT) and UKPDS trials, wherein changes in HbA1c results were equated to a large alteration in the risk of diabetes complications in patients with type 1 or type 2 diabetes. Moreover, all HbA1c methods now need to be National Glycohemoglobin Standardization Program

(NGSP) certified; implying that results by any method should be equivalent to that reported in the DCCT and UKPDS.

It is the attempt of this article to bring forth the considerations that laboratorians and clinicians need to give while evaluating the HbA1c report on the BioRad D10 HPLC system with special reference to interferences caused by hemoglobin variants.

MATERIALS AND METHODS

HPLC chromatograms of a predominantly adult population visiting a tertiary care hospital and tested between September, 2016 and December, 2017 on the BioRad D10 (Short Program) were retrospectively studied. BioRad D10 is a standalone instrument based on the principle of cation exchange HPLC for the separation of hemoglobin fractions. These are eluted sequentially based on the properties of size and charge and analyzed for concentration using an inbuilt spectrophotometer at 415 nm. For normal hemoglobin fractions and hemoglobin variants, we recorded and analyzed their retention times, their proportion of the total Hemoglobin (%) and the peak characteristics. Chromatograms with 'Variant' window indicate the presence of an unknown hemoglobin variant. HbS and HbC are reported clearly when detected in the D10 short program. A few representative chromatograms of each variant type were analyzed separately and reported to illustrate the laboratory's experience in dealing with known interferences on the HPLC system.

RESULTS

High-performance Liquid Chromatography (HPLC) chromatograms for HbA1c quantification (n=6015) yielded 151 abnormal or suspected

'abnormal' peaks (2.5%). The types of such chromatograms are outlined in Table 1 and

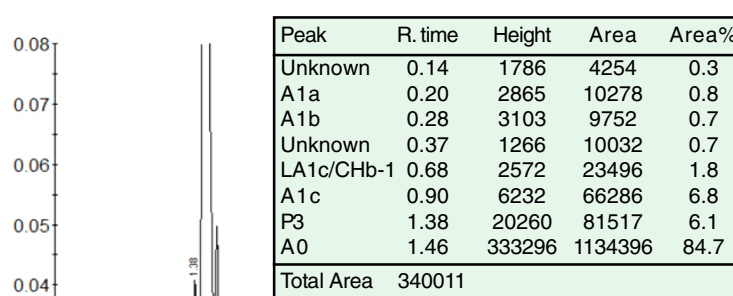


Fig 1 — A normal HPLC chromatogram. HbA1c peak (shaded) has eluted at retention time of 0.9; value is 6.8 % of total hemoglobin

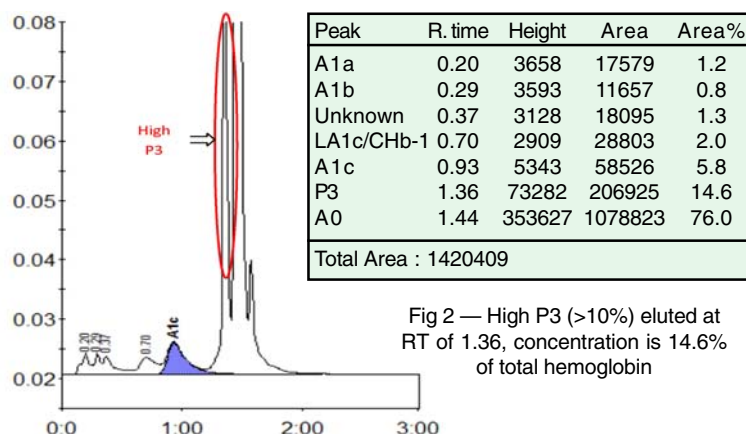


Fig 2 — High P3 (>10%) eluted at RT of 1.36, concentration is 14.6% of total hemoglobin

Table1 — Summary of Abnormal peaks and their characteristics with interpretation on interference in the HbA1c result			
Abnormal Peak	Retention Time (Average, SD)	% Variant of Total Hemoglobin (Average, SD)	Interpretation
P3 > 10% N=2	1.36 (0)	14.3 (0.42)	P3 elevation beyond 10% suggests presence of unknown variant and may affect HbA1c results, interference unknown
HbF = 9.3% N=1	0.51	9.3	HbF near high threshold value of 10%. Interference cannot be ruled out.
S-Window (<60%) HbS Trait N=5	1.65 (0.02)	27.84 (4.34)	HbAS condition. No interference in HbA1c result.
Unknown peak N=18	1.55 (0.02)	30.27 (8.40)	Likely heterozygous condition of unknown hemoglobinopathy. May affect HbA1c results, interference unknown
Variant Window N=122	1.58 (0.019)	29.71 (3.1)	Same as above
No HbA1c Peak N=3	Variant may elute in the HbA0, or as Variant/Unknown peak	>60%, See Chromatogram (Fig 5)	% HbA1c = 0. HbA1c cannot be reported. HbA absent. Likely homozygous or double heterozygous condition
Retention time (RT, min) is the amount of time a particular hemoglobin type spends on the cation exchange column after it has been injected onto the column. It is highly characteristic of the hemoglobin and helps in its identification, NA = Not Applicable			

representative chromatographs follow with findings.

Elution chromatograms of patient specimens on the Bio-Rad D10 HPLC System using the Short Program are presented in Figs 1-5. X axis represents the retention time in minutes for each fraction to elute. The Retention Time (RT) for each fraction is shown with the peak.

Unknown/ Variant peak detected may interfere with the HbA1c result. If the variant is HbE or HbD, it does not interfere with the HbA1c result on the D10 short program as shown in Fig 4.

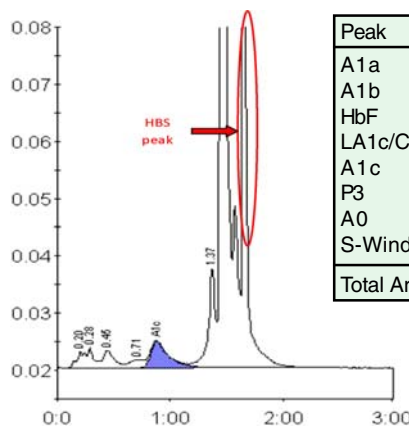
Homozygous or double heterozygous conditions can occasionally be detected when evaluating for HbA1c. In such cases, HbA is absent and therefore HbA1c is not detected (Fig 5).

DISCUSSION

The short program on BioRad D10 measures HbA1c using HPLC and remains one of the most accepted methods of HbA1c quantification⁴. As it separates the hemoglobin fractions chromatographically, it lends the extra benefit of identifying the presence of hemoglobinopathy over other methods⁵. This is particularly useful in the presence of a variant which may have interference in the HbA1c measurement. An unknown peak thus warns the laboratorian to report the HbA1c result carefully.

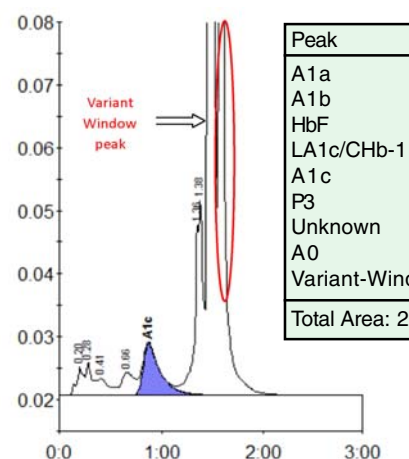
Our survey of HbA1c chromatograms on 6015 adult patients, revealed the presence of ‘other than normal peaks’ in 151 cases. The most common finding was the Variant Window (2.0%) with an average retention time of 1.58 minutes. In the current methodology adopted for HbA1c testing, the manufacturer authorizes reporting for cases of HbC and HbS variants, which is identified in the chromatogram itself. There is no clear cut instruction from the manufacture’s end to report on the other variants eluted as the ‘Variant Window’ peak. In such cases, it becomes difficult for the laboratory personnel to satisfy the customer on their request for HbA1c. This also includes the ‘Unknown peak’ which elutes close to the Variant Window. As per manufacturer’s direction, laboratory personnel are not to report the HbA1c values obtained³. But,

contrary to this, NGSP^{6,7} has issued a guideline that HbA1c can be reported even in the presence of HbE and HbD Variants. Therefore in this light, the BioRad D10 short program should have the provision of identifying HbE and HbD peaks which are common in Eastern India. Due to the lack of this provision, the laboratory has to rerun the specimen on a BioRad A2/ F extended program which entails a financial



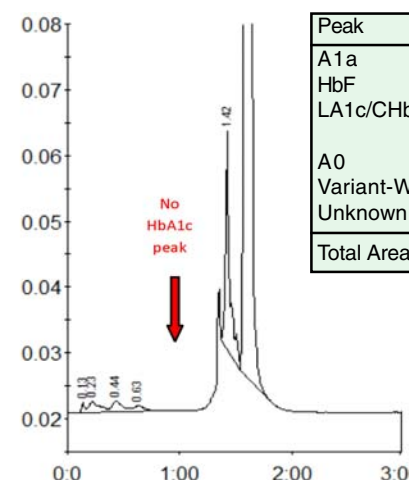
Peak	R.time	Height	Area	Area%
A1a	0.20	2841	15548	1.0
A1b	0.28	3495	13326	0.9
HbF	0.45	3091	21135	1.4
LA1c/CHb-1	0.71	1416	11861	0.8
A1c	0.88	4652	51176	6.4
P3	1.37	17536	74635	5.0
A0	1.45	290671	940707	62.5
S-Window	1.65	213506	377354	25.1
Total Area 1505642				

Fig 3 — HbS Variant (trait) detected. HbS has eluted at RT of 1.65 with Area% of 25.1%. HbS trait does not interfere with the HbA1c result



Peak	R.time	Height	Area	Area%
A1a	0.20	4564	22799	1.0
A1b	0.28	5261	16383	0.9
HbF	0.41	2667	23814	1.4
LA1c/CHb-1	0.66	3671	33995	0.8
A1c	0.87	8248	95701	6.4
P3	1.36	26058	96965	5.0
Unknown	1.38	30876	74962	3.5
A0	1.46	373032	1150687	54.5
Variant-Window	1.58	214964	597692	28.3
Total Area: 2112998				

Fig 4 — Chromatogram of 60 year old male diabetic patient with HbE trait. HbA1c of 8.6% reported



Peak	R.time	Height	Area	Area%
A1a	0.23	1775	11808	0.9
HbF	0.44	1650	11417	0.8
LA1c/CHb-1	0.63	860	6301	0.5
No HbA1c peak				
A0	1.42	33375	84051	6.2
Variant-Window	1.58	210140	403303	29.7
Unknown	1.62	579127	837426	61.7
Total Area 1357447				

Fig 5 — Chromatogram of a 65 year old male patient with a rare HbDE double heterozygous condition (combined area% of variant and unknown peaks is 91.4%). HbA1c peak is missing.

implication on the patient. Our experience of re-examining Variants on the A2/F extended program revealed that majority of patients are HbE trait; occasionally HbD trait was encountered (data not shown). This agrees with the prevalence of hemoglobinopathies seen in this region⁸. Considering the above demographic distribution of hemoglobinopathies in this region, composition of abnormal hemoglobin in the eluted variant window will have more than 90% of HbE and HbD trait. Therefore, HbA1c result can be reported with a reasonable accuracy with a disclaimer of presence of other hemoglobinopathies in rare cases which may be present in the eluted Variant Window. Clinicians should be aware of this fact and in cases where clinically suspected, he/she recommend alternative measures such as serum glycated albumin⁹ to index glycemic control.

An occasional chromatogram may show no HbA1c peak indicating the absence of HbA and the presence of a homozygous or double Heterozygous Hemoglobinopathy. These may be clinically silent HbE disease or rare double heterozygous conditions such as HbED as found in our study. Increased P3 peak or high HbF are also indicators of presence of hemoglobin variants and warrant careful reporting of HbA1c¹⁰.

There may be some variants such as the heterozygous hemoglobin, hope which spuriously increases the levels of HbA1c, without showing any variant peak, asking for cross verification on alternate systems¹¹. Thus, while it is safe to assume that HbE/HbD/HbS/HbC traits do not interfere, presence of other variants may inadvertently affect HbA1c results.

Our finding of about 2.5% of the population having a hemoglobin variant agrees with the picture of high prevalence of hemoglobinopathies in Eastern India⁸. The inclusion of HbA1c in screening healthy population for diagnosis¹² of Diabetes has resulted in an upsurge of HbA1c testing. Chromatograms with hemoglobin variants will demand careful inspection against an increasing test load. Clinicians reading the chromatogram will need to make well informed decisions regarding the validity of HbA1c in such a setting.

CONCLUSION

In summary, the laboratory may encounter several hemoglobin variants depending on the patient population it serves. Careful scrutiny of chromatograms may help identify the presence of aberrant peaks produced by variants. The HbE, HbD, HbS and HbC traits do not interfere with HbA1c results on the BioRad D10 short program. Others can interfere. Patients with a homozygous hemoglobinopathy will show no HbA1c result and alternate methods are required to ascertain glycemic control. Laboratorians need to be aware of the limitations and strengths of their methods of reporting HbA1c especially with an increasing workflow of the biomarker. A laboratory – clinician interaction becomes essential for solving cases that do not align to the apparent clinical picture.

REFERENCES

- 1 Classification and Diagnosis of Diabetes. American Diabetes Association. *Diabetes Care* 2017; **40** (Supplement 1): S11-S24.
- 2 Sacks DB — Measurement of hemoglobin A(1c): a new twist on the path to harmony. *Diabetes Care* 2012; **35**: 2674-80.
- 3 BioRad D10 Dual Program Instruction Manual, US Bio-Rad Laboratories Inc, Hercules, CA. Effective: December 2010.
- 4 Molinaro RJ — Targeting HbA1c: standardization and clinical laboratory measurement. *MLO Med Lab Obs* 2008; **40**: 10-9.
- 5 Rhea JM, Molinaro R — Pathology consultation on HbA(1c) methods and interferences. *Am J Clin Pathol* 2014; **141**(1): 5-16.
- 6 HbA1c assay interferences. *National Glycohemoglobin Standardization Program Web site*. Available at: <http://www.ngsp.org/interf.asp>. Updated November, 2017. Accessed December 2017.
- 7 Little RR, Rohlfing CL, Hanson S — Effects of hemoglobin (Hb) E and HbD traits on measurements of glycated Hb (HbA1c) by 23 methods. *Clin Chem* 2008; **54**: 1277-82.
- 8 Mondal SK, Mandal S — Prevalence of thalassemia and hemoglobinopathy in eastern India: a 10-year high-performance liquid chromatography study of 119,336 cases. *Asian J Transfus Sci* 2016; **10**: 105-10.
- 9 Wu WC, Ma WY, Wei JN, Yu TY, Lin MS, Shih SR, et al— Serum glycated albumin to guide the diagnosis of diabetes mellitus. *PloS One* 2016; **11**: e0146780. 14.
- 10 Little RR, Roberts WL — Laboratory advances in hemoglobin A1c measurement: a review of variant hemoglobins interfering with hemoglobin A1c measurement. *J Diabetes Sci Technol* 2009; **3**(3): 446-51.
- 11 Chakraborty S, Chanda D, Gain M, Krishnan P — Interference of the Hope Hemoglobin with Hemoglobin A1c Results. *Laboratory Medicine* 2015; **46**(3): 221-5.
- 12 Bennett CM, Guo M, Dharmage SC — HbA1c as a screening tool for detection of Type 2 diabetes: a systematic review. *Diabetic Medicine* 2007; **24**: 333-43.

Original Article

Myriad of Presentation of Scrub Typhus in a Tertiary Care Hospital in North Eastern India — A Prospective study

Indrajit Debnath¹, Dwijen Das², Bijush Difoesa³, Swapnalika Bhuyan¹

Background and Objectives : Among the Rickettsial Diseases caused in human, the most wide spread is Scrub Typhus. Scrub Typhus is a re-emerging infectious disease that generally causes Acute Febrile Illness, with disease spectrum ranging from mild illness to multi organ dysfunction. The study was aimed at documenting the demographic characteristics, clinical profile and complications associated with Scrub Typhus.

Materials and Methods : This is a prospective study, done at a Tertiary Care Hospital including patients presenting with Acute Febrile Illness who were found positive for scrub typhus on IgM ELISA.

Results : The most common age group affected is 20-40 years. Majority were from Rural background with male predominance. Apart from fever, which was present in all the patients considered in this study, the other common presenting complaints were pain abdomen in 48.3%, cough in 43.1% and vomiting in 36.2%. Headache was present in 32.8% and altered mental state in 8.6% patients. Findings on physical examination were eschar in 27.5%, hepatomegaly in 15.5% patients. The common laboratory abnormalities were hypo-natremia in 89.7%, elevated liver enzymes, SGOT in 72.4%, SGPT in 65.5% and hypo-albuminemia in 68.9% cases.

Conclusion : Scrub typhus is an important cause of Acute Febrile Illness, with varied presentations and far reaching complications. With the presence of fever with abdominal, respiratory symptoms and supportive findings of eschar, hypo-natremia, hypo-albuminemia in this part of the country, scrub typhus should be kept in the differentials of Acute Undifferentiated Fever, which can help in grabbing the diagnosis early and thus limit the multi-system involvement and complications of scrub typhus.

[J Indian Med Assoc 2021; 119(12): 19-24]

Key words : Scrub typhus, Rickettsial diseases, Hyponatremia, Hypo-albuminemia.

Scrub typhus, an Acute Febrile Illness, is one of the most common Rickettsial infections in the Indian subcontinent¹. The disease is caused by a parasite known as *Orientia tsutsugamushi*, which belongs to the family Rickettsiaceae. Hashimoto from Japan first described Scrub typhus in 1899². Scrub typhus is endemic over a wide geographical area in Afghanistan, Pakistan, India, China, South East Asia, Japan, Korea, Russia and Australia. In India, it is distributed primarily over the forests and Rural areas where endemic pockets have been established and seasonal outbreaks occur on regular basis. It is transmitted by larval form of trombiculid mite, which is a parasite of rodents. The larval stage serves both as reservoir and vector by infecting humans and rodents. The adult mite lives in decaying ground- vegetation where it lays its eggs but does not feed on vertebrate hosts^{3,4}.

Department of Medicine, Silchar Medical College and Hospital, Silchar, Assam 788014

¹MBBS, MD (Medicine), Postgraduate Trainee

²MBBS, MD (Medicine), FACP (USA), FRCP (Glasg), FRCP (Edin), FIACM, Associate Professor and Corresponding Author

³MBBS, MD (Medicine), Assistant Professor

Received on : 08/06/2020

Accepted on : 13/07/2020

Editor's Comment :

- In a tropical country like India, fever is the most common presentation of patients with infectious diseases.
- Scrub typhus is also a common but most often overlooked cause of acute fever associated with a variety of clinical features, which if left untreated, can have serious complications. Herein comes the importance of including Scrub Typhus in the differential diagnosis of acute undifferentiated fever in patients residing in or having recent travel history to places with dense scrub vegetation, mainly in the rainy season, and supportive evidence of an eschar, hyponatremia, elevated hepatic transaminases etc. At a time when drugs against scrub typhus are so readily available, developing a high clinical suspicion regarding this disease can go a long way in preventing morbidity and mortality.

The incubation period of Scrub Typhus infection varies from 6-21 days. The infected human host may present with a variety of symptoms like fever, headache, pain-abdomen, vomiting, myalgia, rashes and/or features suggestive of other organ system involvement. At the site of bite, a papule appears which subsequently evolves in to a painless eschar with an erythematous outer rim. The myriad of non-specific clinical features which overlap with other common

tropical features, make the diagnosis challenging, owing to which many patients land up in life threatening complications. Hence, early recognition of the disease from the clinical presentation, meticulous clinical examination and abnormal laboratory parameters may help in early administration of the highly efficacious drugs. This, in turn, may significantly reduce the disease duration, morbidity and mortality associated with Scrub Typhus. In the North-eastern region of India, although Scrub Typhus is not uncommon, yet not enough studies are available on the dynamic spectrum of the disease. So this study has been undertaken with an aim to understand the demographic characteristics, clinical profile and complications associated with the disease.

MATERIALS AND METHODS

This was a prospective study, done on patients presenting with Acute Febrile Illness who were admitted in the department of General Medicine, Silchar Medical College and Hospital. The study comprised of 58 patients presenting with Acute Febrile Illness with IgM ELISA positive Scrub typhus and was done over a period of 1 year and 1 month, ie, from 1st January, 2019 to 31st January 2020.

Inclusion criteria :

- Inpatients admitted with Acute Febrile Illness for a duration more than 5 days and are found to be positive on serum IgM ELISA Scrub typhus test
- Age > 12 years

Exclusion criteria:

- Patients who did not give consent for participation in the study
- Cases with an established cause of Acute Febrile Illness such as Malaria, Enteric fever, Dengue, Leptospirosis, Viral hepatitis, Urinary tract infection, Respiratory tract infection, Acute gastroenteritis, Meningitis, Encephalitis or other infections and chronic diseases such as Chronic liver disease, Chronic kidney disease, Tuberculosis.

Serological test for detection of IgM antibodies against the causative agent *Orientia tsutsugamushi* was done in the Department of Microbiology of the Institute using ELISA kit.

Organ dysfunction which occurred as a complication of Scrub Typhus in the study cases has been defined as:

Acute Kidney Injury (AKI) : As per the Kidney Disease Improving Global Outcome (KDIGO) criteria⁵.

Hepatic Dysfunction : Elevation of serum transaminases level (SGOT and SGPT) more than two folds of the upper normal limits

Acute Respiratory Distress Syndrome (ARDS) :

A clinical syndrome of severe dyspnea of rapid onset, hypoxemia ($\text{PaO}_2/\text{FiO}_2 \leq 300$ mmHg) and diffuse pulmonary infiltrates leading to respiratory failure⁶.

Statistical data analysis was done with the help of Microsoft EXCEL 2010.

OBSERVATIONS AND RESULTS

Demographic Indices:

The mean age of the patients was observed to be 37.8 ± 14.5 years, of which maximum number of patients was in the age group of 20-40 years followed by 40-60 years. Most of the affected individuals were male with a male-to-female ratio of 2.2:1. More than 84% patients were from Rural background and most of them were either farmers or worked in open fields/ jungles. Among the study subjects, most of the patients were admitted in the month of October and November. The demographic indices have been summarized in the Table 1.

Clinical profile :

A total of 58 cases were recruited in the study and all of them had fever at the time of presentation. The duration of fever at the time of hospitalization varied from 6 days to 13 days with a mean of 8.1 ± 2.1 days. Other common symptoms were pain abdomen in 28 patients (48.3%), vomiting in 21 patients (36.2%), loose stools in 10 patients (17.2%), cough in 25 patients (43.1%) and dyspnea in 10 patients (17.2%). Headache and altered mental status were present in 19 (32.8%) and 5 (8.6%) patients respectively. Dysuria was seen in 4 patients (6.9%).

Findings on physical examination revealed eschar in 16 patients (27.5%), Pedal edema in 10 (17.2%), Hepatomegaly in 9 (15.5%), Splenomegaly in 2 (3.4%), abdominal tenderness in 12 patients (20.7%), signs of ARDS and Pneumonia were found in 6 (10.3%) and 8 (13.8%) patients respectively. Signs of Meningitis were detected in 4 patients (6.9%). In the present series, eschar was found in most cases in well covered

Table 1 — Summarizing the demographic indices of the study subjects

Variables	Number of cases	Percentage
Gender :		
Male	38	65.5
Female	20	34.5
Age groups		
< 20 Years	7	12.1
20-40 Years	29	50
40-60 Years	18	31
>60 Years	4	6.9
Address		
Rural	48	82.8
Urban	10	17.2

areas like the medial aspect of thigh, perineum, abdomen, armpit, blouse clad part of upper back, etc. Furthermore, owing to its painless and non-itchy character, these eschars remain undetected most of the time. Bar diagrams depicting the presenting symptoms and signs of the cases has been shown in the Figs 1 & 2 respectively.



Fig 1 — An eschar on the anterolateral aspect of right knee



Fig 2 — Eschar on the anterior part of arm

Cerebrospinal Fluid (CSF) analysis was done on 5 patients, in 3 patients (5.2%) there was elevated CSF protein with lymphocytic predominance and the other two patients had normal CSF findings. The laboratory abnormalities in the study subjects have been summarized in the Figs 3-5.

Laboratory and Radiological Findings :

The profile of laboratory finding of Scrub Typhus cases are depicted below.

Hematological profile :

Leucocytosis was observed in 25 patients (43.1%), Thrombocytopenia and Leucopenia in 11 (18.9%) and 8 (13.8%) patients respectively on the day of admission.

Biochemical profile :

Biochemically, commonest abnormality was found to be hyponatremia in 52 patients (89.7%) with a mean \pm SD of 129.2 ± 4.5 mmol/dl. Other abnormalities include elevated liver enzymes, SGOT in 42 (72.4%) and SGPT in 38 (65.5%), where SGOT (159.3 ± 59.6 U/L) was observed to be more raised than SGPT (112.6 ± 33.8 U/L), hypo-albuminemia in 40 (68.9%) with mean \pm SD of 3.0 ± 0.33 g/dl. Raised Serum creatinine was observed in 8 patients (13.8%). Abnormal Urine routine examination was observed in 4 patients (6.9%).

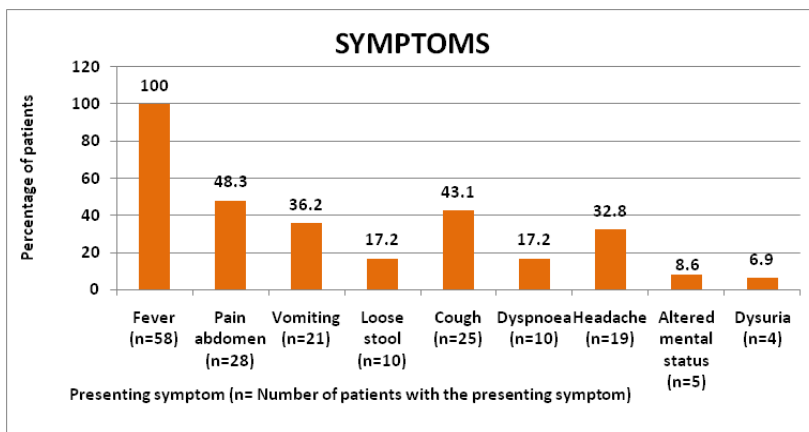


Fig 3 — Bar diagram depicting the presenting symptoms of the cases

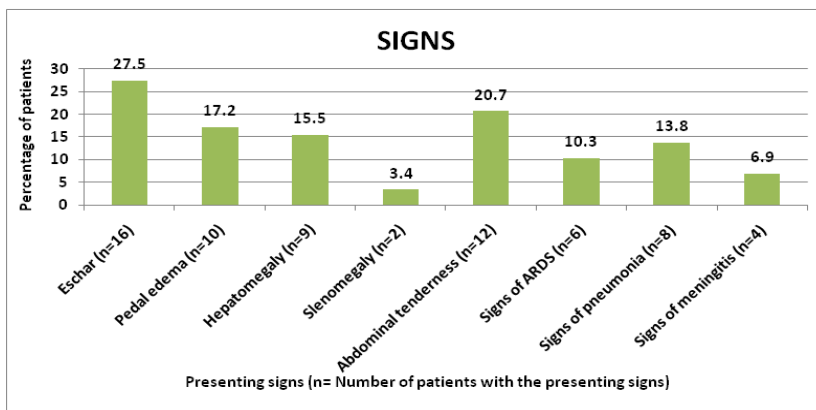


Fig 4 — Bar diagram summarizing the signs observed in the study subjects

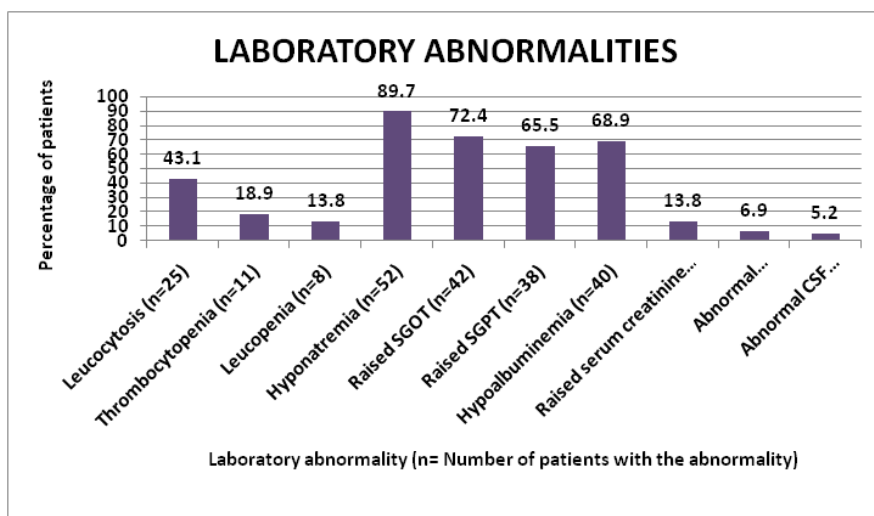


Fig 5 — Bar diagram showing the laboratory abnormalities in the study subjects

In this study, the disease was found to be predominant in the postmonsoon months with maximum cases being reported in the months of October and November. This is the period when ground vegetation is seen to grow more leading to more exposure to scrub infection. This finding tallies with the finding from other studies.

The patients presented with wide variety of clinical features and in general GI symptoms were found to be much more common in the present series which includes pain abdomen in 48.3%, nausea/ vomiting in 36.2%, loose

Radiological findings:

Chest X-ray postero-anterior view showed non-homogenous opacity in bilateral lung fields in 6 patients (10.3%) and signs of consolidation in 3 patients (5.2%).

Ultrasonography of whole abdomen revealed hepatomegaly in 12 patients (20.7%) and mild splenomegaly in 2 patients (3.4%).

DISCUSSION

The results of the present study were compared with the results from other studies done in the Indian subcontinent as well as some studies from other Asian countries. Results of this study showed that the commonest age group of affected patients ranged between 20 to 40 years, as also seen with the study by Pathania *et al*⁷. Males were found to be more commonly affected than females. Factors responsible might be that this constitutes the main working force in the local population who engage in agrarian activities, go to forests to collect firewood and spend more time outdoors, as is often seen among the rural folk. This is in contrast to the study by Pathania *et al*⁷, where female pre-ponderance was seen to be higher.

stools in 17.2%, hepatomegaly in 15.5%, splenomegaly in 3.4%, which is consistent with the findings of Sivarajan *et al*⁸, in Meghalaya, where they observed pain abdomen in 26.7%, nausea/ vomiting in

	Pathania <i>et al</i> ⁷	Subbalaxmi <i>et al</i> ⁸	Sivarajan <i>et al</i> ⁸	This study
Place (India)	Uttarakhand	Andhra Pradesh	Meghalaya	Barak Valley, Assam
Sample size	54	176	90	58
Clinical features :				
Fever	54 (100%)	176 (100%)	75(83.3%)	58(100%)
Pain abdomen	39(79.22%)	NA	24(26.7%)	28 (48.3%)
Nausea/vomiting	29 (53.7%)	NA	21(23.3%)	21 (36.2%)
Loose stools	5 (9.25%)	28 (15.9%)	NA	10 (17.2%)
Cough	28(51.85%)	94 (53.4%)	21(23.3%)	25 (43.1%)
Dyspnoea	NA	NA	NA	10 (17.2%)
Headache	45(83.33%)	92 (52.8%)	24(26.7%)	19 (32.8%)
Altered mental status	14(25.92%)	23 (13.1%)	5(19%)	5 (8.6%)
Dysuria	NA	NA	NA	4 (6.9%)
Eschar	7 (12.96%)	23 (13.1%)	10(11.1%)	16 (27.5%)
Pedal edema	NA	NA	NA	10 (17.2%)
Hepatomegaly	10 (18%)	51(28.9%)	24(26.7%)	9 (15.5%)
Splenomegaly	4 (7.4%)	51 (28.9%)	NA	2 (3.4%)
Abdominal tenderness	29 (53.7%)	NA	NA	12 (20.7%)
Complication :				
Hyponatremia	NA	NA	NA	52(89.7%)
Hypo-albuminemia	NA	NA	NA	40(68.9%)
Pneumonia	1(1.87%)	NA	NA	8 (13.8%)
ARDS	4(7.4%)	NA	NA	6 (10.3%)
Meningitis	11(20.3%)	NA	NA	4 (6.9%)
Renal failure	2(3.70%)	49(27.8%)	11(12.2%)	8 (13.8%)
Leukocytosis	16(29.62%)	18(10.2%)	23(25%)	25 (43.1%)
Leukopenia	1(1.87%)	42(23.9%)	11(12%)	8 (13.8%)
Thrombo-cytopenia	7(12.9%)	53(30.1%)	18(20%)	11 (18.9%)
Elevated transaminases	40(74.07%)	153(86.9%)	SGOT 90(100%) SGPT 85(94%)	SGOT 42(72.4%) SGPT 38(65.5%)
NA - not available				

23.3% and cough in 23.3%. Cough as a presenting feature was found in this study in 43.1% patients which is less than that found in the studies by Kun Ming Wu *et al*¹⁰ (52.5%) and Subbalaxmi *et al*⁸ (53.4%) and is higher than what was reported by Sivarajan *et al*⁹ (23.3%). CNS involvement in scrub typhus may result in altered sensorium, seizures, meningitis etc. Headache (32.8%), altered mental status (8.6%), meningitis (6.9%) were found to be less common in this study than in the other studies.

In this series, another observation was the presence of pedal edema in 17.2%, which is in contrast to the study by Pathania *et al*⁷ where facial puffiness, upper eyelid edema (74.07%) were also observed along with pedal edema. Among other symptoms, dysuria was present in 6.9% patients at admission where as in the study by Premraj *et al*¹⁴ dysuria was present in 24%.

The presence of eschar as a clue to diagnosing scrub typhus was seen in 27.5% of the cases in the present study, as compared to 11.1%, 13.1%, 12.9% which were seen in the studies conducted by Sivarajan *et al*⁹, Subbalaxmi *et al*⁸, Pathania *et al*⁷ respectively. A high level of suspicion and

a meticulous clinical examination preferably with clothes removed after proper consent can yield an early diagnosis.

Among lab parameters, the most common ones were hypo-natremia (89.7%), elevated transaminase (SGOT in 72.4%, SGPT in 65.5%), which are consistent with the findings by Pathania *et al*⁷. This depicts that scrub typhus can be a very important differential in cases of Acute Febrile Illness being evaluated for Anicteric Hepatitis. This finding of elevation of SGOT more than SGPT found here is suggestive of multi system involvement in these cases. Hypo-albuminemia was observed in 68.9% of the study subjects, which is probably a result of increased vascular permeability. Other findings were Leukocytosis in 43.1%, Leukopenia in 13.8%

and Thrombocytopenia in 18.9% which is in contrast to the findings of Subbalaxmi *et al*⁸ and Zhang *et al*¹¹. In resource poor areas where confirmatory tests for scrub typhus may not be present, these lab parameters can raise high degree of suspicion.

Among the complications encountered in an infected patient, Pneumonia (13.8%), ARDS (10.3%), renal failure (13.8%) have been found in this study with their incidence more than that found by Pathania *et al*⁷ 1.87%, 7.4%, 3.70% respectively. Whereas Subbalaxmi *et al*⁸ found 27.8% of renal failure as a complication of the disease. This might be owing to a more virulent strain here, less immunity, less awareness, or delay in seeking medical help among the general population. Comparisons made between this study and few other studies done in different regions of India and few other countries of Asia have been summarized in the Tables 2 and 3 respectively.

CONCLUSION

Scrub typhus is an important cause of Acute Febrile Illness that can have a wide range of clinical

Table 3 — A table of comparison between this study and few other studies done in other Asian countries

	Kun Ming Wu <i>et al</i> ¹⁰	Zhang <i>et al</i> ¹¹	Brummaier <i>et al</i> ¹²	This study
Place	Taiwan	Shandong	North-Western Thailand	Barak Valley, Assam, India
Sample size	136	102	422	58
Clinical features				
Fever	134 (98.5%)	102 (100%)	378 (89.6%)	58(100%)
Pain abdomen	NA	NA	NA	28 (48.3%)
Vomiting	NA	28 (27.4%)	116 (27.5%)	21 (36.2%)
Loose stools	NA	NA	NA	10 (17.2%)
Cough	71 (52.5%)	14 (13.7%)	115 (27.3%)	25 (43.1%)
Dyspnea	NA	NA	NA	10 (17.2%)
Headache	85 (62.5%)	64 (62.7%)	224 (53.1%)	19 (32.8%)
Altered mental status	NA	NA	7 (1.7%)	5 (8.6%)
Dysuria	NA	NA	NA	4 (6.9%)
Eschar	82 (60.3%)	88 (86.3%)	38 (%)	16 (27.5%)
Pedal edema	NA	NA	NA	10 (17.2%)
Hepatomegaly	NA	7 (6.9%)	NA	9 (15.5%)
Splenomegaly	NA	14 (13.7%)	NA	2 (3.4%)
Abdominal tenderness	42 (30.9%)	17 (16.7%)	98 (23.2%)	12 (20.7%)
Complication				
Hyponatremia	NA	NA	NA	52 (89.7%)
Hypoalbuminemia	NA	NA	NA	40 (68.9%)
Pneumonia	13 (20.6%)	22 (21.6%)	30 (9.9%)	8 (13.8%)
ARDS	4 (6.3%)	NA	NA	6 (10.3%)
Meningitis	NA	0	4 (1.3%)	4 (6.9%)
Renal failure	9 (6.8%)	0	8 (2.6%)	8 (13.8%)
Leukocytosis	39 (29.8%)	(13.5%)	NA	25 (43.1%)
Leukopenia	NA	(4.1%)	NA	8 (13.8%)
Thrombo-cytopenia	NA	(25.4%)	NA	11 (18.9%)
Elevated transaminases	109/127 (85.8%)	SGOT (75%) SGPT (80.3%)	NA	SGOT 42(72.4%) SGPT 38(65.5%)
NA - not available				

manifestations and thus, should be included unfailingly in the differentials of acute undifferentiated fever. Due to a myriad of presentation that may vary significantly from case to case and a low degree of suspicion on the part of the physician, these cases are often overlooked and under diagnosed. Scrub typhus as such, can have far reaching complications if left untreated. Particularly in this part of the country, presence of fever with abdominal, respiratory symptoms with supportive findings of eschar, hyponatremia, hypo-albuminemia can help in grabbing the diagnosis early and thus limit the multi-system involvement and complications of Scrub Typhus.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my mentors Dr Dwijen Das and Dr Bijush Difoesa without whose able guidance and constant motivation, this would not have been possible. I extend my heartfelt gratitude to Dr Swapnalika Bhuyan for her dedicated work, the Doctors of Microbiology Department of Silchar Medical College for their collaboration and the inpatients included in this study for their active participation.

Funding : None

Conflict of Interest : None

REFERENCES

- 1 Chang WH — Current status of tsutsugamushi disease in Korea. *J Korean Med Sci* 1995; **10**: 227-38. doi: 10.3346/jkms.1995.10.4.227.
- 2 Mahajan SK — Scrub Typhus. *JAPI* 2005; **53**: 954-58.
- 3 Lai CH, Huang CK, Chen YH — Epidemiology of acute Q Fever, scrub typhus, and murine typhus, and identification of their clinical characteristics compared to patients with acute febrile illness in southern Taiwan. *J Formos Med Assoc* 2009; **108**(5): 367-76.
- 4 Suputtamongkol Y, Suttinont C, Niwatayakul K — Epidemiology and clinical aspects of rickettsioses in Thailand. *Ann N Y Acad Sci* 2009; **1166**: 172-9.
- 5 <https://www.medscape.com/answers/1925597-112195/what-are-the-kdigo-criteria-of-acute-kidney-injury-aki>.
- 6 The ARDS Definition Task Force — Acute respiratory distress syndrome: The Berlin definition. *JAMA* 2012; **307**(23): 2526-33. doi:10.1001/jama.2012.5669.
- 7 Pathania M, Amisha, Malik P, Rathaur VK — Scrub typhus: Overview of demographic variables, clinical profile, and diagnostic issues in the sub-Himalayan region of India and its comparison to other Indian and Asian studies. *J Family Med Prim Care* 2019; **8**: 1189-95.
- 8 Subbalaxmi MVS, Chandra N, Teja VD, Lakshmi V, Rao MN, Raju YSN — Scrub typhus – Experience from a South Indian tertiary care hospital. *BMC Infect Dis* 2012; **12**: 77.
- 9 Sivarajan S, Shivalli S, Bhuyan D, Mawlong M, Barman R — Clinical and paraclinical profile, and predictors of outcome in 90 cases of scrub typhus, Meghalaya, India. *Infect Dis Poverty* 2016; **5**: 91. doi: 10.1186/s40249 016 0186.
- 10 Wu KM, Wu ZW, Peng G, Wu JL, Yilee S — Radiologic pulmonary findings, clinical manifestations and serious complications in scrub typhus: Experiences from a teaching Hospital in Eastern Taiwan. *Int J Gerontol* 2009; **3**: 223 32.
- 11 Zhang M, Zhao ZT, Wang XJ, Li Z, Ding L, Ding SJ — Scrub typhus: Surveillance, clinical profile and diagnostic issues in Shangdong, China. *Am J Trop Med Hyg* 2012; **87**: 1099 104. doi: 10.4269/ajtmh. 2012.12 0306.
- 12 Brummaier T, Kittittrakul C, Choovichian V, Lawpoolsri S, Namaik Iarp C, Wattanagoon Y — Clinical manifestations and treatment outcomes of scrub typhus in a rural health care facility on the Thailand Myanmar border. *J Infect Dev Ctries* 2017; **11**: 407 13. doi: <https://doi.org/10.3855/jidc.8912>.
- 13 Pathania M, Amisha, Malik P, Rathaur VK — Scrub typhus: Overview of demographic variables, clinical profile, and diagnostic issues in the sub-Himalayan region of India and its comparison to other Indian and Asian studies. *J Family Med Prim Care* 2019; **8**: 1189-95.
- 14 Premraj SS, Mayilanthi K, Krishnan D, Padmanabhan K, Rajasekaran D — Clinical profile and risk factors associated with severe scrub typhus infection among non-ICU patients in semi-urban south india. *J Vector Borne Dis* 2018; **55**(3): 47-51.

Original Article

Perception of Foundation Course Curriculum by the Faculty of Medical Colleges

Rekha Udgiri¹, Vidya Patil²

Introduction : The Foundation course is one of the new curricula the National Medical Council (NMC) of India implemented for the present academic course at the beginning of the MBBS program. It is a month's duration where all the students should undergo this foundation course. The purpose of the course is to orient the students in all aspects of the Medical College environment, equipping them with certain basic skills required for patient care, enhancing their communication, language and computer and learning skills. Sports and extracurricular activities are also given importance in the foundation course. The present study was an attempt to take responses in the form of feedback by the faculties with regards to the foundation course.

Objectives : (1) To assess the responses with regards to the foundation course by the faculties. (2) Based on the analysis of feedback, a recommendation should be made for the Undergraduate Medical Curriculum.

Methodology : It was a cross-sectional study, the data was collected using self-administered, semi-structured questionnaires. The feedback form along with the foundation course curriculum was e-mailed to all the faculties those who are undergone one or the other training of Faculty Development Programme. Those who have submitted the responses were included in the study.

Results : The reflection responses given by faculties are apt for the foundation course implementation. They opine that NMC has taken a new initiative for the Undergraduate.

Conclusion : The foundation course is a need of the hour for the undergraduate to get sensitized to basic information about the Medical Profession.

[J Indian Med Assoc 2021; 119(12): 25-9]

Key words : Foundation course, Feedback, faculties, National Medical Council of India.

The Foundation Course is one of the new curricula the National Medical Council (NMC) of India implemented for the present academic course at the beginning of the MBBS program. It is a month duration where all the students should undergo this foundation course. In this course, students were sensitized to a new Professional environment that is going to help them in their career as a medical profession. The purpose of the course is to orient the students in all aspects of the medical college environment, equipping them with certain basic skills required for patient care, enhancing their communication, language and computer and learning skills¹. Sports and extracurricular activities are also given importance in the foundation course. The present study was an attempt to take responses in the form of feedback by the students with regards to the foundation course.

Editor's Comment :

- Foundation course is in need of the hour with little modification in the module to implement for Indian medical graduates by the National Medical Council of India (NMC).
- Foundation course helps the students to sensitize all aspects of the medical environment.
- The foundation course is an excellent addendum to the Competency-based medical education (CBME).

Objectives :

- (1) To assess the responses with regards to the foundation course by the faculties
- (2) Based on the analysis of feedback, a recommendation should be made for the undergraduate medical curriculum.

MATERIALS AND METHODS

It was a cross-sectional study. Institutional ethical clearance was taken before the start of the study. After taking consent from the faculties, the data was collected using self-administered, semi-structured questionnaires. For structured questions 5 point Likert scale was applied. each item is given a numerical score ranging from 1-5 (Poor=1, Average=2, Good=3, Very good= 4, Excellent=5).

The feedback form along with the Foundation course curriculum was e-mailed to other Colleges and Different

BLDE (Deemed to be University) Shri B M Patil Medical College Hospital & Research Centre, Vijayapura, Karnataka 586103

¹MD, Professor, Department of Community Medicine and Corresponding Author

²MS, Professor and Head, Department of Anaesthesiology

Received on : 22/06/2021

Accepted on : 05/11/2021

Departments, for those who have undergone one or the other training of faculty development program. And involved in a foundation course programme. A total of 30 faculties participated in the study. Those who have submitted the responses were included in the study. Data were analyzed using SPSS version 20.

RESULTS

A total of 30 faculties participated in the study, among them the majority were males (53.3%) followed by females (46.7%), all of them have undergone one or the other Faculty Training Program (FTP). and have also involved in the foundation course program at their institute. In the present study maximum number of respondents were professors (47%), followed by Assistant Professors (30%) and Associate Professors (23%). participants average age and length of services 41.30 ± 6.143 and 12.23 ± 5.771 respectively.

The responses related to the goals and objectives of the foundation course were good with an average mean of $3.63 \pm .928$. With regard to course, content and organization mean scores were $3.83 \pm .699$. Teaching-learning methods and assessment of syllabus were also good.

Our study observed a statistically significant association was observed between department wise and the planned theory and practical classes in the course at $p = 0.026$. Similarly for course content to achieve the learning outcome at $p = 0.023$ and also for rate the appropriateness of teaching-learning methods at $p = 0.014$. Surprisingly In our study, there is no statistically significant association observed between organizations like private, Government and Deemed University with related to their response to the foundation course curriculum (Table 1)

Responses for the open-ended questions :

All of them were given their opinion regarding foundation course and responses were compiled .as much as possible repetition were avoided.

(1) Comment on the duration of the course : The majority of them opined that the duration of the course was too lengthy (47%).

(2) Recommendations for additional evaluation method which would ensure student competency:

- Foundation course is more about awareness and orientation than acquiring the competency. So too much evaluation is not recommended.
- Introduction to Objective Structured Practical Examination (OSPE)/Objective Structured Clinical Examination (OSCE) in the foundation course.
- Small group skits on ethics and moral by students can be incorporated.

- The evaluation could include narratives also along with reflection writing.
- Too early to evaluate the competency taught in the first month.

(3) Additional comments regarding course development you feel have not been addressed :

- The majority of them gave an opinion that the course design has been adequately addressed.
- Shift the first two AETCOM modules in the foundation course itself.
- No need for extra hours for professionalism and communication.
- Reduce the time allotted to sports and other extracurricular activities
- How to handle a pandemic problem in society
- The majority of them commented that the course needs to be streamlined.
- Keep it simple with less content. Address a few things only in the foundation course
- How to lead a life in medical college including hostel and campus life.
- Communication needs more hours & more community exposure
- Can't think of any at present

(4) Comment on the infrastructure facilities available at your institute :

Much more is required in terms of infrastructure especially the skills lab. Some of them said we don't have presently the skill lab facilitates and need a lot of improvement for infrastructure facilitates. Others said they have adequate facilities for skill lab especially private and deemed universities.

(5) Challenges faced at your institute for the conduct of this course :

- Changing mindsets of faculties.
- Lack of infrastructure facilities.
- Space, equipment and manpower shortage for 150 students
- The duration of the course was not acceptable.
- Clinicians support and involvement
- Students joined a little late. Rescheduling the sessions done as the admission dates were extended.

(6) Reflection for the foundation course :

- The majority of them said, the concept of the foundation course is a very good initiative by NMC, But how it works out is to be seen in the future.
- Some of them said, very much required to orient the student to the course.
- Floating attendance was observed because of late admission.

Table 1 — Responses related to foundation course by department wise

Components	Departments	N	Mean±Std. Deviation	Kruskal Walli's test	P value
Students response to Goals and objectives (a) course gives a clear idea about what is expected out come from this course	Clinical	7	3.86±.378	2.205	0.332
	Para Clinical	11	3.91±.701		
	Pre Clinical	12	3.25±1.215		
	Total	30	3.63±.928		
(b) How do you rate the course objectives stated are well aligned with the course content?	Clinical	6	4.00±.000	2.066	0.356
	Para Clinical	11	3.64±.674		
	Pre Clinical	12	3.50±1.000		
	Total	29	3.66±.769		
Responses related to Course content and organization (a) The course identify the health care needs and problem of the community]	Clinical	7	4.00±.577	1.773	0.412
	Para Clinical	11	3.91±.831		
	Pre Clinical	12	3.67±.651		
	Total	30	3.83±.699		
(b) How well planned are the theory and practical classes in the course ?	Clinical	7	4.29±.488	7.333	0.026*
	Para Clinical	11	3.64±.505		
	Pre Clinical	12	3.17±1.115		
	Total	30	3.60±.894		
(c) course content is well structured to achieve the leaning outcome	Clinical	7	4.57±.535	7.525	0.023*
	Para Clinical	11	3.73±.467		
	Pre Clinical	12	3.50±1.087		
	Total	30	3.83±.874		
Responses related to Teaching-learning methods (a) Rate the appropriateness of teaching-learning methods	Clinical	7	4.57±.535	8.483	0.014*
	Para Clinical	11	4.00±.775		
	Pre Clinical	12	3.50±.674		
	Total	30	3.93±.785		
Responses related to Assessment methods (a) Rate the appropriateness of the formative assessment	Clinical	7	4.00±1.000	5.314	0.070
	Para Clinical	11	3.64±.809		
	Pre Clinical	12	3.08±.900		
	Total	30	3.50±.938		
(b) How do you rate depth of assessment of syllabus content?	Clinical	7	3.57±1.134	1.886	0.392
	Para Clinical	11	3.64±.809		
	Pre Clinical	12	3.17±1.115		
	Total	30	3.43±1.006		
Other questions related to course (a) To what extent do you think is the course career oriented?	Clinical	7	4.00±1.155	2.140	0.343
	Para Clinical	11	3.73±.786		
	Pre Clinical	12	3.42±.669		
	Total	30	3.67±.844		
(b) How do you rate time allotted for the course?	Clinical	7	3.57±1.134	5.130	0.077
	Para Clinical	11	2.91±1.044		
	Pre Clinical	12	2.75±.866		
	Total	30	3.00±1.017		
(c) How do you rate the quality and relevance of the foundation course content to MBBS course?	Clinical	6	4.33±.516	6.884	0.032*
	Para Clinical	11	3.64±.924		
	Pre Clinical	12	3.08±.996		
	Total	29	3.55±.985		

*Statistically Significant

- It's a good start, helpful for students to understand about the MBBS course in the beginning.
- A good initiative which exposes students to what actually they will be encountered in the future.

addendum to the Competency-based Medical Education (CBME).

- The lack of faculty orientation and unavailability of the infrastructure may pose a challenge on its

- Foundation course is good but needs adequate faculty training.

- Planning and implementing the Foundation Course was Challenging and interesting.

- Helpful for both students and teachers

- many of them told ,it is a need of the hour

- It gave an opportunity into what are the needs of students and expectations at the very beginning. It was felt the course structure was a bit prolonged, suitable modifications would definitely help.

- It provided an opportunity, how the student will identify the needs/ participate in group activities based on their diverse background of schooling.

- Very good course if trimmed and made concise. Suggested to take feedback from present and past students. Involve all stakeholders in planning.

- It has actually shifted the focus of students from learning basic sciences to the clinical context.

- Some subject topics can be spread in the first quarter for better realization.

- More hands- on, practical, and skill -based activities should be conducted than being theoretical.

- On paper, it is very good but require a lot of preparation, more number of faculties and training of faculty

- The foundation course is an excellent

Table 2 — Responses related to foundation course by different institutions

Components	Institutions	N	Mean±Std Deviation	Kruskal Walli's test	P value
Students response to Goals and objectives (a) course gives a clear idea about what is expected out come from this course	Deemed University	12	3.50±1.087	1.208	0.547
	Government Organisation	7	4.00±.577		
	Private Organisation	11	3.55±.934		
	Total	30	3.63±.928		
Students response to Goals and objectives (b) How do you rate the course objectives stated are well aligned with the course content?	Deemed University	12	3.64±.924	0.370	0.831
	Government Organisation	7	3.57±.535		
	Private Organisation	11	3.73±.786		
	Total	30	3.66±.769		
Responses related to Course content and organisation (a) The course identify the health care needs and problem of the community	Deemed University	12	3.75±.866	4.388	0.111
	Government Organisation	7	4.29±.488		
	Private Organisation	11	3.64±.505		
	Total	30	3.83±.699		
Responses related to Course content and organisation (b) How well planned are the theory and practical classes in the course ?	Deemed University	12	3.50±1.087	0.289	0.865
	Government Organisation	7	3.57±.535		
	Private Organisation	11	3.73±.905		
	Total	30	3.60±.894		
Responses related to Course content and organisation (c) course content is well structured to achieve the leaning outcome	Deemed University	12	3.75±.965	1.005	0.605
	Government Organisation	7	3.71±.488		
	Private Organisation	11	4.00±1.000		
	Total	30	3.83±.874		
Responses related to Teaching-learning methods (a) Rate the appropriateness of teaching-learning methods	Deemed University	12	3.92±.900	0.169	0.919
	Government Organisation	7	3.86±.690		
	Private Organisation	11	4.00±.775		
	Total	30	3.93±.785		
Responses related to Assessment methods (a) Rate the appropriateness of the formative assessment	Deemed University	12	3.33± 1.073	0.433	0.819
	Government Organisation	7	3.57±.787		
	Private Organisation	11	3.64±.924		
	Total	30	3.50±.938		
Responses related to Assessment methods [(b) How do you rate depth of assessment of syllabus content?]	Deemed University	12	3.42±1.084	.160	0.923
	Government Organisation	7	3.57±.787		
	Private Organisation	11	3.36±1.120		
	Total	30	3.43±1.006		
Other questions related to course [(a) To what extent do you think is the course career oriented?]	Deemed University	12	3.67±.778	.529	0.768
	Government Organisation	7	3.86±.900		
	Private Organisation	11	3.55±.934		
	Total	30	3.67±.844		
Other questions related to course [(b) How do you rate time allotted for the course?]	Deemed University	12	3.25±1.138	1.428	0.490
	Government Organisation	7	2.86±1.069		
	Private Organisation	11	2.82±.874		
	Total	30	3.00±1.017		
Other questions related to course [(c) How do you rate the quality and relevance of the foundation course content to MBBS course?]	Deemed University	12	3.45±.934	.734	0.693
	Government Organisation	7	3.86±.690		
	Private Organisation	11	3.45±1.214		
	Total	30	3.55±.985		
Non- significant					

appropriate implementation.

- However, the successive implementation from next year and shared experiences from different

institutions will pave the way for more information and outputs for better execution.

- Objectives were very appropriate and achieved.

Early exposure to clinical setup & Attitude, Ethics and Communication Manual (AETCOM) module will definitely help students.

- A foundation course is needed. It may be concise to 15 days excluding computer and language classes.

- Needs to be streamlined possible only with dedicated faculty with the support of the administration.

- Overall it was a good and new experience.

Above all are reflections given by all the faculties for the foundation course.

(7) Suggestions for the course :

- Instead of focusing on too many modules and so many competencies initially, it can be like an overview of the course and make students realize what is their attitude and expected outcome as a basic doctor

- The Foundation Course is needed. But the duration may be reduced excluding computer, language classes, also sports and extra-curricular activities.

- The course should be started after all the admission gets over through National Eligibility cum Entrance Test (NEET).

- Medical Council of India (MCI) should increase the staff position.

DISCUSSION

Implementation of the foundation course in MBBS was aimed at creating medical students to serve as health care providers who need not only provide adequate, appropriate and cost-effective health care service but also need to be the leaders of their community. The Foundation Course will also provide a sound foundation for learning in the MBBS course and later in their professional career¹. There is no available literature in general after the implementation of a foundation course feedback by faculties. Some of the literatures are available related to student feedback for the foundation course.

The present study found that the majority of the faculties are in the opinion that, foundation course is in need of the hour with little modification in the module. In 47% of the faculties said, the duration of the course was lengthy. The study conducted by Udgiri R², observed in her study similar findings related to the duration of the course that the majority of them were in the opinion that duration of the course should be between 15-20 days. Statistically, a significant association was observed between departments wise

and the planned theory and practical classes & Teaching-learning Methods. This could be due to the reason that more work for clinical staff, as already they are burdened with treating patients.

Surprisingly In our study, there no statistically significant Association was observed between organizations like Private, Government and Deemed University with related to their response to the Foundation Course curriculum. This shows that the Foundation Course is in need of the hour to implement for Indian Medical graduates by the NMC. Our study observed that faculties preferred more of more hands-on, practical and skill-based activities than being theoretical. The same opinion was observed in the study conducted by Priyadarshini *et al*³, responses like making the sessions more interactive and including role-plays.

In our study, suggestions were given to modify the foundation course. Similar suggestions were observed for modifications to be made in designing and implementing the foundation course by Sobti *et al*⁴

Limitations of the study :

With the present sample size we cannot generalize the statement, so we need more sample size. And need a follow-up study to see the impact of the course.

Conclusion :

NMC has made good initiative for implementing the Foundation Course for the Indian Medical Graduate to orient and sensitize the student to various areas and prepare a learner to study Medicine effectively. The Foundation Course is a consequence of the focus on Upgrading the Medical Curriculum. It helps the students to all aspects of the medical environment.

Conflict of Interest : None

REFERENCES

- 1 Medical council of India (2019) — Foundation course for the undergraduate medical program. Accessed on: 1/08/2019. Available from: Medical Council of India. Foundation Course for the Undergraduate Medical Education Program, 2019: Pg No 1-46.
- 2 Udgiri R, Patil V — Feedback on Foundation Course Curriculum from the Newly Joined Indian Medical Graduates. *South-East Asian Journal of Medical Education* 2020; **14**(1): 88-71.
- 3 Mishra P, Kar M — Perception of students on foundation course conducted for first year MBBS students at AIIMS Bhubaneswar. *Indian J Community Fam Med* 2017; **3**: 16-9.
- 4 Sobti S, Gupta M, Gupta V, Gupta A, Parihar S, Singh V — Assessment of newly introduced foundation course for medical undergraduates: students' vs faculty's perspective. *J Family Med Prim Care* 2020; **9**: 3042-7.

Original Article

Clinical Profile of Incisional Hernia and Minimally Invasive Approach Using Larger Mesh for Repair

B S Pathania¹, Devika Mahajan², Surbhi Abrol³

Context : Incisional Hernia repair is commonly performed worldwide. Minimally invasive approach for repair using composite Mesh covering the entire previous incision can significantly reduce its most dreaded complication ie, recurrence.

Aims : To study the patient variable factors in correlation with the etiopathogenesis of incisional hernia and the clinical outcome of Incisional Hernia repair with Mesh covering the entire previous incision.

Settings and Design : Prospective study.

Methods and Material : 40 patients with incisional hernia who visited the Department of Surgery, Acharya Shri Chander College of Medical Sciences and Hospital (ASCOMS), over a period of one year were enrolled in this study. Patient variable factors were analysed and minimally invasive approach for repair was done using a composite Mesh intraperitoneally covering entire previous incision. Patients were then followed up Postoperatively.

Statistical analysis : Student t –test and Chi square (χ^2) test . SPSS 21 software.

Results : Incidence of incisional hernia was highest in the age group of 40-50 years with female predominance (85%) Obesity was the most common risk factor. Majority of hernias followed Gynaecological procedures (65%) with lower midline incision being the commonest (40%). 75% patients developed hernia within 2 years of previous surgery. Mean length of incision was 13.90 ± 3.16 cm and the size of Mesh used was 300 cm^2 in majority of the patients. 6 patients had haemorrhage during fixation and 2 underwent limited conversion. Wound complications were observed in 20% cases. No recurrence noted in a mean follow up period of 21.625 ± 1.97 months. All patients had a good quality of life and a satisfactory body image.

Conclusions: Minimally invasive approach with defect closure and intraperitoneal placement of composite mesh covering entire incision using dual fixation for repair of incisional hernia after optimising the risk factors, is recommended to prevent recurrence and morbidity.

[J Indian Med Assoc 2021; 119(12): 30-5]

Key words : Incisional hernia, Etiopathogenesis, Intraperitoneal Onlay Mesh Repair, Recurrence, Large Composite Mesh.

Hernia is a general term used to describe a bulge or protrusion of an organ through the structure or muscle that usually contains it. Either congenital or acquired. 80% of these acquired hernias result from previous surgery. It's repair is one of the most common operation performed. Reported in 11 to 20% of laparotomy incisions¹. Laparoscopic approach has revolutionized the treatment of incisional hernia repair. Recurrence is the most important clinical outcome of the Incisional Hernia Repair. Two technical details can minimise recurrence - sufficient overlap of the Mesh and the mesh fixation. Further, larger Meshes have been advised covering the whole previous incision site as it has been observed that recurrence post repair occurs due to disregard for the principle that the entire incision – not just the hernial defect has a potential for

Department of Surgery, ASCOMS and Hospitals, Jammu, Jammu and Kashmir 180017

¹MBBS, MS, Professor

²MBBS, Surgery Resident

³MBBS, Surgery Resident and Corresponding Author

Received on : 08/11/2021

Accepted on : 10/11/2021

Editor's Comment :

- We recommend closure of the defect because of the inherent benefits of reduced recurrence, seroma and good body image.
- Combination of transfacial delayed absorbable sutures and tacks should be preferred for fixation of composite mesh.
- To reduce further incidence of recurrence, we recommend use of composite mesh covering the whole incision and not just the hernial defect.

hernia development².

This study was undertaken in which larger Meshes addressing the complete fascial scar was used to determine its clinical outcome along with prospective study of various risk factors influencing the development of incisional hernia which need optimisation.

AIM AND OBJECTIVES

(1) To study the patient variable factors in correlation with the etiopathogenesis of incisional hernia.

(2) To study the clinical outcome of Incisional Hernia repair with mesh covering the entire previous incision.

MATERIALS AND METHODS

This prospective study of 40 patients suffering from incisional hernia was conducted in the postgraduate Department of Surgery, ASCOMS, Jammu for a period of one year.

Following inclusion and exclusion criteria were taken into consideration:

Inclusion criteria : Patients suffering from incisional hernia of either sex, more than 18 years of age who were fit for G/A

Exclusion criteria : Patients with age <18 years, hernial defect size >15cm. obstructed hernia/strangulated hernia, very large hernias (where there is no place for working trocars), morbid obesity with large apron of fat (requiring Abdominoplasty), densely scarred abdomen, Ascites, Skin infection, Enterocutaneous fistula and those not fit for G/A.

Selected patients suffering from incisional hernia were taken up in this study. Cessation of smoking was advised well in advance before the surgery. All the patient variable factors - Age, Sex, Risk factors, mode of presentation and previous operation were analysed. Other risk factors - obesity, hypertension, Diabetes Mellitus, COPD, Malignancy. These patients were made to undergo routine and special radiological investigations ie, CT scan/MRI were done to assess the exact defect size, contents and adhesions. Regarding the size of the Mesh, whole of previous incision was measured keeping a 5-7 cm overlap of defect and length of incision.

Operative Procedure — Intraperitoneal Onlay Mesh Repair with defect closure (IPOM PLUS) was done. After administering general anaesthesia pneumoperitoneum was created using closed technique by means of veress needle inserted at palmer's point (below left costal margin along mid clavicular line) in most cases 10 mm telescope was inserted which was followed by placement of three trocars (5/10mm) forming one arc utilizing the "encirclement strategy". Adhesiolysis was carried out to visualize hernial defect by using endo-scissors or ultracision followed by reduction of contents. In case of difficult adhesiolysis, hybrid technique which a limited incision was made over the hernia site only large enough to allow dissection of the hernial sac was used (Fig 1). The hernial defect was closed by continuous sutures at an interval of 1-2cm with 3-4 sutures in the retrograde manner using one number Polydioxanone (PDS). Composite Meshes (polyester on the parietal side and collagen layer on visceral side) were used. The Mesh was centre aligned to overlap the incision intraperitoneally by 5-7cm circumferentially. Mesh fixation was carried out by using combination of



Fig 1 — One case in which limited coversion was done

transfascial sutures and tackers (placed 4-5cm at the periphery of Mesh). We used our own innovative technique for transabdominal fixation every 3-5 cm on the margins of the Mesh. Two Touhy (epidural No 16) needles were used : one was used for making an endloop of one number polypropylene and passed at the proposed site of fixation through a 1mm-2mm incision over the abdominal wall piercing through the Mesh and the second needle carrying one number polydioxanone was passed through the same incision into the abdomen, keeping a distance of 1-2 cm between the two needles and then was passed through the loop made by the first needle with sufficient length of 7-10cm with the help of needle holder and then both needles was withdrawn outside and both ends of polydioxanone suture were tied in 5-6 knots securely (Figs 2&3). Fascial closure was done using PDS suture and skin closed with polyamide sutures.

Postoperatively — Oral fluids were started on first post operative day and ambulation was allowed. Patients were followed up for Postoperative complications and were advised to wear abdominal binders for a minimum of 1 month. Pain was assessed post operatively and on follow up using Visual Analog Scale (VAS) asking the patients to score their pain from 0 (no pain) to 10 (severe pain) . Quality of life of the patients was assessed using Carolinas Comfort Scale (Fig 4) which is a preformed questionnaire and each parameter in it is given a score of 0 to 5 with a maximum overall score of 115. Higher the score, poorer the quality of life .

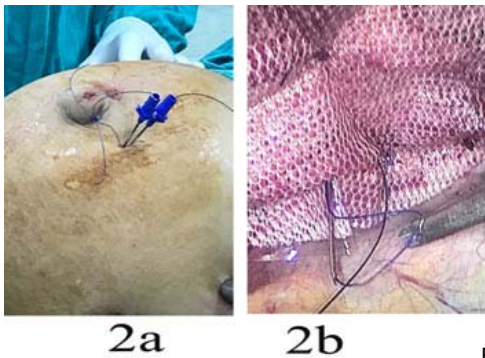


Fig 2 — Showing 2 needle technique

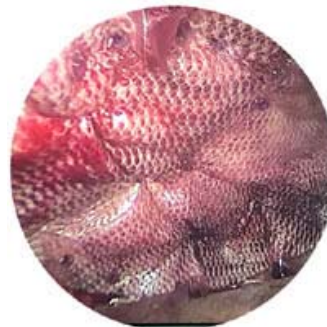


Fig 3 — Complete closure with Mesh

RESULTS

Forty patients suffering from incisional hernia were admitted, examined and subjected to Laparoscopic Hernia Repair. With maximum patients in the range of 40-50 years. There were 34 females (85%) and 6 males (15%) in our study. Obesity being the most common risk factor was seen in 29 patients (72.5%) with a BMI above 30 kg/m².

4 of the 6 males in our study were chronic smokers. 12 patients had associated co-morbid conditions out of which 8 patients had hypertension only, 2 patients had both hypertension and diabetes out of which one had associated Ischemic Heart Disease and 1 patient had Diabetes Mellitus only, 3 patients had Chronic Obstructive Pulmonary Disease and 1 patient had history of Hypothyroidism with Recurrent Hydatid Cyst in the Liver.

Incisional hernias were observed mostly in patients with history of obstetric and gynaecological procedures. In 26 patients (40% cesarean section 25% hysterectomy) followed by open cholecystectomy and laparotomy in 5 patients Lower midline incision was the commonest site for development of incisional hernia (40%) followed by transverse incisions (25%) and upper midline incision (7.5%). In 75% of the patients developed hernia within 2 years of the previous Surgery (Table 1). History of wound infection was seen in 9 patients out of which 2 had wound dehiscence.

The size of hernial defects ranged from 2.5 cm to 10 cm in greatest dimension as identified on imaging (Ultrasonography and CT Scan). Mean length of incision was 13.90 ± 3.16 cm with hernial defect size ranging from 3 to 10 cm measured in greatest dimension.

Intraoperatively, 80% patients were found to have adhesions of omentum with

anterior abdominal wall whereas in 7 cases (17.5%) had adhesions of omentum with small gut and one patient had adhesions of omentum with transverse colon. Mean size of the composite Mesh used for covering the entire previous incision was 347.50 ± 125.32 cm². The mean operating time was 109.17 ± 30.02 mins (60-170mins). A combination of tacks and delayed absorbable transfascial sutures were used for fixation. No conversion to open procedure was

required in any case. 2 patients (5%) out of forty needed limited conversion because of adhesions of the gut to the skin Intraoperatively, 15% patients had haemorrhage while applying transabdominal sutures for Mesh fixation which was managed. No other intraoperative complication was seen.

On Postoperative pain assessment using Visual analog scale, 33 patients (82.50%) had moderate pain in the immediate postoperative period while others complaint of mild pain only. Only 13 patients continued to experience moderate pain after 2 days on mobility

Carolinas Comfort Scale™
 NOT FOR USE WITHOUT SCORING ALGORITHM AND LICENSE AGREEMENT

Name: _____
 Date of Surgery: _____
 Date of Survey: _____

Carolinas Medical Center
 Division of Gastrointestinal and Minimally Invasive Surgery

0= No Symptoms
 1= Mild but not bothersome symptoms
 2= Mild and bothersome symptoms
 3= Moderate and/or daily symptoms
 4= Severe symptoms
 5= Debilitating symptoms

Please answer ALL questions for each of the 8 activities.
 Use N/A if an activity was not performed.

1. While laying down, do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
2. While bending over, do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
c) movement limitations	0	1	2	3	4	5	N/A
3. While sitting up, do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
c) movement limitations	0	1	2	3	4	5	N/A
4. While performing activities of daily living (i.e. getting out of bed, bathing, getting dressed), do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
c) movement limitations	0	1	2	3	4	5	N/A
5. When coughing or deep breathing, do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
c) movement limitations	0	1	2	3	4	5	N/A
6. While walking, do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
c) movement limitations	0	1	2	3	4	5	N/A
7. When walking up the stairs, do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
c) movement limitations	0	1	2	3	4	5	N/A
8. While exercising, do you have							
a) sensation of mesh	0	1	2	3	4	5	N/A
b) pain	0	1	2	3	4	5	N/A
c) movement limitations	0	1	2	3	4	5	N/A

© 2011. All rights reserved.

Fig 4 — Carolina Comfort Scale

Table 1 — Distribution of Patients According to Time of Onset of Hernia after Surgery (months)

Time of onset of hernia (months)	No of patients	Percentage
≤6 months	7	17.5
7-12 months	11	27.50
13-18 months	7	17.5
19-24 months	5	12.5
> 24 months	10	25.0
Total	40	100

or straining while the others complaint of mild pain. Most of the patients (77.5%) were made ambulatory on 1st POD. There was one patient who suffered from respiratory Tract Infection (consolidation) during the hospital stay requiring ventilatory support for two days following which she recovered and 4 patients suffered from Urinary Tract Infection diagnosed during the first week managed conservatively, all of whom had suprapubic hernias and were catheterized prior to Surgery. The average postoperative hospital stay for patients was 3.3 ± 0.83 days.

In 4 patients (10%) developed Seroma at the site of hernial repair which completely resolved spontaneously within 6-8 weeks. Wound infection and port-site cellulitis was observed in 1 patient each managed with local debridement + oral antibiotics (Table 2).

Upto 3 weeks, 22 patients complaint of mild pain at suture site which resolved spontaneously whereas 2 patient complaint of moderate pain managed with oral analgesic. No Mesh infection seen. In 37 patients resumed their routine activity by 14th postoperative day out of which 17 were able to start their normal activity by 7th day. Majority of the patients (33) were satisfied with body image at 3 weeks, remaining patients were not satisfied due to presence of wound complications like Seroma and Cellulitis. However, at 3 months postoperatively all the patients were satisfied with their body image. At 3 weeks postoperatively, majority of the patients (80%) had a score less than 30 corresponding to relatively good quality of life using Carolina Comfort Scale (Table 3). Only one patient (2.5%) who developed wound infection requiring repeated dressings had a score more than 60. Quality of life assessment at 3 months, showed all patients had a score of 0 which means good quality of life. The

Table 2 — Distribution of Patients According to Wound Related Complications

Wound related complication	No of patients	Percentage
Seroma	4	10.00
Wound infection	1	2.50
Port site cellulitis	1	2.50
Abdominal wall ecchymosis	2	5.00
No wound related complication	32	80.00
Total	40	100

mean follow up period was 22.625 ± 1.97 months ranging from 18-26 months and we did not observe any recurrence during our follow up.

DISCUSSION

The repair of incisional hernia has been a challenging problem for which different techniques have been described. Various series of study have shown the superiority of laparoscopic approach over the open approach for Incisional Hernia Repair in terms of quicker recovery time and less postoperative pain and it is now widely accepted^{3,4}.

In our study the mean age of the patients was 52.30 years similar to findings in various studies in the past⁵⁻⁷. This occurrence at an older age has been explained by decreased Reticulin Fibres and Hyaline degeneration of Collagen Fibres from the skin causing delayed and impaired wound healing.

Moore M, *et al*⁸ observed there were 75.55% females similar to 85% females in this study. In a study by Bhamre SD *et al* incidence of incisional hernia was twice more common in females as in males⁹. Mean body mass index of the patients in our study was 32.37kg similar to that observed by Chelala E, *et al*¹⁰.

In our study 2 of the 3 diabetic patients with IH, had history of wound infection following previous surgery making diabetes a strong risk factor for IH. 22.5% of cases in our study had history of wound infection similar to 20% noted in studies conducted by Suhas, *et al*¹¹.

Considering risk factors, BMI >30 kg/m² was found in 72.25% patients. Among other risk factors observed in our study hypertension was the commonest in 10 patients (25%), Diabetes in 3 patients (7.5%), COPD in 3 patients (7.5%) and smoking seen in 2 patients (6.66%). In a study by Khandra H, *et al*¹² 50% had risk factors: Hypertension being the commonest (43.33%), Chronic Cough (10%) and Diabetes Mellitus (10%).

Most patients (40%) in our study had previous surgeries using lower midline incisions most of whom underwent Obstetric and Gynaecological procedures similar to findings in studies where more than 50% of patients had lower midline incisions^{11,12}. This may be because intra-abdominal hydrostatic pressure is higher

Table 3 — Distribution of Patients According to Quality of Life Assessment at 3 Weeks Postoperatively Using Carolina Comfort Scale

Quality of life	No of patients	Percentage
≤10	13	32.50
11-20	10	25.00
21-30	9	22.50
31-40	4	10.00
41-50	2	5.00
51-60	1	2.50
>60	1	2.50

in lower abdomen compared to upper abdomen in erect position ie, 20 cm of water and 8 cm of water respectively and posterior rectus sheath is also absent below arcuate line.

Majority of the patients (75%) developed hernia within first 2 years of the previous surgery. 80% of patients developed incisional hernia within 1 year of previous surgery and only 3.8% after 2 years in a study by Sharma VM *et al*¹³.

In order to cover the whole of previous incision site in our study, the length of previous incision was taken into regard for deciding the Mesh size keeping in view an overlap of at least 5 cm all around the defect. Most of the studies advocate a Mesh overlap of a minimum of 5 cm around the hernial defect^{14,10} and we advocated the same. Only a few studies available in the literature advocated covering the whole of previous incision only when they noticed recurrence following their earlier repairs of hernial defect and later did not find any recurrence in their follow up^{2,17}. It is recommended to access the abdomen off the midline, to avoid areas with potential bowel adhesions. Regarding port placement, it is desirable to have the working ports as far lateral as possible to expose midline hernias and to be able to place a large piece of Mesh without interference. In our study too, initial access to the abdomen could be accomplished by closed technique – inserting Veress needle in left hypochondrium (palmer's point) away from the hernia defect similar to the technique used in various studies^{18,19}, as we did not have any case of hernia in left hypochondrium or any contraindication for left hypochondrium access.

We carried out an additional step of closing the defect in our patients before placing the Mesh. We used composite Meshes with its peritoneum side made of polypropylene or polyester giving structural strength and promoting tissue ingrowth and visceral side having polyester lined by collagen forming bowel-protective anti-adhesion barrier similar to the Mesh used in a few studies^{7,20}. On the contrary some studies used expanded Polytetrafluoroethylene Mesh (ePTFE)^{18,19} and Chowbey PK, *et al*⁶ used Polypropylene Mesh. However, we did not use either due to its lack of memory making it difficult to work with and tendency to produce more fibrosis and adhesions.

Van't Riet M, *et al*²¹ noticed 2.5 times greater tensile strength of suture in transabdominal suture than that of tacks with reduced recurrence in Laparoscopic ventral Hernia Repair. Therefore, we used a combination of tacks and delayed absorbable snugly tight transfascial sutures for Mesh fixation.

The mean operating time in our study was 109.17 mins which was similar to 110 minutes in the defect closure group in a study by Palanivelu C, *et al*²². Longer

operating time was attributed to using larger Meshes. We had two cases (5%) of limited conversion (hybrid technique) wherein gut was adherent to skin, so to avoid enterotomy we had to make a small 8 cm incision over the skin and did adhesiolysis followed by closure of fascial defect and laparoscopic placement of mesh similar to rate of limited conversion observed by LeBlanc KA, *et al*⁶. No conversion to open surgery was observed.

Most patients in our study 33 (82.50%) experienced moderate postoperative pain at 24 hours and during a follow up period of 3 weeks, pain at suture site responded to oral NSAID except in 2 cases (5%) where postoperative pain at suture site persisted beyond 3 weeks and subsided by 6 weeks with the use of oral paracetamol and diclofenac tablets. No patient in our study required long acting local aesthetic. To prevent ischaemic pain associated with transabdominal suture fixation we used Polydioxanone suture which were tied snugly. Pain at operated site has also been reported when tacks alone were used⁶.

We had 4 patients (10.00%) who developed Seroma at the site of hernial repair which resolved spontaneously within 6-8 weeks. Low incidence of Seroma could be attributed to defect closure prior to Mesh placement since it provides a lattice made by viable tissue for Mesh placement and reduces dead space²².

Wound infection was seen in 1 patient who underwent limited conversion (2.5%) which was managed with local dressings and oral antibiotics. In another patient we had port site Cellulitis managed with oral antibiotics whereas Heniford BT, *et al*²¹ observed five patients with trocar site infection who were treated successfully with oral or intravenous antibiotic. Mesh infection was noted in a few studies where the Mesh had to be removed^{6,18}. We did not notice any Mesh related complication in our series.

We observed that 42.5% patients resumed their normal routine activity by 7th postoperative day while only 2 patients resumed their work by third week because of prolonged suture site pain. Khandra H, *et al*² observed that 46% patients in their study resumed daily work within 6-10 days.

In our study the follow up period ranged from 18 to 25 months which included physical examination, follow up Ultrasound and assessment of quality of life. There was not a single case of recurrence in our study with a minimum follow up of 21.625 months suggesting that until now there is no technical failure in our study. Le Blanc KA, *et al*²² observed a 9% recurrence rate over a mean follow up of 36 months, one of which developed at a site other than the previous repair, following which they started the practice of covering the entire incision that contains the hernia rather than

only the site of the hernia itself to reduce recurrence. Koehler RH, *et al* observed recurrence in 3 patients (9%), one of which developed in a section of previously intact scar just above the original mesh placed 15 months previously¹⁷.

Fixation of Mesh may significantly impact the rate of recurrence. Recurrences upto 3-4% have been reported in various studies where only tacks were used for Mesh fixation^{4,19,25}. Insufficient Mesh overlap over the defect was believed to be a major cause for recurrence in various studies^{7,10}. The observations from studies by Wassenaar EB *et al*. suggest recurrence occurrence due to disregard for a well accepted principle - that the whole incision not just the hernia must be addressed after observing recurrences in another part of the previously intact original scar. No recurrences after repairing the recurrences by placing a larger mesh over entire incision and not just the hernia². Keeping this in view, we covered the whole incision with the mesh ensuring an overlap of atleast 5 cm all around the defect.

Carolina comfort scale was used for assessment of quality of life and patients were questioned about their postoperative body image. At 3 weeks, 33 patients (82.5%) were satisfied with their body image and at 3 months all the patients were satisfied. Vorst AL, *et al*²³ suggests that Carolinas comfort scale is hernia specific and assesses pain, limitations in movement and Mesh sensation for eight daily activities. There was no mortality in our study.

CONCLUSION

Based on our observations we conclude that incorporating few technical modifications in minimally invasive approach for incisional hernia repair like prior defect closure, using larger Mesh that covers the whole incision not just the hernial defect, dual fixation of Mesh and pre-operative optimisation of risk factors results in reduced incidence and morbidity associated with incisional hernia. As we have not found any recurrence in our follow up, we believe that the whole incision and not just the hernia must be addressed.

REFERENCES

- Bloeman A, Van Dooren P, Huizinga BF, A G M Hoofwijk — Randomized clinical trial comparing polypropylene or polydioxanone for midline abdominal wall closure. *Br J Surg* 2011; **98**(5): 633-9.
- Wassenaar EB, Schoenmaeckers EJ, Raymakers JT, Job van der Palen, Srdjan Rakic Recurrences after laparoscopic repair of ventral and incisional hernia: lessons learned from 505 repairs. *Surg Endosc* 2009; **23**(4): 825-83.
- Park A, Gagner M, Pomp A — Laparoscopic repair of large incisional hernias. *Surg Laparosc Endosc* 1996; **6**(2): 123-8.
- Carbajo MA, Martin del Olmo JC, Blanco JL, Croc E — Laparoscopic treatment vs open surgery in the solution of major incisional and abdominal wall hernias with mesh. *Surg Endosc* 1999; **13**(3): 250-2.
- LeBlanc KA, Booth WV, Whitaker JM, Bellanger DE, Rhynes VK — Laparoscopic incisional and ventral herniorrhaphy in 100 patients. *Am J Surg* 2000; **180**(3): 193-7.
- Chowbey PK, Sharma A, Khullar R — Laparoscopic Ventral Hernia Repair. *J Laparoendosc Adv Surg Tech A* 2000; **10**(2): 79-84
- Hauters P, Desmet J, Gherardi D, Dewaele S, Poilvache H, Malvaux P — Assessment of predictive factors for recurrence in laparoscopic ventral hernia repair using a bridging technique. *Surg Endosc* 2017; **31**(9): 3656-63.
- Moore M, Bax T, Macfarlane M, Mcnevin MS — Outcomes of the fascial component separation technique with synthetic mesh reinforcement for repair of complex ventral incisional hernias in the morbidly obese. *Am J Surg* 2008; **195**(5): 575-9.
- Bhamre SD, Pingale ND — A Clinical Study of Incisional Hernia. *MVP J Med Sci* 2016; **3**(1): 1-6.
- Chelala E, Gaede F, Douillez V, Dessily M, Alle JL — The suturing concept for laparoscopic mesh fixation in ventral and incisional hernia repair: Mid-term analysis of 400 cases. *Surg Endosc* 2007; **21**(3): 391-5.
- Kondreddy S, Nittala R — Incisional Hernia – A Prospective study of 50 cases for 1 year. *Indian Journal of Applied Research* 2014; **4**(5): 403-7.
- Khandra H, Patel N, Parmar H, Patel R — Study of pre-operative and post-operative variables for incisional hernia repair by open and laparoscopic technique. *IAIM* 2015; **2**(1): 36-43.
- Sharma VM, Akruwala SD — Study of factors associated with incisional hernia in female. *Int J Res Med Sci* 2014; **2**: 127-31.
- Bageacu S, Blanc P, Breton C, Gonzales M, Porcheron J, Chabert M, *et al* — Laparoscopic repair of incisional hernia. *Surg Endosc* 2002; **16**: 345-8.
- Koehler RH, Voeller G — Recurrences in laparoscopic incisional hernia repairs: a personal series and review of the literature. *JLS* 1999; **3**(4): 293-304.
- Kannan K, Ng C, Ravintharan T — Laparoscopic ventral hernia repair: local experience. *Singapore Med J* 2004; **45**(6): 271-5.
- Perry ZH, Netz U, Mizrahi S, Lantsberg L, Kirshtein B — The experience with a modified technique for laparoscopic ventral hernia repair. *J Laparoendosc Add Surg Tech A* 2003; **13**(5): 305-7.
- Picazo-Yeste J, Moreno-Sanz C, Sedano-Vizcaíno C, Morandeira-Rivas A, Sánchez-De Pedro F — Outcomes after laparoscopic ventral hernia repair: does the number of previous recurrences matter? A prospective study. *Surg Endosc* 2017; **31**(11): 4514-452.
- van't Riet M, de Vos van Steenwijk PJ, Kleinrensink GJ, Steyerberg EW, Bonjer HJ — Tensile strength of mesh fixation methods in laparoscopic incisional hernia repair. *Surg Endosc* 2002; **16**: 1713-6.
- Palanivelu C, Jani KV, Senthilnathan P, Parthasarathi R, Madhankumar MV, Malladi VK — Laparoscopic sutured closure with mesh reinforcement of incisional hernias. *Hernia* 2007; **11**(3): 223-8.
- Heniford BT, Park A, Ramshaw BJ, Voeller G — Laparoscopic ventral and incisional hernia repair in 407 patients. *J Am Coll Surg* 2000; **190**(6): 645-6501.
- LeBlanc KA, Whitaker JM, Bellanger DE, Rhynes VK — Laparoscopic incisional and ventral hernioplasty: lessons learned from 200 patients. *Hernia* 2003; **7**(3): 118-1241.
- Vorst AL, Kaoutzanis C, Carbonell AM, Franz MG — Evolution and advances in laparoscopic ventral and incisional hernia repair. *World J Gastrointest Surg* 2015; **7**(11): 293-305.

Original Article

Vitamin D Level in Patients with Juvenile Idiopathic Arthritis : A Study from a Tertiary Care Institute of Kolkata

Pijush Kanti Mandal¹, Arindam Bandyopadhyay², Sajeed Mondal³, Rajashree Pradhan⁴

Introduction : Vitamin D insufficiency in children is a major public health concern Worldwide. Many studies have been published on Vitamin D deficiency and its affect in children and adolescents. Vitamin D has an impact on calcium metabolism as well as in bone mineralization. This vitamin serves as an immunomodulator as well. In certain studies, problems in Vitamin D metabolism have been linked to the release of proinflammatory cytokines, which restrict the development of regulatory T cells.

General objective : Vitamin D has been hypothesised to influence development, activity and therapy of autoimmune illnesses based on the findings of clinical and laboratory studies. We wanted to see how common vitamin D deficiency are prevalent in persons with JIA (Juvenile Idiopathic Arthritis) and the relation between Vitamin D and JIA disease activity.

Methodology : Study Design- Observational Cross-sectional study. Study Area- Patient suffering from JIA of any duration, attending Paediatric OPD (Out Patient Department) and IPD (In Patient Department) of College of Medicine and Sagore Dutta Hospital, Kolkata. Study population-50 patients of age 1 month - 12 years attended OPD or IPD in Pediatric department of College of Medicine and Sagore Dutta Hospital, Kolkata. Study Period- 1 year. Sample Size- 50 patients of Juvenile idiopathic arthritis.

Analysis and Result : We found in Less than 6 months, the mean Vit D was 22.5922, in 6 months to 3 years mean Vitamin D was 22.3863 and in More than 3 years, the mean Vitamin D was 24.1693. Difference of mean according to duration was found statistically significant (P 0.001).

Summary and Conclusion : Understanding the influence of genetic variations which increase the risk of development of disease and being able to identify precise goals for Vitamin D status as a potential adjunct therapy in the management of JIA will improve the quality of life of patients and family members in respect of JIA.

[J Indian Med Assoc 2021; 119(12): 36-9]

Key words : Vitamin D, Juvenile, Idiopathic Arthritis.

A major public health concern, Vitamin D deficiency affects millions of children and adolescents around the World. Several studies have reported Vitamin D deficiency and insufficiency during childhood. Vitamin D is known for its role in bone mineralization and calcium metabolism¹. It also has an immunomodulatory effect on immunity. Some studies observed that abnormalities in Vitamin D metabolism may lead to the release of proinflammatory cytokines that inhibit regulatory T cell production².

Childhood rheumatoid arthritis, most commonly known as Juvenile Idiopathic Arthritis (JIA), is characterized by chronic joint inflammation

¹MBBS, MD, Associate Professor, Department of Medicine, Malda Medical College and Hospital, Malda 732101 and Corresponding Author

²MD, Associate Professor, Department of Paediatrics, Deben Mahata Government Medical College & Hospital, Purulia 723147

³MD, Associate Professor, Department of Pathology, Rampurhat Government Medical College & Hospital, Rampurhat 731224

⁴MD, Associate Professor, Department of Pathology, College of Medicine and Sagore Dutta Hospital, Kolkata 700058

Received on : 16/09/2021

Accepted on : 04/12/2021

Editor's Comment :

- Vitamin D deficiency is not uncommon in pediatric and adolescent age group. Its association with Juvenile Idiopathic Arthritis has been found.
- This article emphasised the relation and therapeutic benefits of Vitamin D in JIA children. However larger studies needed to evaluate its potential role.

accompanied by swelling, pain, and movement limitations.³ There may be irreversible abnormalities in non-articular organs as well, including the eyes (as a result of iridocyclitis) or kidneys (as a result of amyloidosis), or they may result from drugs. JIA is managed with a goal to improve symptoms the quality of life (HRQL) of the patient and prevent irreversible damage⁴.

Various studies have linked chronic inflammatory disorders with Vitamin D deficiency or insufficiency. Some studies have also found low levels of Vitamin D in JIA. It has been proposed that Vitamin D deficiency may play a role in JIA pathophysiology since it inactivates Th1 and Th17, both of which play a role in

JIA pathophysiology⁵. The data on the association between serum vitamin D levels and disease activity is limited, however.

Objective of research proposal :

General objective —

The possible role of Vitamin D in the pathogenesis, activity, and treatment of autoimmune disorders have been raised based on the results and observations of clinical and laboratorial studies. Our objective is to find the prevalence of Vitamin D deficiency and/or insufficiency and to investigate the relationship between Vitamin D and disease activity in patients suffering from JIA.

Specific objective —

We aim to accomplish the following through our study :

- To evaluate Vitamin D status in patients who have JIA and
- To correlate these findings with clinical and laboratory parameters of disease activity.

MATERIALS AND METHODS

Study Design — Observational Cross-sectional study.

Study Area — Patient suffering from JIA of any duration, attending Paediatric Outdoor or Indoor of College of Medicine and Sagore Dutta Hospital, Kolkata.

Study Population — Approximately 50 patients of (age 1 month - 12 years) coming to Pediatric outdoor and indoor of College of Medicine and Sagore Dutta Hospital, Kolkata.

Study Period — 1 year.

Sample Size — 50 patient of Juvenile idiopathic arthritis

Inclusion Criteria :

- Age between 1 month to 12-year suffering from JIA (meeting ILAR criteria) of any duration.
- Able to understand English/Bengali/Hindi.
- Absence of any other chronic diseases not related to the primary disease or its treatment.
- Absence of known hypovitaminosis D unrelated to primary disease.

Exclusion Criteria :

- Age less than 1 month and more than 12 years.
- Known history of hypovitaminosis D unrelated to primary disease
- Not Able to understand English/Bengali/Hindi.
- Presence of other chronic comorbid medical condition.

Study Tools :

- JADAS 27 score to assess disease activity status
- Electronic platform type weighing machine with calibration of 500 gm.
- Stadiometer with a calibration of 1 mm.
- Infantometer which has a fixed headboard and moveable footboard with a calibration of 1 mm.
- Phlebotomy equipment.
- 1ml of blood was sent for vitamin D assessment by Enzyme linked Fluorescent Assay(ELFA).

ANALYSIS AND RESULTS

Our study showed that the mean Vitamin D in male was 21.0690 and Mean Vitamin D in female was 25.3474. Difference of mean was statistically significant. Vitamin D levels of female patients did not follow a normal distribution. Mann-Whitney U test ($U=136.5$, $W=367.5$, $p\text{-value}=0.088$ two tailed) indicated that both samples did not have statistically significantly different distribution shapes as the $p\text{-value}$ is above the critical value of 0.05. However, the observed different distribution shapes warrant further investigation, including further data collection. In Oligoarthritis, the mean Vitamin D was 21.9807 and in Polyarthritis mean Vitamin D was 23.7736. Mann-Whitney U test ($U=145.0$, $W=265.0$, $p\text{-value}=0.235$ two tailed) indicated that both samples did not have statistically significantly different distribution shapes as the $p\text{-value}$ is above the critical value of 0.05. However, given the observed very different distribution shapes warrants further investigation, including further data collection.

We found in Less than 6 months, the mean Vitamin D was 22.5922, in 6 months to 3 years mean Vitamin D was 22.3863 and in More than 3 years, the mean Vitamin D was 24.1693. Difference of mean Vitamin D according to duration was statistically significant. Using Kruskal-Wallis analysis, it was examined if serum Vitamin D levels differed according to disease duration. No statistically significant differences were found between the three groups of patients (Chi square = 0.885, $p = 0.642$, $df = 2$). The mean of JADAS27 (Mean \pm SD) of the patients was 12.0200 ± 11.30873 . Vitamin D3 and JADAS correlated negatively, but this correlation statistically insignificant. According to the Spearman correlation, there was no statistically significant relationship between JADAS 27 and serum Vitamin D levels, ($r = -0.012$, $p 0.941$). No association between disease activity status of patients with JIA (Inactive, Low, Moderate and High) and Vitamin D status (Deficiency, Insufficiency and Sufficiency) was

observed, $\chi^2(6, N = 40) = 3.178, p = 0.786$ to patients living in urban areas (10.43).

Our study showed that the Mann-Whitney U test ($U=45.0, W=73.0, p\text{-value}=0.012$ two tailed) indicated that both samples have statistically significantly different distribution shapes as the p-value is below the critical value of 0.05 with mean rank in rural group much higher than urban group of patients. Kruskal-Wallis Test was conducted to examine the differences in serum Vitamin D levels according to duration of therapy. No significant differences (Chi square = 0.156, $p = 0.925, df = 2$) were found among three group of patients. Patients receiving Vitamin D had a higher mean rank (23.28) for Serum Vitamin D levels compared to patients not receiving Vitamin D (16.74). However, Mann-Whitney U test ($U=131.5, W=284.5, p\text{-value}=0.080$ two tailed) indicated that both samples did not have statistically significantly different distribution shapes as the p-value is above the critical value of 0.05. However, given the observed very different distribution shapes warrants further investigation, including further data collection.

DISCUSSION

Soybilgic *et al* undertook a review of steroid-related osteoporosis, prevention, and treatment practises of paediatric rheumatologists in North America in 2014⁶. They discovered that the majority of paediatric rheumatologists advise kids on long-term corticosteroids to take vitamin D6. Vitamin D's significance in mediating bone health, particularly in relation to corticosteroids, has been proven. Even small dosages of corticosteroids have an effect on bone health in people with autoimmune illnesses, both short and long term. The significance of Vitamin D in inflammation and disease activity, as well as an optimal amount of Vitamin D consumption or 25(OH)D goal, has yet to be determined. The serum 25 (OH) Vitamin D level and serum phosphorus levels were shown to be considerably lower in patients compared to controls by Soumya *et al* (2014)⁷. The difference in mean serum calcium, alkaline phosphatase, and parathormone levels between the two groups was not significant. Vitamin D levels in the JIA group were 21.85 (7.29) higher than in the control group.

According to Finch *et al* (2018)⁸, out

of 38 studies looking at 25(OH)D levels in children with chronic arthritis, 32 (84.2%) revealed that a large number of children had inadequate (75 nmol/L) levels. The findings also suggest that children suffering from chronic arthritis have low Vitamin D levels.

When compared to patients who did not get Vitamin D, patients who received Vitamin D had a higher mean rank (23.28) for Serum Vitamin D levels (16.74). However, Mann-Whitney U test ($U=131.5, W=284.5, p\text{-value}=0.080$ two tailed) indicated that both samples did not have statistically significantly different distribution shapes as the p-value is above the critical value of 0.05. However, given the observed very different distribution shapes warrants further investigation, including further data collection. Peixoto D *et al*⁹ (2013) have evaluated 31 females and 9 males, with a mean age of 22.3 (4-63 years) and disease duration of 14.6 ± 12.1 . In terms of vitamin D intake, they discovered that 32.5 percent had a high intake, 27.5 percent had normal readings, and 40 percent had insufficient intake. They discovered poor vitamin D levels in 75% of the patients, with insufficiency and deficiency rates of 47.5 percent and 27.5 percent, respectively. Vitamin D levels were considerably lower in JIA individuals with less sun exposure and a higher ESR. They also discovered that patients with more joint degeneration had lower vitamin D levels, however this was not statistically significant ($p=0.07$).

Table 1 — Association between Disease Activity Status based on JADAS 27 score and Vitamin D status

		Disease Activity Status * Vit D status Crosstabulation			Total
		Vit D status			
		Deficiency	Insufficiency	Sufficiency	
Disease Activity Status :					
Inactive	Count	4	3	2	9
	% within Disease Activity Status	44.4%	33.3%	22.2%	100.0%
	% within Vit D status	26.7%	15.8%	33.3%	22.5%
		10.0%	7.5%	5.0%	22.5%
Low	Count	1	2	1	4
	% within Disease Activity Status	25.0%	50.0%	25.0%	100.0%
	% within Vit D status	6.7%	10.5%	16.7%	10.0%
		2.5%	5.0%	2.5%	10.0%
Moderate	Count	3	2	0	5
	% within Disease Activity Status	60.0%	40.0%	0.0%	100.0%
	% within Vit D status	20.0%	10.5%	0.0%	12.5%
		7.5%	5.0%	0.0%	12.5%
High	Count	7	12	3	22
	% within Disease Activity Status	31.8%	54.5%	13.6%	100.0%
	% within Vit D status	46.7%	63.2%	50.0%	55.0%
		17.5%	30.0%	7.5%	55.0%
Total	Count	15	19	6	40
	% within Disease Activity Status	37.5%	47.5%	15.0%	100.0%
	% within Vit D status	100.0%	100.0%	100.0%	100.0%
	% of Total	37.5%	47.5%	15.0%	100.0%

A total of 154 patients (61 percent females, 88 percent non-Hispanic whites) were included in the study by Pelajo CF *et al* (2012)¹⁰. The average age of the participants was 10.6 years. The average 25(OH)D level in the blood was 29.2 ng/ml. Vitamin D deficiency was found in 13% of patients, whereas insufficiency was seen in 42%. The median value of JADAS-27 was 5.2. (range 0-30.7). 25(OH)D levels were not linked to JADAS-27 or its individual components in univariate or multivariate analysis. However, there was a non-significant negative connection between serum 25(OH)D levels and JADAS-27 ($r=-0.29$, $p=0.14$) in a subset analysis comprising all new onset (time from disease beginning 3 months) JIA patients ($n=27$). Nearly half of the patients had a deficient 25(OH)D level (20 ng/ml) in the first serum sample and a quarter had a deficient level in both tests, according to Sengler C *et al* (2018)¹¹. Szymanska-Kaluza J *et al*¹² (2013) found that the concentration of 1,25(OH)2D in the serum of children with the disease was statistically significantly lower compared to the children in the control group (34.86 ± 17.14 pg/ml *versus* 48.47 ± 17.99 pg/ml, $p = 0.0015$ on average, respectively). However, 25(OH) D concentrations in both groups were similar (17.36 8.44 ng/ml on average *versus* 17.36 16.29 ng/ml on average), although lower than the recommended rate (ie, 30 ng/ml). When compared to the control group, Wang Y *et al* (2015)¹³ observed that the JIA group had significantly lower serum 25(OH)D3 levels (median: 42.6 nmol/L *versus* 49.9 nmol/L; $P 0.01$). In the JIA group, the percentage of individuals with severe vitamin D deficiency was considerably higher than in the control group (17.0 percent vs 6.6 percent; $P 0.05$).

SUMMARY AND CONCLUSION

In a study of 40 children with JIA, it was discovered that 15 (37.5 percent) had 25(OH)D deficiency and 19 (47.5 percent) had 25(OH)D insufficiency. The ideal Vitamin D status for children with JIA, whether reduced Vitamin D is caused by enhanced utilization or reduced Vitamin D status in children with JIA, the impact of Vitamin D on disease activity, or the involvement of VDR polymorphisms in JIA are all unknowns.

The long-term association between Vitamin D level and JIA in newly diagnosed people has yet to be studied. Investigating the genetic and environmental roles of Vitamin D in the prevention and control of JIA

in children will aid in the discovery of Vitamin D's varied involvement in this disease understanding how genetic variations increase the risk of disease development and being able to identify precise goals for Vitamin D status as a potential adjunct therapy in the treatment of JIA will improve the quality of life of patients and their families.

REFERENCES

- Palacios C, Gonzalez L — Is vitamin D deficiency a major global public health problem? *J Steroid Biochem Mol Biol* 2014; **144**: 138-45.
- Cantorna MT — Mechanisms underlying the effect of vitamin D on the immune system. *Proc Nutr Soc* 2010; **69**: 286-9.
- Ravelli A, Martini A — Juvenile idiopathic arthritis. *Lancet* 2007. **369(9563)**: 767-78.
- Petty RE, Cassidy JT — Chronic arthritis in childhood. In: Cassidy JT, Petty RE (ed). *Textbook of Pediatric Rheumatology* (5th ed). Philadelphia: Elsevier Saunders Company; 2005: 206-341.
- Cantorna MT — Vitamin D and autoimmunity: is vitamin D status an environmental factor affecting autoimmune disease prevalence? *Proc Soc Exp Biol Med* 2000; **223**: 230-3.
- Saurenmann RK, Rose JB, Tyrrell P, Feldman BM, Laxer RM, Schneider R, *et al* — Epidemiology of juvenile idiopathic arthritis in a multiethnic cohort: ethnicity as a risk factor. *Arthritis Rheum*. 2007; **56**: 1974-84.
- Dey S, Jahan A, Yadav TP, Bhagwani DK, Sachdev N — Measurement of bone mineral density by dual energy X-ray absorptiometry in juvenile idiopathic arthritis. *The Indian Journal of Pediatrics* 2014; **81(2)**: 126-32.
- Finch SL, Rosenberg AM, Vatanparast H — Vitamin D and juvenile idiopathic arthritis. *Pediatric Rheumatology* 2018; **16(1)**: 34.
- Peixoto D, Teixeira F, Lucas R, Costa J, Costa L, Araújo D — AB1128 Vitamin d status in patients with juvenile idiopathic arthritis. *Annals of the Rheumatic Diseases* 2013; **71(Suppl 3)**: 702-.
- Pelajo CF, Lopez-Benitez JM, Kent DM, Price LL, Miller LC, Dawson-Hughes B — 25-Hydroxyvitamin D levels and juvenile idiopathic arthritis: Is there an association with disease activity? *Rheumatology international* 2012; **32(12)**: 3923-9.
- Sengler C, Zink J, Klotsche J, Niewerth M, Liedmann I, Horneff G, *et al* — Vitamin D deficiency is associated with higher disease activity and the risk for uveitis in juvenile idiopathic arthritis-data from a German inception cohort. *Arthritis Research & Therapy* 2018; **20(1)**: 276.
- Szymanska-Kaluza J, Biernacka-Zielińska M, Stańczyk J, Smolewska E — Vitamin D level in children with juvenile idiopathic arthritis and its correlation with clinical picture of the disease. *Reumatologia/Rheumatology* 2013; **51(4)**: 271-6.
- Wang Y, Lu MP, Teng LP, Guo L, Xu YP, Zou LX, Tong MQ — Association of vitamin D concentrations with juvenile idiopathic arthritis. *Zhongguo dang dai er ke za zhi= Chinese journal of contemporary pediatrics* 2015; **17(4)**: 375-8.

Original Article

A Study to find out the Association and Correlation between the Serum Uric Acid Levels with the Patients having Impaired Glucose Tolerance

Bapilal Bala¹, Pradip Kumar Chowdhury², Ujjwal Kumar Roy³, Aneek Ghosh⁴

Background : The Impaired Glucose Tolerance (IGT) is a pre-diabetic condition having high risk of developing T2DM. Hence, the most important measures to prevent development of T2DM are to target the subjects with IGT. In Metabolic Syndrome the Insulin resistance as well as Hyperinsulinemia are associated with Hyperuricemia^{1,2}. Furthermore, the risk of progression to type 2 diabetes are increased in presence of Hyperuricemia in patients having an IGT³⁻⁵. Hence, we have designed our study to detect any association and congruence between the Uric acid level and the patients having IGT.

Materials and Methods : A cross-sectional cum observational study was carried out involving the 151 individuals of >40 years but <80 years. The patients with Glucose level 140 to 199 mg/dl after 2 hours of 75 g oral Glucose was considered as IGT. The control groups having Glucose level <140 mg/dl. The patients with overt Diabetes Mellitus, altered serum Uric acid level, taking any drugs that may lead to altered Uric acid metabolism, Renal disease, Chronic liver disease, Heart failure and carcinoma were excluded from this study.

Results and analysis : The mean value of Uric acid of persons with normal GTT was 4.57 mg/dL and standard deviation was 0.528; whereas IGT groups had mean Uric acid level 7.01 mg/dL with standard deviation of 1.194. The value of serum Uric acid >5.15 mg/dL might predict impaired Glucose tolerance with the sensitivity 82.7% and specificity 89%. The area under the curve revealed a value of 0.915 and the 95% confidence interval was in between 0.859 and 0.970. The details of statistical analysis revealed the statistically significant correlation (*p value*<0.001) between the serum Uric acid levels and Glucose tolerance.

Conclusion : The IGT population those may turn into overt diabetes can be predicted by their increasing serum Uric acid concentration. Thus early recognition of IGT population by a simple measurement of uric acid in serum can help to undertake the preventive measures of the development to overt diabetes.

[J Indian Med Assoc 2021; 119(12): 40-4]

Key words : Uric acid, Glucose intolerance, Diabetes mellitus, Hyperuricemia.

As Impaired Glucose Tolerance (IGT) is a pre-diabetic condition, so it may be used to identify people at high risk of developing Diabetes Mellitus. Now it has been well recognized that IGT is a noticeable primary stage in the natural course of Type 2 Diabetes Mellitus (T2DM) which carries a significant risk of producing cardiovascular disease and mortality^{6,7}. There are increasing evidence proving that diabetes can be prevented or halted by modifications of lifestyle or using anti-diabetic drugs. Therefore, majority of the preventive

Editor's Comment :

- A statistically significant correlation found between serum uric acid levels and impaired glucose tolerance.
- A simple test like estimation of serum uric acid may predict the person having IGT.
- Thus early recognition of IGT population can help to undertake the preventive measures of the development to overt diabetes mellitus.

measures targets the population with Impaired Glucose Tolerance^{8,9}. Now American Diabetic Association (ADA) recommends screening for IGT among population of ≥45 years of age especially those with overweight or obese. The IGT remains unrecognized in many subjects in the field of clinical practice after the revised diagnostic criteria for diabetes ascertained by ADA and World Health Organization (WHO)¹⁰.

Impaired Insulin secretion as well as its resistance can lead to Glucose intolerance, and finally give rise to Diabetes Mellitus. But, which defect originate first and which relates IGT with various alterations in Glucose Homeostasis is still remains unclear¹¹. The

¹MD (Gen Medicine), Associate Professor, Department of General Medicine, Maharaja Jitendra Narayan Government Medical College and Hospital, Cooch Behar 736101

²MD (Gen Medicine), Assistant Professor, Department of General Medicine, Diamond Harbour Government Medical College, Diamond Harbour, South 24 Parganas 743331 and Corresponding Author

³MD (Gen Medicine), Specialist Medical Officer (General Medicine), Islampur Sub-divisional Hospital, Uttar Dinajpur 733202

⁴MBBS, Resident Medical Officer, Department of Critical Care Medicine, Rabindranath Tagore International Institute of Cardiac Sciences, Mukundapur, Kolkata 700099

Received on : 27/09/2021

Accepted on : 03/12/2021

subjects with IGT shows Hyperinsulinemia and or increasing Insulin resistance or may have defective insulin secretion in response to Glucose load¹². The "Insulin Resistance" denotes the impaired biochemical response to exogenously administered or endogenously secreted Insulin. It is manifested by impaired Insulin mediated transport and metabolism of Glucose in Liver, Adipose Tissue, and Skeletal Muscle¹³. The insulin resistance plays a major role in the development of IGT and Diabetes Mellitus. It is present for years before the onset of diabetes. So, IGT is the pre-diabetic condition in asymptomatic patient who may have Insulin resistance. There are several biochemical markers including Uric acid, which have consistent correlation with IGT. When there is derangement of Glucose Metabolism, there is alteration of blood Uric acid level also. So, in the reverse way, when elevated Blood Uric acid level is found in biochemical report, it can be predicted that there might be presence of impairment of glucose tolerance. Uric acid is the end product of the purine metabolism. A positive association was well observed between elevated serum Uric acid levels and the development of Type 2 Diabetes Mellitus (T2DM)^{5,14,15}. Moreover, the individuals with Impaired Glucose Tolerance having elevated serum uric acid level was shown more risk of developing T2DM^{11,16,18}.

The Uric acid can play a role of pro-oxidant; hence it may be used both as a marker of oxidative stress as well as an antioxidant therapeutically¹⁹. The soluble form of Uric acid, Urate can chelate the transition metals and can scavenge both the superoxide as well as the Hydroxyl Radicals²⁰. Hyperuricemia is associated with Insulin resistance and or hyperinsulinemia in the Metabolic Syndrome²¹. While some studies clearly demonstrated an elevated Serum Uric acid levels in Pre-diabetes and Diabetes mellitus patients, some other studies have shown a declining trend of the serum uric acid levels with increasing blood glucose concentration²²⁻²⁴. However, in a recently conducted meta-analysis including eleven studies, the elevated Serum Uric Acid level was closely associated with a higher risk of developing Diabetes Mellitus^{3,25,26}. In addition, Hyperinsulinemia, Owing to insulin resistance in patients with metabolic syndrome, can increase serum uric acid levels by decreasing urinary excretion of Uric acid as well as accumulating the substrates for Uric acid production^{11,22}.

Therefore, this study was designed to find out any association and or correlation of serum Uric acid level with IGT, considering the relevant clinical, biochemical and the anthropometric data.

MATERIALS AND METHODS

A hospital based cross-sectional observational study was carried out in Medical College & Hospital, Kolkata from 01/02/ 2012 to 31/07/2012. The 151 patients of >40 years but <80 years were selected from Outpatient department of General Medicine and Diabetic Clinic after detailed history and clinical examination. The patients having blood Glucose level between 140 mg/dl and 199 mg/dl after two hours of a 75 g oral Glucose challenge were only included in this study. The control population group was considered having no Impaired Glucose Tolerance. The patients with overt Diabetes Mellitus, having altered serum Uric acid level, taking any drugs that may lead to altered Uric acid metabolism, Renal disease, Chronic liver disease, Heart failure, Carcinoma etc were excluded from this study. About 2.5 ml whole blood was collected in sodium fluoride containing vial for estimation of blood glucose concentration by Hexokinase Method and about 3.5 ml clotted blood was used for determination of serum uric acid level by Trinder reaction (Enzymatic, Uricase PAP) method. The entire biochemical tests and other relevant routine investigations were performed in the Department of Biochemistry of this College. The statistical analysis was done applying standard statistical methods with the help of SPSS, EPI INFO and assuming a null hypothesis.

ANALYSIS AND RESULTS

Among the 151 study subjects, 55% (83 persons) were male and 45% (68 persons) were female. About 65.6% (N =99) subjects have shown normal OGTT, whereas impaired OGTT (IGT) were observed in 34.4% (N= 52) of the study subjects. The 51.5% (n = 51) of subjects were contributed by male and 48.5% (n = 48) by female among the subjects having normal Glucose Tolerance Test (n= 99). In contrast, among the IGT group (n = 52) the male subjects were significantly more in number; ie, 61.5% (n = 32) compared to female subjects which is 38.5% (n = 20). In age group 41- 50 years IGT found in 43.8 %, in 51-60 years it was 30.3 %, in 61-70 years it was 58.3 % and in the age group 71-80 years IGT was found in 16.7% among male subjects. On the other hand in female subjects in age group 41-50 years IGT found in 26.5 %. In age group 51-60 years it was 30%, in age group 61-70 years it was 40% and in 71-80 years it was 25 %. The more number of IGT cases were found in lower age groups (ages between 41 and 60 years) whereas less cases were found in higher age group (ages between 71 and 80 years) among subjects having IGT(n = 52)(Table 1).

The mean value of Uric acid of persons with normal GTT was 4.57 mg/dl and standard deviation was 0.528 and IGT groups showed mean Uric acid level 7.01 mg/dl and standard deviation of 1.194 (Tables 2 & 3).

Serum Uric acid level ≥ 5.15 mg/dl may predict Impaired Glucose Tolerance with sensitivity 82.7% and specificity 89%. AUC = 0.915 with 95% confidence interval is in between 0.859 -0.970 (Vide ROC curve and Table 4).

The Tables 5 & 6 with descriptive statistics of serum Uric acid and GTT shows significant co-relation between Uric acid and GTT. p value is <0.001 with a correlation of 0.847.

DISCUSSION

Though diabetes is a global epidemic disease but with modern therapy the management of diabetes is very effective and increases the life span of diabetic patients. Thus it can actually increase the morbidity and obviously the cost of therapy. Hence, prevention of diabetes is always desirable. Pre-diabetic patient shows insulin resistance as well as glucose intolerance¹. Therefore patient with pre-diabetic state should be diagnosed earlier for taking preventive measures. There are several costly investigations like serum Insulin assay available for uses. In day to day practice, we need to look for some cost effective investigations. The oral glucose tolerance test and the serum uric acid level estimation are essay to perform

Table 1 — Sex and age-wise distribution of the normal and IGT group among the study population

Total Patients n = 151		OGTT		Total
		Normal	IGT	
Age (years) :				
41 – 50	Number	18	14	32
	Percentage	56.3%	43.8%	100%
51 – 60	Number	23	10	33
	Percentage	69.7%	30.3%	100%
Male (Total n = 83) :				
61 – 70	Number	5	7	12
	Percentage	41.7%	58.3%	100%
71 – 80	Number	5	1	6
	Percentage	83.3%	16.7%	100%
Total	Number	51	32	83
	Percentage	61.4%	38.6%	100%
Female (Total n = 68) :				
41 – 50	Number	25	9	34
	Percentage	73.5%	26.5%	100%
51 – 60	Number	14	6	20
	Percentage	70%	30%	100%
61 – 70	Number	6	4	10
	Percentage	60%	40%	100%
71 – 80	Number	3	1	4
	Percentage	75%	25%	100%
Total	Number	48	20	68
	Percentage	70.6%	29.4%	100%

Table 2 — Age and sex wise distribution of mean uric acid level (mg/dL) among normal and IGT population

Normal Glucose Tolerance		Impaired Glucose Tolerance (IGT)	
Age Group	Mean uric acid level	Age Group	Mean uric acid level
Male (Total n =51)		Male (Total n = 32)	
41 - 50	4.63	41 - 50	6.62
51 - 60	4.54	51 - 60	7.13
61 - 70	4.56	61 - 70	7.89
71 +	4.44	71 +	7.60
Total	4.56	Total	7.09
Female (Total n = 48)		Female (Total n = 20)	
41 - 50	4.61	41 - 50	7.09
51 - 60	4.56	51 - 60	6.93
61 - 70	4.62	61 - 70	6.32
71 +	4.43	71 +	6.90
Total	4.59	Total	6.88
All Sex (Total n = 99)		All Sex (Total n = 52)	
41 - 50	4.62	41 - 50	6.80
51 - 60	4.55	51 - 60	7.06
61 - 70	4.59	61 - 70	7.32
71 +	4.44	71 +	7.25
Total	4.57	Total	7.01

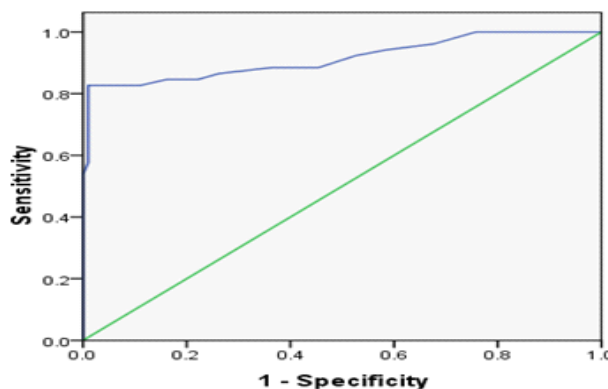
Table 3 — Mean uric acid level (mg/dL) in persons with normal and impaired GTT

OGTT	Mean	Number	Std. deviation
Normal	4.57	99	0.528
Impaired (IGT)	7.01	52	1.194
Total	5.41	151	1.419

OGTT – Oral glucose tolerance test, IGT – Impaired glucose tolerance test, GTT – Glucose tolerance test

and are less costly. Whether there is any relationship present in between them is a matter of interest to clinical investigators. According to published literature the serum uric acid level is increased in patients with IGT. For this reason several prospective and cross-sectional studies have been or being performed over this matter^{9,16,23}.

ROC Curve



Diagonal segments are produced by ties.

Table 4 — Area under the curve (AUC) :
Test result variables – Uric acid

Area	Std. error	Asymptomatic Significance	Asymptomatic 95% Confidence Interval	
			Lower Bound	Upper Bound
0.915	0.028	0.000	0.859	0.970

Table 5 — Correlation of uric acid and GTT

Correlations		Uric acid	GTT
Uric acid	Pearson Correlation	1	0.847**
	Sig. (2-Tailed)		0.000
	Number	151	151
GTT	Pearson Correlation	0.847**	1
	Sig. (2-Tailed)	0.000	
	Number	151	151

**Correlation is 0.01 (2-Tailed) and it is significant.

Table 6 — Correlation between serum uric acid level and GTT

	Mean	Standard deviation	Number
Uric acid level	5.41	1.419	151
GTT	135.75	25.948	151

In our study, out of 151 study subjects IGT subjects were 52 in which 32 were male and 20 were female. Among the total study population, only 6.6% people had age in between 71-80 years. The majority of the study population (43.7%) had age in between 41-50 years, and 35% and 14.6% people were of age group between 51-60 years and 61 – 70 years respectively. 34.4% subjects had Impaired Glucose Tolerance test (IGTT). Among the person with IGT 44% subjects had age in between 41-50 years and 51% in between 51-70 years. Person with IGT were mostly male (61.5%) in this study population. But if we consider the age distribution of subjects with IGTT; there were no significant difference in IGT cases between male and female in the age group of 51-70 years (88.6% male *versus* 70% female). But in the age group of 71-80 years, the significant number of subjects with IGT were female (25% *versus* 16.7%). Serum Uric acid had been measured in all study population. The mean uric acid level was 5.41 mg/dl with a Standard Deviation (SD) of 1.419. In the subjects with normal Glucose Tolerance Test, the mean serum uric acid level was 4.57 mg/dl with a SD of 0.528, whereas in the subjects with IGT the mean serum Uric acid level was 7.01 mg/dl with a SD of 1.194. Therefore, in our study there was no significant sex and age specification of increased serum Uric acid level and IGT but with this statistical analysis it was found that there was a significant correlation in between elevated serum Uric acid level

and IGT ($r = 0.847$), P value <0.001 . It was also observed that the serum uric acid level ≥ 5.15 mg/dl had 82.7% sensitivity and 89% specificity rate to predict the presence of IGT.

The results of our study were similar with results of other studies of same interest conducted across the world. In many populations it was shown that this association is more in female population²⁷⁻²⁹.

CONCLUSION

In this study, both the male and female subjects were included having different age groups with no such variations found; and in all age groups of both sexes there were linear relationships between the serum uric acid level and IGT. As only two important variables (IGT and Uric acid) were included in this study, so different association were not observed but an obvious correlation was found between IGT and Serum Uric acid level. By excluding other modifiable factors (which may alter the results of the variables) it is concluded that elevated serum uric acid level is associated with almost all Impaired Glucose Tolerance persons. So a simple test like Serum Uric acid level may predict the person having IGT, that in near or distant future may turn it to overt diabetes.

Limitations :

Some noticeable limitations of this study were – the patients with Diabetes Mellitus were excluded, Serum Insulin Estimation was not done, small sized study population, the constant time limit, and different variables were excluded owing to limitations of funds. In the future a large population based prospective long term follow up study with different variables may be conducted to overcome such limitations.

Conflict of Interest : None.

REFERENCES

- 1 Krishnan E, Pandya BJ, Chung L, Hariri A, Dabbous O — Hyperuricemia in young adults and risk of insulin resistance, prediabetes, and diabetes: A 15-year follow-up study. *Am J Epidemiol* 2012; **176(2)**: 108-16.
- 2 Modan M, Halkin H, Karasik A, Lusky A— Elevated serum uric acid—a facet of hyperinsulinaemia. *Diabetologia* 1987; **30(9)**: 713-8.
- 3 Whitehead TP, Junger I, Robinson D, Kolar W, Pearl A, Hal A— Serum urate, Serum glucose and Diabetes. *Ann Clin Biochem.* 1992; **29**: 159-61.
- 4 Hairong N, Zengchang P, Shaojie W — Serum uric acid, plasma glucose and diabetes. *Diab Vasc Dis Res* 2010; **7(1)**: 40-6.
- 5 Cook DG, Shaper AG, Thelle DS, Whitehead TP— Serum uric acid, serum glucose and diabetes: relationships in a population study. *Postgrad Med J* 1986; **62**: 1001-6.

- 6 Agamah ES, Srinivasan SR, Webber LS, Berenson GS — Serum uric acid and its relation to cardiovascular disease risk factors in children and young adults from a biracial community: The Bogalusa Heart Study. *J Lab Clin Med* 1991, **118**: 241-9.
- 7 Bhole V, Choi JW, Kim SW, de Vera M, Choi H— Serum uric acid levels and the risk of type 2 diabetes: A prospective study. *Am J Med* 2010; **123(10)**: 957-61.
- 8 Yamashita S, Matsuzawa Y, Tokunaga K, Fujioka S, Tarui S — Studies on the impaired metabolism of uric acid in obese subjects: marked reduction of renal urate excretion and its improvement by a low-calorie diet. *Int J Obes* 1986; **10**: 255-64.
- 9 Niskanen L, Laaksonen DE, Lindstrom J — Serum uric acid as a harbinger of metabolic outcome in subjects with impaired glucose tolerance: The finnish diabetes prevention study. *Diabetes Care* 2006; **29(3)**: 709-11.
- 10 (a) Definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia. Geneva: World Health Organization; 2006. (b) Report of a World Health Organization consultation. Use of glycated haemoglobin (HbA1c) in the diagnosis of diabetes mellitus, *Diabetes Res Clin Pract* 2011; **93**: 299-309. (c) American Diabetes Association, Diagnosis and classification of diabetes mellitus. *Diabetes Care* 2014; **37(Suppl. 1)**: S81–S90.
- 11 Kodama S, Saito K, Yachi Y, Asumi M, Sugawara A, Totsuka K, *et al* — Re - association between serum uric acid and development of type 2 diabetes mellitus. A Meta-Analysis. *Diabetes Care* 2009; **32(9)** : 1737-42.
- 12 Sluijs I, Beulens JW, van der ADL, Spijkerman AM, Schulze MB, van der Schouw YT— Plasma uric acid is associated with increased risk of type 2 diabetes independent of diet and metabolic risk factors. *J Nutr* 2012.
- 13 Quinones Galvan A, Natali A, Baldi S, Frascerra S, Sanna G, Ciociaro D, Ferrannini E — Effect of insulin on uric acid excretion in humans. *Am J Physiol* 1995; **268**: E1-5
- 14 Adlija C, Sabina S, Amra MD, Bakira C, Tanza D, Maja M, *et al* — Relevance of Uric Acid In Progression of Diabetes Mellitus. *Journal of Basic Science* 2010; **10(1)**: 54-9.
- 15 Matsuura F, Yamashita S, Nakamura T, Nishida M, Nozaki S, Funahashi T, *et al* — Effect of visceral fat accumulation on uric acid metabolism in male obese subjects: visceral fat obesity is linked more closely to overproduction of uric acid than subcutaneous fat obesity. *Metabolism* 1998; **47**: 929-33.
- 16 Kramer CK, von Muhlen D, Jassal SK, Barrett-Connor E— A prospective study of uric acid by glucose tolerance status and survival: The rancho bernardo study. *J Intern Med* 2010; **267(6)**: 561-6.
- 17 Perry IJ, Wannamethee SG, Walker MK, Thomson AG, Whincup PH, Shaper AG — Prospective study of risk factors for development of non-insulin dependent diabetes in middle aged British men. *BMJ* 1995; **310**: 560-4.
- 18 Chien K-L, Chen M-F, Hsu H-C, Chang W-T, Su T-C, Lee Y-T, Hu FB — Plasma uric acid and risk of type 2 diabetes in a Chinese community. *Clin Chem* 2008; **54**: 310-6.
- 19 Glantzounis GK, Tsimoyiannis EC, Kappas AM, Galaris DA — Uric acid and oxidative stress. *Current Pharmaceutical Design* 2005; **11**: 4145-51.
- 20 Sautin YY, Nakagawa T, Zharikov S, Johnson RJ — Adverse effects of the classic antioxidant uric acid in adipocytes: NADPH oxidase- mediated oxidative/nitrosative stress. *Am J Physiol Cell Physiol* 2007; **293**: C584-96.
- 21 Chiou WK, Wang MH, Huang DH, Chiu HT, Lee YJ, *et al.* — The relationship between serum uric acid level and metabolic syndrome: differences by sex and age in Taiwanese. *J Epidemiol* 2010; **20**: 219-24.
- 22 Bandaru P, Shankar A — Association between serum uric acid levels and diabetes mellitus. *International Journal of Endocrinology* 2011; **2011**: 1-6.
- 23 Rabari K, Samadhiya A, Saha S, Sharma A, Mirza AA, Naithani M — A study to assess serum uric acid level and its association with glycemic parameters in individuals with prediabetes and diabetes mellitus in a North Indian tertiary care hospital. *Yuva J Med Sci* 2018; **4**: 12-8.
- 24 Nan H, Dong Y, Gao W, Tuomilehto J, Qiao Q — Diabetes associated with a low serum uric acid level in a general Chinese population. *Diabetes Res Clin Pract* 2007; **76**: 68-74.
- 25 Causevic A, Semiz S, Macic Dzankovic A — Relevance of uric acid in progression of type 2 diabetes mellitus. *Bosn J Basic Med Sci* 2010; **10(1)**: 54-9.
- 26 Herman JB, Goldburt U — Uric acid and Diabetes: Observation in a population study. *The Lancet* 1982; **2(7)**: 240-3.
- 27 Meisinger C, Thorand B, Schneider A, Stieber J, Döring A, *et al*— Sex differences in risk factors for incident type 2 diabetes mellitus. The MONICA Augsburg Cohort Study. *Arch Intern Med* 2002; **162**: 82-9.
- 28 Finn R, Jones PO, Tweedie MCK, Hall SM, Dinsdale OF, Bowidillon RE — Frequency distribution curve of uric acid in the general population. *Lancet* 1966, **2**: 185-7.
- 29 Yuan HJ, Yang XG, Shi XY, Tian R, Zhao ZG — Association of serum uric acid with different levels of glucose and related factors. *Chin Med J (Engl)* 2011; **124(10)**: 1443-8.

Original Article

Impact of Lifestyle Modification and Psychological Interventions in Academic Performance of UG Medical Students, Institution Based Prospective, Cross-sectional Study

Lopamudra (Dhar) Chowdhury¹, Prakash Mohite², Ranjan Bhattacharyya³, Anurag Chaudhuri⁴

Introduction : Mental health is considered as an essential component of health by the World Health Organization. Students may not be able to identify their problem and avoid seeking help often due to reasons of confidentiality or finances.

Materials & Methods : In this study, Undergraduate Medical Students of 1st MBBS and 2nd MBBS, who fulfil the inclusion criteria and are willing to participate in the study, were given standardized questionnaire at random and screened for depression, anxiety or stress as per DASS 21 criteria and included in the study after taking proper individualized consent and approval from the Institutional Ethics Committee. Their academic scores in the last two Internal Assessments (IA1 & IA2) before and after Lifestyle Modification (LM) Psychological Interventions (PI) have been noted. The interventions were given via online (four times, each session lasting for 40 minutes) and classroom based (two monthly sessions lasting for one hour) in a small group counselling (n=59) for 2 months. The academic scores were compared before and after the intervention, as well as the DASS 21 score were noted at the end of the study.

Results & Analysis : The academic performance as well as the DASS 21 Score of the study group noted at the beginning and at end of the study were compared and analyzed statistically by Paired T test and was found to be significant. 225 students of both 1st Professional and 2nd Professional MBBS were screened for standardized DASS 21 Score, of which 15 students from 1st Professional MBBS and 44 students from 2nd Professional MBBS were found to have significant depression, anxiety or stress. Paired T-Test of Internal Assessment 1 and 2 (IA1 & IA2) before and after psychological interventions have shown p value 0.001.

[J Indian Med Assoc 2021; 119(12): 45-50]

Key words : Depression, Anxiety, Stress, Medical students, Initial and Final assessment, Psychological interventions.

Medical Education Curriculum spanning five to six years are very strenuous as the Medical Sciences are rapidly expanding with newer therapeutic options and more indepth understanding of the subject. The extensive course and evaluation process in Medical learning takes a heavy toll on Physical and mental health of Medical Students. The previous studies have found that Medical students are more vulnerable to suffer from depression, anxiety and stress^{1,2}.

Many times, otherwise physically and mentally healthy students suffer from depression, anxiety and stress during their days in Medical Colleges³. The stress of UG students gets compounded for their

Editor's Comment :

■ Undergraduate (UG) Medical students are vulnerable to suffer from depression, anxiety and stress. Lifestyle modifications (LM) and Psychological Interventions (PI) have been found to be beneficial in this present study of four months duration. These interventions helped to reduce depression, anxiety and stress among UG Medical students and also found beneficial objectively as evident from improvement in scoring from Internal Assessment at baseline and following LM & PI (IA1 & IA2).

apprehension for future about getting selected in Postgraduate (PG) examination and job opportunities.

The diagnosis of depression is confirmed by classification system of International Classification of Diseases 10th Division (ICD10)/DSM V (Diagnostic and Statistical Manual of Mental Disorders) who shows following symptoms of depressed or low mood, lack of interest in pleasurable activities (anhedonia), low self-esteem, feelings of inappropriate guilt, autonomic arousal, physiological changes, reduced sleep and appetite, poor concentration and suicidal thoughts^{4,5}.

The stress and anxiety symptoms are characterised by constant worry, muscle tension, free floating anxiety and inability to relax^{6,7}. The perception and experience among medical students are also changing rapidly with

¹DA, MD, Professor and Head, Department of Pharmacology, Murshidabad Medical College & Hospital, Berhampore 742101

²MD, PhD, LLB, Vice Dean (Administration), Professor, Forensic Medicine, Datta Megha Institute of Medical sciences, Sawangi, Wardha, Maharashtra 442004

³MD, DNB, Associate Professor & Head, Department of Psychiatry, Murshidabad Medical College & Hospital, Berhampore 742101 and Corresponding author

⁴MBBS, Junior Resident, Datta Megha Institute of Medical sciences, Sawangi, Wardha, Maharashtra 442004

Received on : 05/11/2021

Accepted on : 22/11/2021

rapidly changing social-milleu. The multiple underlying factors play a crucial role like economic debts for carrying expenses, higher tuition fees in private Medical Colleges, living away from home, higher expectations from family, relatives and peer group etc. all of these factors eventually culminate into heightened stress, anxiety and depression among students.

Unfortunately, extensive literature review have found the paucity of research work in this field especially in Indian context. The mental health issues among medical students are often underdiagnosed and if diagnosed are often remain undertreated. These unresolved issues may lead to increase morbidity due to mental health issues and increase mortality due to suicide. This one of the toughest academic career jeopardizes the professional and personal life Worldwide.

The human resource potential are immense in this target group of the study and it has been found in literature that as high as 40% of children in this age group may suffer from depression, anxiety and both.

It is utmost necessary to prevent suicide among Medical Students which is predicted by stress, anxiety, depression and behavioural manifestations⁸. The students acknowledge that both the incidents and severity of their mental health problems are on rise. In the existing literatures have found that depression, anxiety and stresses have significantly increased amongs the medical students but there had not been enough studies especially highlighting the Psychological Interventions among them. The present study aims at Lifestyle Modification (LM) and Psychological Interventions (PI) on Medical students and how beneficial it can be for them.

In various cross sectional as well as in longitudinal studies across 43 nations it has been found that depressive disorders are seen in 27% Medical students which is affecting their scholastic performances leading to social isolation and causing absenteeism⁹.

The college life is full of adventurism where the students learn new skills, becomes smarter, habituated with newer lifestyles, find new friends, roommates and at times life partners and exposed to new cultures and throws newer challenges in life¹⁰.

MATERIALS AND METHODS

The current study is an attempt to find out the personal lifestyle, attitude, mental state amongst the UG Medical Students with a semi-structured questionnaire and to look for the impact of LM & PI in them. In the semi-structured standardized questionnaire various domains like diet, exercises, yoga, meditation, sleep, interpersonal and familial relationships have been explored as well as the impact

of Lifestyle Modification (LM) & PI have been analyzed.

Apart from LM and advising to follow International Sleep Hygiene, the Psychological Interventions like stress management, time management, Brief Psychodynamic Psychotherapy have been given to students jointly by the first author and by the Head of the Department of Psychiatry Department of a tertiary Medical College of Eastern India (Corresponding author).

Dietary factors also play a very crucial role for keeping the students Physically healthy and medically fit. The balanced diet has been defined as eating adequate amount of calories as per the BMI and physical activities. The vegetable sources like those from legumes, restricting saturated fats in particulars and fats in general, reducing intake of granulated Sugar (<10 gm/day), salt (5gm/day), Sodium (2 gm/day) from the available sources¹⁰.

The adequate duration of sleep amounting 6-8 hours/night avoiding daytime snaps, daily exercises which is defined by at least 150–300 minutes of moderate-intensity aerobic exercises with minimum 75–150 minutes of intensive activity or an equivalent combination of the both throughout the week^{11,12}. The regular meditation had been advised among the students which can be defined as meditation for 12 hours and yoga retreat for around 9 hours and self reflective exercises over a week.

The study design consists of institution based, prospective, observational, cross-sectional study comprising of students of 1st and 2nd MBBS students of tertiary Government Medical College in India. The study has been approved by Scientific Review Committee and Institutional Ethics Committee. The 1st and 2nd Professional MBBS students of the College who are having high depression, anxiety or stress in initial assessment by DASS 21 questionnaire have been included in the study (Cut off score in DASS scale Depression subscale >10, Anxiety subscale >8, Stress subscale >15).

Those students who are willing to participate in the study voluntarily and willing to provide written informed consent have been included in the study. The other professional MBBS students of the same Institute, MBBS Students of other Institutes, students who are unwilling to undergo the study and students who are under any medication or therapy have been excluded from the study. The individualized consent of each participating students and approval from the Institutional Ethics Committee has been taken. Their academic scores in the recent semester examination were noted. All students of 1st Professional MBBS and 2nd Professional MBBS were advised to undertake

DASS 21 Questionnaire and from those 225 students, 59 students having higher cut-off score in any of the sub-items have been included in the study. In the questionnaire, their lifestyle history regarding sleep, diet, exercise, meditation, family problem, relationship problem, work stress or addiction have been incorporated.

The inclusion of the subjects was anonymous and voluntary. All participants were included after written informed consent. The students were given printed written information and procedure of consent along with the DASS-21 questionnaire. In addition to DASS-21, information was sought regarding gender; year of study; attendance of a pre-medical University Preparatory Program (UPP); housing and living; addiction history and/or use of any recreational drugs. An additional open-ended section was included to allow students to reflect on the reason/reasons, if any, for their choices in DASS-21. The data from the open-ended section were grouped based on common themes.

Formal in depth interview regarding the lifestyle including diet, exercise, sleep, meditation/ yoga, interpersonal or familial problem if any were noted in structured questionnaire forms. LM & PI were jointly given to the students by the investigator and the HOD of Psychiatry Department of the Institution regularly via Whatsapp group and classroom based small groups at small intervals for four months. The academic scores in initial and final assessments (IA1 & IA2) completion were compared both before and after the intervention, as well as the DASS 21 score were noted at the end of the study. The DASS subitems such as depression, anxiety, and stress can be rated as normal, mild, moderate, and extremely severe and each item is scored in a Likert scale from 0 (didn't apply to me all) to 3 (much or mostly applied to me) in the past 1 week. The academic performance as well as the DASS 21 score of the study group noted at the beginning and at end of the study were compared and analyzed for any statistical significance¹⁴.

The DASS 21 score and the academic score of students included in the study were compared before and after the intervention were undertaken. Various lifestyle parameters of students, taken into consideration, the depression, anxiety and stress score as per DASS 21 criteria, academic record before and after the intervention were noted down and entered in MS Excel Sheet and assessed by Paired Test for any statistical significance. Validation will be done both by the investigator and senior most faculty of Department of Psychiatry of the same Institute. The DASS 21 score positive students were given interventional lifestyle counselling on regular basis. Their academic score prior

to the intervention as well as at the end of study are to be compared. Their DASS 21 score at the end of study too were assessed for any change.

RESULTS

The study group comprises total 59 Undergraduate students and there are first year (n=15, 24.8 %) and second year students (n= 44, 76.2%) included in the study. The socio demographic variables were compared and their correlation with Depression, Anxiety and Stress subscales (of DASS scale) had been analysed in initial and final evaluation. The initial assessment at baseline before psychological interventions showed that the chi square values are highly significant ($p < 0.001$) across all variables which signifies high levels of baseline depression, anxiety and stress among the first and second year Undergraduates. Among the Students many (n=28 46.1%) complained of having sleep problems and only less than half of them (n=27, 44.7%) have had they are receiving balance nutritious diet in hostel. Only few students (n=11, 18.3 %) were doing regular exercises and all of them who are doing regular exercises are also doing meditation. Among the Students almost half have said (n=29, 49.1%) that they are having current family problems and majority of students (n=32, 52.5%) have acknowledged that they are currently having relationship problems pertaining to relationship break ups, rejection, roommate in adjustability and peer group maladjustment. A significant (n=50, 82.3%) number of students are feeling study related stress and six students (n=6, 10.1%) have acknowledged to have some addiction meeting ICD criteria of substance dependence¹⁵(Table 1).

All those above variables have shown statistically significant at p value 0.001 which suggest the first and second year are having baseline stress with respect to above variables. The final assessment had been done at the end of two months following Psychological Intervention (PI). There are 2 classrooms and 4 online modes of interventions have been done (Table 2). The depression ($p=0.669$), anxiety ($p=0.169$) and stress subscale ($p=0.759$), sleep problems ($p=0.331$), consumption of balance diet ($p= 0.053$), having current family problems ($p=0.252$), current relationship problem ($p=0.061$), study related stress (0.706), addiction problems ($p=0.876$), all these variables were not found statistically significant. However regular exercise ($p=0.031$) and meditation ($p=0.001$), these two variables have been emerged to be statistically significant.

The Paired T -Test of Internal assessment 1 and 2 (IA1 & IA2) before and after Psychological Interventions have shown p value 0.001 which is highly statistically

significant (Table 3). This signifies the successful Psychological Interventions had enabled to reduce level of stress, anxiety and depression among Medical students.

The Crosstab and Pearson's correlation in between various demographic, lifestyles, environmental variables amongst students are shown in Table 4. The depression (IA1) and family Problem are directly correlated (p=0.041); anxiety and meditation are negatively correlated (p=0.038); stress (IA1) and Sleep problems are directly correlated (p=0.028), 'doing regular exercises' variable is negatively correlated with stress (p=0.042), 'having family problems' variable is negatively correlated with stress (IA1) (p=0.001) and 'relationship problem' has been found to be negatively correlated with stress (IA1) (p= 0.001).

Stress in Final assessment (IA2) has been found to be negatively correlated with statistical significance with exercise (p=0.012) and meditation (p=0.030) but directly correlated with family problems (p=0.003). Table 5 shows one sample statistic of Internal Assessment score before (m=10.65±1.703) and after Internal Assessment 2 (Final) (m=12.51±1.612). The IA score has been found to be improved controlling all other confounding variables. In the Table 6, comparing with means with one sample test during initial and final assessment (IA1 & IA2) shows highest significance (p=0.001).

DISCUSSION

Studies have shown that Medical students are more inclined to stress, anxiety and Depression compared to their non-medical peers. Medical students suffer from

Depression and Anxiety Disorders more than their non-medical peer group as medical studies are extremely

Table 1 — Socio-demographic variables and correlation with depression, anxiety and stress subscales in initial intervention

Variable	N (%)	Depression (initial)		Anxiety (initial)		Stress (initial)	
		χ ²	P value	χ ²	P value	χ ²	P value
First year	15 (24.8)	18.520	0.357	13.466	0.409	8.895	0.883
Second year	44 (76.2)						
Sleep problems :							
Yes	28 (46.1)	84.130	0.000**	81.608	0.000**	83.232	0.000**
No	31 (53.9)						
Balanced Diet :							
Yes	27 (44.7)	80.533	0.000**	72.963	0.000**	83.428	0.000**
No	32 (55.3)						
Regular Exercises :							
Yes	11 (18.3)	84.170	0.000**	71.010	0.000**	78.717	0.000**
No	48 (81.7)						
Meditation :							
Yes	11 (18.3)	84.170	0.000**	71.010	0.000**	78.717	0.000**
No	48 (71.8)						
Current family problem :							
Yes	29 (49.5)	78.943	0.000**	76.300	0.000**	86.424	0.000**
No	30 (50.5)						
Current relationship :							
Yes	32 (52.5)	77.533	0.000**	70.359	0.000**	90.550	0.000**
No	27 (47.5)						
Study related stress :							
Yes	50 (82.3)	78.945	0.000**	73.014	0.000**	70.681	0.000**
No	9 (16.7)						
Addiction :							
Yes	6 (10.1)	80.533	0.000**	86.947	0.000**	86.350	0.000**
No	53 (89.9)						

Table 2 — Socio-demographic variables and correlation with depression, anxiety and stress subscales

Variable	N (%)	Depression (initial)		Anxiety (initial)		Stress (initial)	
		χ ²	P value	χ ²	P value	χ ²	P value
First year	15 (24.8)	17.685	0.669	23.587	0.169	17.070	0.759
Second year	44 (76.2)						
Sleep problems :							
Yes	28 (46.1)	27.786	0.146	16.170	0.543	24.310	0.331
No	31 (53.9)						
Balanced Diet :							
Yes	27 (44.7)	19.718	0.539	19.871	0.340	33.685	0.053
No	32 (55.3)						
Regular Exercises :							
Yes	11 (18.3)	17.795	0.662	20.291	0.317	35.925	0.031*
No	48 (81.7)						
Meditation :							
Yes	11 (18.2)	21.531	0.427	15.896	0.600	47.133	0.001**
No	48 (71.8)						
Current family problem :							
Yes	29 (49.5)	23.590	0.313	25.286	0.117	25.991	0.252
No	30 (50.5)						
Current relationship :							
Yes	32 (52.5)	14.346	0.000**	37.858	0.004**	33.081	0.061
No	27 (47.5)						
Study related stress :							
Yes	50 (82.3)	20.967	0.461	16.620	0.549	18.002	0.706
No	9 (16.7)						
Addiction :							
Yes	6 (10.1)	29.809	0.096	16.230	0.576	14.667	0.876
No	53 (89.9)						

demanding and require regular hard work to coping with competition^{16,17}.

Depression, Anxiety and stress if left unrecognized and untreated have high detrimental effect to the individual themselves as well as the society as a whole; with negative outcomes like

medical dropouts, increased suicidal tendency, relationship problems and inability to work effectively. Keeping these in mind, a greater attention is necessary to be given to the psychological well - being of the Medical Students to improve their quality of life and thereby improvement of their academic performance^{18,19}. Symptoms of Depression, Anxiety or Stress may reflect upon their day to day activity, leading to absenteeism, social withdrawal, and lack of interest in studies and

feeling of hopelessness and even suicidal thoughts and attempts^{20,21}. Though there are many studies to establish Depression, Anxiety and Stress among Medical Students, as well as the reasons of such mental state, there are only few interventional study on relieving their depression, anxiety or stress. Demonstration and practice of relaxation exercises, deep breathing exercises, Jacobson's Progressive Muscular Relaxation (JPMR), ways to handle rejection, pitfalls and how to get rid of mobile and social media addiction was also explained in classroom based, large group

counselling sessions by the HOD Department of Psychiatry of the Institute. Students were happy to find someone to confide in about their problems, they could contact the investigator at any moment of need or advice, when they were depressed and could not concentrate in their studies. At the end of study a feedback form was given to all participants. At the end of the study, it was found that there was significant improvement of depression, anxiety as well as stress score among the participants. There was also slight improvement in their academic score in the second internal assessment than the first one.

Table 3 — Paired T-test of Internal Assessment 1 & 2 (CI=95%, 2SD)

Variable	N	Mean	Std Deviation	Std Error of Mean	Significance
Int Assessment 1	59	10.65	1.703	0.222	0.000**
Int Assessment 2	59	12.51	1.612	0.210	

Table 4 — Crosstab and Pearson's correlation in between various Demographic, lifestyle and environmental variables among students

Variables	Sleep	Diet	Exercise	Meditation	Fam Prob	Rel Prob	Study Stress	Addiction
D1								
Pearson correl	-0.137	0.151	-0.050	-0.031	0.267	0.194	0.091	-0.239
Sigf(2 tailed)	0.301	0.255	0.706	0.818	0.041*	0.141	0.494	0.068
A1								
Pearson correl	-0.096	0.059	-0.123	-0.271	0.177	0.040	0.001	-0.248
Sigf(2 tailed)	0.470	0.655	0.352	0.038*	0.180	0.766	0.995	0.058
S1								
Pearson correl	-0.287	0.098	-0.266	-0.345	0.609	0.430	0.055	-0.165
Sigf(2 tailed)	0.028*	0.459	0.042*	0.007**	0.001**	0.001**	0.678	0.212
D2								
Pearson correl	-0.098	0.035	-0.096	-0.023	0.225	0.143	0.173	-0.205
Sigf(2 tailed)	0.459	0.794	0.471	0.860	0.086	0.279	0.190	0.119
A2								
Pearson correl	-0.043	0.164	-0.161	-0.123	0.306	0.250	0.086	-0.196
Sigf(2 tailed)	0.747	0.216	0.224	0.351	0.018*	0.056	0.519	0.138
S2								
Pearson correl	-0.007	0.110	-0.326	-0.283	0.383	0.208	0.028	-0.129
Sigf(2 tailed)	0.959	0.406	0.012*	0.030*	0.003**	0.113	0.835	0.328

Table 5 — One Sample Statistics of Scores of Internal Assessments before and after Psychotherapy

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Internal Assessment 1	59	5	14	10.65	1.703
Internal Assessment 2	59	9	16	12.51	1.612

Table 6 — Comparing means with one sample test during Initial and final assessments and their significance

Variable	t	df	Sig (2 tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Internal Assessment 1	48.059	58	0.000**	10.653	10.21	11.10
Internal Assessment 2	59.597	58	0.000**	12.508	12.09	12.93

There are certain limitations of the study. The sample size is only modest (n=59) and the study duration is only four months. A longer duration study with a large sample size could have increased the power of the study. However in the present study there had been no dropouts. The results obtained from this study could be more helpful to extrapolate in future. The Internal Assessment Method of Academic Performance undertaken in this study too is not standardized as for complete assessment the overall performance of both formative as well as summative assessments should have been incorporated.

Many studies throughout the world show that medical students suffer from depression, anxiety and stress due to their excessive work pressure, extensive syllabus and various other reasons due the lifestyle they lead. This study proves that though depression, anxiety as well as stress may exist in medical students, these can be overcome by proper identification of its existence, bringing out the causes and providing appropriate LM and PI. The often students often becomes home sick and they can't adjust with their room-mates, peer group, the new environment or work culture they are now exposed to. Hence, they need faculties at their aid, whom they can depend on, confide in, for the solution of their mental anxiety, stress or depression. Such a measure if undertaken in all Medical schools would certainly be helpful in preventing hazardous consequences like suicides and improve the Mental State of many Medical Students improving their quality of life and bringing out better academic performance in the long run.

ACKNOWLEDGEMENTS

Dr Ritu Ghosh, Assistant Professor, Department of Community Medicine, Murshidabad Medical College & Hospital.

Source of funding : Nil.

Conflicts of interest : None.

REFERENCES

- Mao Y, Zhang N, Liu J, Zhu B, He R, Wang X — A systematic review of depression and anxiety in medical students in China. *BMC Med Educ* 2019; **19(1)**: 327. doi: 10.1186/s12909-019-1744-2. PMID: 31477124; PMCID: PMC6
- Liu CH, Stevens C, Wong SHM, Yasui M, Chen JA— The prevalence and predictors of mental health diagnoses and suicide among US college students: Implications for addressing disparities in service use. *Depress Anxiety* 2019; **36(1)**: 8-17. doi: 10.1002/da.22830. Epub 2018 Sep 6. PMID: 30188598; PMCID: PMC6628691.
- Altannir Y, Alnajjar W, Ahmad SO, Altannir M, Yousuf F, Obeidat A, Al-Tannir M — Assessment of burnout in medical undergraduate students in Riyadh, Saudi Arabia. *BMC Med Educ* 2019; **19(1)**: 34. doi: 10.1186/s12909-019-1468-3. PMID: 30683088; PMCID: PMC6347822.
- Park H, Castaño J, Ávila P, Pérez D, Berinsky H, Gambarte L, et al — An Information Retrieval Approach to ICD-10 Classification. *Stud Health Technol Inform* 2019; **264**: 1564-1565. doi: 10.3233/SHTI190536. PMID: 31438233.
- Loas G— Les particularités du DSM-V [The DSM-V : An overview]. *Rev Med Brux*. 2016;**37(4)**:231-234. French. PMID: 28525220.
- Ngasa SN, Sama CB, Dzekem BS, Nforchu KN, Tindong M, Aroke D, et al — Prevalence and factors associated with depression among medical students in Cameroon: a cross-sectional study. *BMC Psychiatry* 2017; **17(1)**: 216. doi: 10.1186/s12888-017-1382-3. PMID: 28599624; PMCID: PMC5466797.
- Rotenstein LS, Ramos MA, Torre M, Segal JB, Peluso MJ, Guille C, et al — Prevalence of Depression, Depressive Symptoms, and Suicidal Ideation Among Medical Students: A Systematic Review and Meta-Analysis. *JAMA* 2016; **316(21)**: 2214-2236. doi: 10.1001/jama.2016.17324. PMID: 27923088; PMCID: PMC5613659
- Dyrbye LN, Thomas MR, Shanafelt TD— Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med* 2006; **81(4)**: 354-73. doi: 10.1097/00001888-200604000-00009. PMID: 16565188.
- Sugumar D, Fleming O, Ogden K — A mental health programme for medical students. *Clin Teach* 2019; **16(4)**: 352-55. doi: 10.1111/tct.13052. Epub 2019 Jul 7. PMID: 31282124.
- Healthy diet — Available from <https://www.who.int/news-room/fact-sheets/detail/healthy-diet> last accessed on January 4th, 2021.
- Chen MY, Wang EK, Jeng YJ— Adequate sleep among adolescents is positively associated with health status and health-related behaviors. *BMC Public Health* 2006; **6**: 59. Published 2006; 8. doi:10.1186/1471-2458-6-59
- Physical Activity — <https://www.who.int/news-room/fact-sheets/detail/physical-activity> last accessed on January 4th, 2021.
- Regular meditation more beneficial than vacation. Available from <https://www.health.harvard.edu/blog/relaxation-benefits-meditation-stronger-HYPERLINK> "https://www.health.harvard.edu/blog/relaxation-benefits-meditation-stronger-relaxation-benefits-taking-vacation-2016102710532"relaxation-benefits-taking-vacation-2016102710532 last accessed on January 4th, 2021.
- Lovibond PF, Lovibond SH — The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther* 1995; **33**: 335-43. [PubMed] [Google Scholar]
- Mental and behavioral disorders due to psychoactive substance use F10-F19. Available from <https://www.icd10data.com/ICD10CM/Codes/F01-F99/F10-F19> last accessed on January 4th, 2021.
- Iqbal S, Gupta S, Venkatarao E— Stress, anxiety and depression among medical undergraduate students and their socio-demographic correlates. *Indian J Med Res* 2015; **141(3)**: 354-7. doi: 10.4103/0971-5916.156571. PMID: 25963497; PMCID: PMC4442334.
- Kulsoom B, Afsar NA— Stress, anxiety, and depression among medical students in a multiethnic setting. *Neuropsychiatr Dis Treat* 2015; **11**: 1713-22. doi: 10.2147/NDT.S83577. PMID: 26213470; PMCID: PMC4509544.
- Sherina MS, Rampal L, Kaneson N— Psychological stress among undergraduate medical students. *Med J Malaysia* 2004; **59(2)**: 207-11. PMID: 15559171.
- Tran TD, Tran T, Fisher J — Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *BMC Psychiatry* 2013; **13**: 24. doi: 10.1186/1471-244X-13-24. PMID: 23311374; PMCID: PMC3566910.
- Wang X, Hegde S, Son C, Keller B, Smith A, Sasangohar F — Investigating Mental Health of US College Students During the COVID-19 Pandemic: Cross-Sectional Survey Study. *J Med Internet Res* 2020; **22(9)**: e22817. doi: 10.2196/22817. PMID: 32897868; PMCID: PMC7505693.
- Chatterjee SS, Bhattacharyya R, Bhattacharyya S, Gupta S, Das S, Banerjee BB — Attitude, practice, behavior, and mental health impact of COVID-19 on doctors. *Indian J Psychiatry* 2020; **62(3)**: 257-65. doi: 10.4103/psychiatry.IndianJPsychiatry_333_20. Epub 2020 May 15. PMID: 32773868; PMCID: PMC7368446.

Original Article

Thyroid Autoimmunity in Children and Young Adults with Type 1 Diabetes and Their Siblings

Janani Ramesh¹, Sougata Mahato², Anju Seth³, Ekta Debnath⁴

Introduction : Type 1 Diabetes Mellitus (T1DM) and Autoimmune Thyroid Disease (AITD) are often associated. AITD is diagnosed by the presence of antibodies to Thyroglobulin (Tg), Thyroid Peroxidase (TPO) and Thyroid-stimulating Hormone Receptor (TSHR). Considering the risk of the genetic component in diabetes and autoimmune immune diseases, this study aims study thyroid autoimmunity in children and young adults with Type 1 diabetes and their siblings.

Methods : Serum levels of free T4, TSH and anti-TPO antibody were measured in 360 children and young adults including Type 1 diabetics, their siblings and age and sex matched controls.

Results : The levels of anti-TPO antibody among the three groups were significantly different ($p < 0.001$). Also anti-TPO titre and TSH levels were found to be significantly different across the 3 groups.

[J Indian Med Assoc 2021; 119(12): 51-4]

Key words : Adolescents, Anti TPO antibody, Siblings, Type 1 Diabetes.

Type 1 Diabetes Mellitus (T1DM) is an Endocrine disorder caused by an aberrant immune response against insulin secreting pancreatic β -cells. The Autoimmune diseases more commonly associated with T1DM in childhood are Autoimmune Thyroid Disease, Coeliac Disease and Autoimmune Gastric Disease¹. In Autoimmune Thyroid Disease, the major immune response is targeted against Thyroid Antigens Tg, Thyroid Peroxidase (TPO), and TSHR. The presence of antibodies to these Thyroid antigens is more common and reported to be as high as 10-20% in women². AITD can be grossly divided as Graves' Disease and Hashimoto's Thyroiditis (HT). In Graves' Disease, the predominantly stimulating TSHR antibodies cause Hyperthyroidism and Hashimoto's Thyroiditis causes Hypothyroidism, depending on the Grade of Lymphocytic Infiltration³.

But, the major population of subjects with measurable Thyroid Antibody titres is Euthyroid. The prevalence of high serum concentrations of Thyroid antibodies varies according to race and ethnic background⁴. The etiology of AITD is multifactorial due to a complex interplay of genetic changes and environmental exposures. Considering genetic

Editor's Comment :

- We found thyroid autoimmunity to be very common in Type 1 Diabetics and their siblings.
- Subclinical hypothyroidism was the most common presentation of thyroid disease in this population. Hence annual follow-up for Type 1 diabetics should also include screening for thyroid autoimmunity.

components, the HLA-DR3 allele has a well-established association with AITD². It has been reported that almost 50% of the genetic risk for T1DM is attributed to the Human Leukocyte Antigen (HLA) region. The HLA-DR3 genotype is highly associated with Beta-cell Autoimmunity⁵.

Clustering of autoimmune disorders is observed in families of patients that have Autoimmune Diseases. According to a recent calculation, the HLA region accounts for 41% of familial clustering of type 1 diabetes⁶. This increases the risk for other Autoimmune disorders in first-degree relatives of T1DM subjects. Since many Euthyroid cases with high Anti-thyroid antibody titres ended up developing subclinical or overt hypothyroidism⁴, it is important to follow up on those cases. Our study here aims to determine the prevalence of Thyroid autoimmunity in children and young adults with Type 1 Diabetes and their siblings.

MATERIALS AND METHOD

Subjects : The study was done in a Tertiary Care Paediatrics Hospital in collaboration with the Department of Biochemistry. The subjects were divided into three groups Group A, Group B and Group C consisting of 120 cases of Type 1 Diabetes Mellitus of age 2-18 years already diagnosed and under follow

Department of Biochemistry, Lady Hardinge Medical College (LHMC) and Associated Hospitals, New Delhi 110001

¹MBBS, Resident and Corresponding Author

²MD, Senior Resident, Department of Division of Paediatric Gastroenterology and Hepatology, PGIMER, Chandigarh 160012

³MD, Professor, Director, Department of Paediatrics, LHMC and Kalawati Saran Childrens Hospital, New Delhi 110001

⁴MD, DNB, MNAMS, Professor

Received on : 08/11/2021

Accepted on : 23/11/2021

up at the Endocrine clinic, 120 siblings of the cases, and 120 age and sex matched controls respectively. The control subjects had no Chronic Disease or any other Autoimmune Disorder, such as Thyroiditis and T1DM. The study had the approval of the Institutional Ethical Committee.

Sampling : Venous sampling was done after an overnight fast into a plain red vial. The sample was allowed to clot and serum was separated after centrifugation. Sera were used to measure freeT4, TSH, and anti-TPO antibody. All the samples were processed in COBAS e411 using Electrochemiluminescence principle. For this study, the following cutoffs of TSH (0.5 uIU/ ml – 6 uIU/ ml) and Free T4 (0.95 ng/dl – 1.75 ng/dl) were used. An anti-TPO titre ≥ 35 IU/ml was taken positive for all cases included in this study.

Statistical analysis : Data was analyzed using SPSS 20 version. Descriptive statistical methods were used for continuous data and frequencies and percentages for categorical data. The normally distributed data within the three groups were analyzed using ANOVA test and skewed data used Kruskal Wallis test. Chi-square test was used to find an association between the categorical variables and expressed in odds ratio with 95% CI. p-value ≤ 0.05 was taken as significant.

OBSERVATIONS

Out of 120 children in each group anti-TPO positivity was present in 30 children (25%) of group A, 10 children (8.3%) of group B and 8 children (6.7 %) of group C respectively (p<0.001).

Anti TPO titre and TSH levels were found to be significantly different across 3 groups (Table 1). Comparison of thyroid function among anti-TPO positive and anti-TPO negative in all three groups is given in Table 2. Intragroup comparisons of anti-TPO positivity are given in Table 3.

DISCUSSION

While considering the worldwide prevalence of thyroid autoimmunity in children with T1DM, the maximum prevalence was reported by Menon et al from India (54.3%)⁷. Burek *et al* analyzed the thyroid autoimmunity in African American and Caucasian children and found the prevalence to be 50% among white children⁸. A recent meta-analytical study that reviewed the prevalence of autoimmune disorders in T1DM patients found a weighted prevalence of 18.3% for TPO positivity in T1DM patients⁹. A Turkish study by Karaguezel *et al*¹⁰ found 38.6% TPO antibodies in diabetics as compared to 21.1% in their siblings. But in our study, we reported 25% TPO⁵ positivity in T1DM children and 8.3% TPO positivity in the sibling population. The prevalence of thyroid dysfunction among the children with T1DM was 15% in our study.

Subclinical hypothyroidism (8.3%) was the most Common Thyroid Dysfunction among children with T1DM. This is in concordance with the following studies.

A Libyan study in T1DM children reported a 2.3% prevalence for subclinical hypothyroidism and 0.9% prevalence for overt Hypothyroidism, Subclinical hyperthyroidism and overt hyperthyroidism¹¹. A study on T1DM children in the Iranian population¹² reported that 38.8% of T1DM children had subclinical hypothyroidism and 5.5% had subclinical hyperthyroidism. Another study in the Egyptian population also found that 11.2% of children with T1DM have subclinical hypothyroidism¹³. Thus the subclinical hypothyroidism has been the commonest presentation.

In our study anti-TPO positive subjects in group B

Table 1 — Thyroid function and autoimmunity among the three groups

	Group A	Group B	Group C	p - value
TSH (uIU/ml)Median (IQR)	2.71(1.81-3.68)	3.41(2.12-4.52)	2.8(1.7-4.2)	0.023*
FT4 (ng/dl)Mean \pm SD	1.32 \pm 0.3	1.35 \pm 0.39	1.37 \pm 0.29	0.392
Anti TPO titre (IU/ml)				
Median (IQR)	11.7(7.74-35.83)	8.17(5.39-16.83)	10.75(6.39-17.97)	0.002*

*significant at p <0.05

Table 2 — Comparison of thyroid function among anti-TPO positive and negative in all three groups

	Group A(n=120)		p-value	Group B(n=120)		p-value	Group C(n=120)		p-value
	Anti-TPO +ve n=30	Anti-TPO -ve n=90		Anti-TPO +ve n=10	Anti-TPO -ve n=110		Anti-TPO +ve n=8	Anti-TPO -ve n=112	
	N(%)	N(%)		N(%)	N(%)		N(%)	N(%)	
Euthyroid	17(56.7)	85(94.4)	<0.0001	4(40)	99 (90)	<0.0001	1 (12.5)	105(93.8)	<0.0001*
Thyroid dysfunction	13(43.3)	5(5.5)	<0.0001	6 (60)	11 (10)	<0.0001	7(87.5)	7(6.25)	<0.0001*
Subclinical hypothyroidism	6(20)	4(4.4)	NS	4(40)	11(10)	NS	7(87.5)	6(5.4)	NS
Overt hypothyroidism	3(10)	0(0)	NS	0(0)	0(0)	NS	0(0)	1(0.9)	NS
Subclinical hyperthyroidism	2(6.7)	1(1.1)	NS	2(20)	0(0)	NS	0(0)	0(0)	NS
Overt hyperthyroidism	2(6.7)	0(0)	NS	0(0)	0(0)	NS	0(0)	0(0)	NS

*significant at p <0.05

and group C were more commonly associated with thyroid dysfunction than the anti-TPO negative subjects in this study (Table 2). In our study, we found that among the anti-TPO positive siblings 40% had subclinical hypothyroidism and 20% had subclinical hyperthyroidism. This finding was higher than the observation of Mohn *et al*¹⁴ who reported a 33.3% prevalence of subclinical hypothyroidism among the anti-TPO positive siblings of diabetic children. Karaguzel *et al*¹⁰ found no thyroid dysfunction among the siblings though 13.5%

were positive for the anti-TPO antibody.

As per our findings, 87.5 percent of the healthy controls with a positive anti-TPO titre had subclinical hypothyroidism. But in studies by Menon *et al* from India⁷ and Mohn *et al*¹⁴ from Italy, none of the healthy children with anti-TPO positivity had any thyroid dysfunction. In our study, the children with T1DM had more overt hypo/hyperthyroidism while the healthy children had more subclinical hypothyroidism (Fig 1).

While considering the intergroup comparisons between the groups, the risk of having anti-TPO positivity in subjects in group A was significantly higher as compared to group B and group C subjects. The group A subjects were found to be 4.7 times more likely to be positive for anti-TPO as compared to group C subjects and 3.7 times more likely to be positive than group B subjects (Table 3).

In our study, we found that within group A, anti-TPO positive children are significantly more prone to develop thyroid dysfunction as compared to those who are anti-TPO negative. Ardestani *et al*¹² reported that the chance of having thyroid dysfunction in diabetic children with autoimmunity was five times higher than the diabetics without autoimmunity.

In our study prevalence of thyroid autoimmunity among the siblings of children with T1DM (8.3%) was much lower than the

	Group A (n-120)	Group B (n-120)	p-value	Odds ratio (C.I)	Group C (n-120)	p-value	Odds ratio (C.I)
	N(%)	N(%)			N(%)		
Anti TPO positivity	30 (25%)	10 (8.3%)	0.001*	3.7 (1.70 - 7.90)	8 (6.7%)	<0.0001*	4.7 (2.04-10.68)
Anti TPO negativity	90 (75%)	110 (91.7%)			112 (93.3%)		

*Significant at p<0.05

	Siblings of diabetic children with anti TPO positivity (n=27)	Siblings of diabetic children with anti TPO negativity (n=93)	p-value	Odds ratio (positivity/negativity)	CI of odd's ratio
	N(%)	N(%)			
Anti TPO positivity	4(14.8)	6(6.5)	0.166	0.397	0.103-1.524
Anti TPO negativity	23 (85.1)	83(93.5)			
Any thyroid dysfunction	7(25.9)	10(10.7)	0.047*	2.905	0.984-8.574
Euthyroid	20 (74.1)	83(89.2)			

*Significant at p <0.05

diabetic children (25%) but was similar to the healthy children (6.7%). This finding

was in contrast with Mohn *et al*¹⁴ who found higher prevalence of Autoimmune Thyroid Disease among siblings of diabetic children than healthy controls. Karaguzel *et al*¹⁰ also showed that the siblings of the diabetics had a high prevalence of thyroid autoimmunity though lower than that observed in diabetics. They did not include a control group.

A subgroup analysis was done between siblings of anti-TPO positive diabetics and siblings of anti-TPO negative diabetics (Table 4). The prevalence of Thyroid autoimmunity was similar in both groups, though the prevalence of Thyroid dysfunction was significantly more in the former group. This was in contrast with the finding by Burek *et al* who showed that siblings of the antibody-positive diabetics had higher positivity

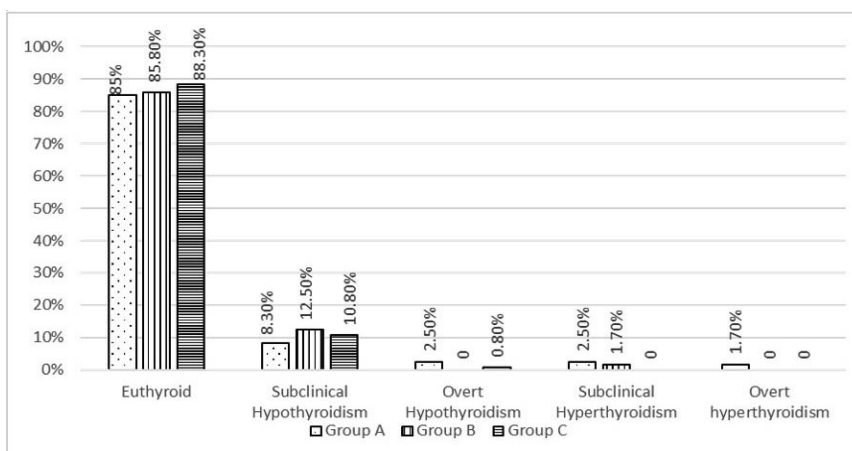


Fig 1 — Clinical Thyroid Status among Three Groups

(44%) for antithyroid antibody than those siblings antibody-negative diabetics (18%)⁸. Comparison of thyroid dysfunction between those 2 subgroups was not done in their study. The limitations of our study would be that anti-thyroid antibody was not tested and diagnosis of Autoimmune Thyroiditis was not confirmed by ultrasonography or FNAC.

CONCLUSION

The children with Type 1 Diabetes Mellitus have a higher prevalence of Autoimmune Thyroid Disease, assessed by anti TPO antibody titres when compared to their siblings and healthy controls. However prevalence of Thyroid Dysfunction is not different in the three groups. Siblings of diabetic children do not have a higher prevalence of either Thyroid Autoimmunity or Thyroid Dysfunction as compared to healthy controls. Hence, thyroid antibody screening should be included in the routine followup of the Type 1 Diabetics for the early diagnosis and treatment of the disease.

REFERENCES

- 1 Kakleas K, Soldatou A, Karachaliou F, Karavanaki K — Associated autoimmune diseases in children and adolescents with type 1 diabetes mellitus (T1DM). *Autoimmun Rev* 2015; **14(9)**: 781-97. DOI: 10.1016/j.autrev.2015.05.002.
- 2 Lee HJ, Li CW, Hammerstad SS, Stefan M, Tomer Y— Immunogenetics of autoimmune thyroid diseases: A comprehensive review. *J Autoimmun* 2015; **64**: 82-90. DOI:10.1016/j.jaut.2015.07.009.
- 3 Banga JP, Schott M— Autoimmune Thyroid Diseases. *Horm Metab Res Horm Stoffwechselforschung Horm Metab* 2018; **50(12)**: 837-9. DOI:10.1055/a-0799-5068.
- 4 Orgiazzi J— Thyroid autoimmunity. *Presse Med* 2012; **41(12 PART2)**: e611–25. DOI:10.1016/j.lpm.2012.10.002.
- 5 Taplin CE, Barker JM — Autoantibodies in type 1 diabetes. *Autoimmunity* 2008; **41(1)**: 11-8. DOI: 10.1080/08916930701619169.
- 6 Hemminki K, Li X, Sundquist J, Sundquist K — Familial association between type 1 diabetes and other autoimmune and related diseases. *Diabetologia* 2009; **52(9)**: 1820-8. DOI:10.1007/s00125-009-1427-3.
- 7 Menon PSN, Vaidyanathan B, Kaur M— Autoimmune Thyroid Disease in Indian Children with Type 1 Diabetes Mellitus. *J Pediatr Endocrinol Metab* 2001; **14(3)**: DOI:10.1515/jpem.2001.14.3.279.
- 8 Burek CL, Rose NR, Guire KE, Hoffman WH — Thyroid Auto Antibodies in Black and in White Children and Adolescents with Type 1 Diabetes Mellitus and Their First Degree Relatives. *Autoimmunity* 1990; **7(2-3)**: 157–67. DOI:10.3109/08916939008993388.
- 9 Nederstigt C, Uitbeijerse BS, Janssen LGM, Corssmit EPM, Koning EJP de, Dekkers OM — Associated auto-immune disease in type 1 diabetes patients: a systematic review and meta-analysis. *Eur J Endocrinol* 2019; **180(2)**: 135-44. DOI: 10.1530/EJE-18-0515.
- 10 Karagüzel G, Pimpek S, Deđer O, Ökten A — Screening of diabetes, thyroid, and celiac diseases-related autoantibodies in a sample of Turkish children with type 1 diabetes and their siblings. *Diabetes Res Clin Pract* 2008; **80(2)**: 238-43. DOI: 10.1016/j.diabres.2007.12.007.
- 11 Ghawil M, Tonutti E, Abusrewil S, Visentini D, Hadeed I, Miotti V, *et al* — Autoimmune thyroid disease in Libyan children and young adults with type 1 diabetes mellitus. *Eur J Pediatr* 2011; **170(8)**: 983-7. DOI: 10.1007/s00431-010-1386-1.
- 12 Ardestani SK, Keshteli AH, Khalili N, Hashemipour M, Barekati R — Thyroid Disorders in Children and Adolescents with Type 1 Diabetes Mellitus in Isfahan, Iran. *Iran J Pediatr* 2011; **21(4)**: 502–8. PMID: 23056839
- 13 Metwalley KA, El-Saied A-RA-H — Thyroid abnormalities in Egyptian children and adolescents with type 1 diabetes mellitus: A single center study from Upper Egypt. *Indian J Endocrinol Metab* 2014; **18(5)**: 637-41. DOI: 10.4103/2230-8210.139218.
- 14 Mohn A, Di Michele S, Faricelli R, Martinotti S, Chiarelli F — Increased frequency of subclinical hypothyroidism and thyroid-associated antibodies in siblings of children and adolescents with type 1 diabetes mellitus. *Eur J Endocrinol* 2005; **153(5)**: 717-8. DOI: 10.1530/eje.1.02008.

Submit Article in JIMA - Online

See website : [https:// onlinejima.com](https://onlinejima.com)

Any queries : (033) 2237-8092, +919477493027; +919477493033

Review Article

The Concept of Hypertension Clinic and Hypertensionologist

A Muruganathan

There are more diabetic clinics and diabetologists in India even though Hypertension prevalence, morbidity and mortality is three times more than Diabetes. Hence the concept of Hypertension clinics and Hypertensionologists should be promoted. Objectives are to offer Medical service, Education, Patient record maintenance, Referral, Research and Follow up monitoring.

A stroke clinic similarly can take care of a specialized subset of patients with individualized care.

[*J Indian Med Assoc* 2021; **119**(12): 55-6]

Key words : Hypertension clinic, Service, Research, Followup.

The concept of Hypertension Clinic :

A small outpatient clinic which focuses on hypertension screening, prevention and management

- This clinic should run by a physician with 10 years of experiences in hypertension management (hypertension specialist-Hypertensionologist)
- This clinic should provide a good validated BP monitor and practice accurate BP measurement
- Should have three different types of cuff sizes for measuring BP for obese people
- Home BP Monitor needs to be popularized needs to be focused largely to optimize the management of hypertension patients.
- It should have ambulatory blood pressure monitors facilities
- This clinic should have trained nurses, diet and exercise counselors
- Should have ECG machine
- Should have lab facilities to do basic tests
- Should have a Fundoscope
- Echo – optional
- Practice simplified protocols for management
- Proper data maintenance (ER)
- The experienced physicians with proper clinical examination and history would get a clue for diagnosing secondary hypertension.
- This hypertension clinic can be linked to a hypertension specialty center for necessary referral.

Rationale for smaller Hypertension clinics across India :

- To significantly improve hypertension screening

and treatment to reduce the burden of complications due to hypertension.

- There is an emerging need to strengthen healthcare at primary, secondary and tertiary levels, integrating prevention, diagnosis, and appropriate treatment for hypertension management.

Best Practices education :

Accurate blood pressure measurement :

- The team with qualified expert physicians and nurses should ensure the accurate reliable measurement of BP as per the guidelines with the help of validated BP monitors.
- HBPM and ABPM to be promoted.
- ABPM, HBPM and clinic BP devices should be validated by an independent professional body using established protocols.

Hypertension Speciality Centre :

- Hypertension centre is a specialized tertiary care centre with necessary modern equipments, an upgraded sophisticated version of Hypertension clinic.
- Consisting of a team of specialists,
- Hypertension centre consists of a team enriched with specialists, like cardiologist, nephrologist, neurologist, endocrinologist, experienced healthcare workers, known for their high-quality work in research and clinical management with special interest in management of all forms of hypertension and its complications, with highly integrated, comprehensive and collaborative team working together with a strong patient centric approach.
- With a well-equipped facility in place, the highly skilled members must be able to demonstrate extreme capability to diagnose secondary hypertension.
- 24 hours' hypertension emergencies services on a need basis for patients
- Can assess the indices of organ damage, the total cardio vascular risk using Echo, Fundoscopy,

¹MD, FICP, FRCP (Glasg & London), FRCP Ireland (Hon), Master of ACP (USA), FPCP (Philippines), Imm. Past Governor American College of Physicians India Chapter, Chairman, Shristi A G Hospital, Tirupur 641601, Tamilnadu and Corresponding Author

Received on : 01/12/2021

Accepted on : 07/12/2021

CMT, Ankle brachial index (ABI) and Pulse Wave Velocity (PWV).

- Possess a state-of-the-art modern lab to diagnose secondary hypertension and complications.
- Should possess Cath lab, CT scan and other necessary infrastructure to diagnose and tackle any complications

Objectives of the hypertensive specialty Centre :

(1) Medical service : Clinical care, investigation, treatment, ongoing monitoring, and auditing of therapeutic response using ABPM/HBPM (Ambulatory Blood Pressure Monitoring/ Home Blood Pressure Monitoring).

(2) Education :

- To provide structured training for junior physicians
 - Conduct webinars and seminars to update the nearby physicians
 - Training healthcare workers
 - Patients' education aiming to empower the patients to improve adherence to treatment and prevent complications through online and live demonstrations. Handbills in regional language describing hypertension to be provided to all the patients.
 - Training about HBPM and ABPM.

(3) Lifestyle modification and other risk factors: Non-pharmacological management including diet, exercise, yoga, meditation and weight reduction should be done by the proper educational counselor. Multi-disciplinary team may need to be involved to achieve the desired result regarding the lifestyle modification and treating the risk factors.

(4) Patient record maintenance : Hypertension registry to be maintained

- Data base management system with the help of computer software must be established. This can be designed to systematically collect, store and retrieve patient's data.

(5) Referral center : It should have specialists to treat patients who are referred with difficult to treat Hypertension, secondary Hypertension, and hypertension with complications referred by primary care physicians.

(6) Research : Facilities to do epidemiological and clinical trials in collaboration with other hypertension specialty centres with the support of regulatory bodies.

(7) Adopt a village

(8) Use telemedicine

(9) Periodical screening camps

Follow up monitoring : Follow-up monitoring is very important as HT management is a lifelong process. The follow-up management can be done through mobile

phone, WhatsApp, internet, auditing reviewing individual cases.

Another important concept is that of a stroke unit because hypertension is directly responsible for 57% of all stroke deaths. Hypertension and stroke are intimately related .

What is a Stroke Unit ?

- A stroke unit can be defined as: "an area within a hospital where stroke patients are managed by a co-ordinated multidisciplinary team specializing in stroke management

Why are Stroke Units effective ?

- Geographical concentration of stroke care expertise
 - Team approach
 - Focused attention on stroke care specifics:
 - Factors that worsen outcome
 - Prevention, early detection & treatment of complications
 - Early implementation of secondary prevention strategies
 - Early rehabilitation
 - Motivation of "Team" motivates patients/families

Who will run the Stroke Unit ?

- A stroke specialist (Neurologist or Internist with specialized training)
- Team comprising trained nurses, physiotherapists, occupational therapists
- Stroke unit with a comprehensive stroke programme
 - Neurologist, Physician, Geriatrician, Rehabilitation Physician

How to organise a stroke unit in resource limited settings ?

Facility to do CT Scan (to diagnose thrombosis and to rule out hemorrhage)

Intensive care with all necessary equipments (gadgest) and trained persons

Ward :

- Geographically defined area
- Beds 4
- Monitors
- Infusion pumps

Staffing :

- Nurses
- **Doctors:** Physicians, Neurologists, Neurosurgeons and a Radiologist
 - **Rehabilitation :** Physiotherapist, Occupational therapist and Speech therapist
 - Social worker

Review Article

Pollution-Induced Rhinitis and Nasal Health in India

Paramesh H¹, Ashok Mahashur², Deepak Talwar³, Sameer Bhargava⁴, Jayesh Lele⁵, Sarika Verma⁶, Parul Vadgama⁷, Agam Vora⁸, S Jayaraman⁹, C John Panicker¹⁰, Sachin Pawar¹¹, Manan Shah¹²

Air pollution-associated respiratory diseases are a major concern among children and adults in India. Online expert round table meetings were recently held to assess the current literature related to pollution-induced upper respiratory tract disorders, explore the current scenario related to the identification and management of pollution-induced Upper Respiratory Tract Disorders in India and create an expert consensus and guidance for the identification and management of pollution-associated Upper Respiratory Tract Disorders and Nasal Hygiene. The outcomes and expert opinions regarding indoor and outdoor pollution and steps to address pollution-induced Allergic Rhinitis have been enumerated in this article.

[J Indian Med Assoc 2021; 119(12): 57-61]

Key words : Pollution, Human disorders, Respirable Suspended Particulate Matter, Ambient Air Pollution.

The association between pollution and human disorders is well established. Notably, the risk of adverse health outcomes is the highest with Respirable Suspended Particulate Matter (RSPM) with an aerodynamic diameter of $<10\mu\text{m}$ (PM_{10}). The symptoms of respiratory disease are often aggravated following exposure to air pollutants. Some of the commonly noted upper respiratory symptoms include running or stuffy nose, sinusitis, sore throat, cold head, fever, burning or red eyes and irritation¹.

Air pollution is associated with adverse health outcomes, particularly respiratory diseases and is a major concern among children in India. In a study that compared Urban with Rural children in India, respiratory problems were significantly higher in Urban children¹.

¹Paediatric Pulmonologist, Environmentalist, Chairman, Lakeside Education Trust, Bangalore

²Consultant Chest Physician, Pulmonary Medicine Specialist, Hinduja Hospital, Mumbai

³Senior Consultant & Chairman, Metro Respiratory Center Pulmonology & Sleep Medicine, Noida

⁴ENT Surgeon, President, Association of Otorhinolaryngology, Consultant, Hinduja Hospital, Mumbai

⁵Hony Secretary General, Indian Medical Association (IMA)

⁶ENT Surgeon and Allergy Specialist

⁷Associate Professor & Head, Pulmonary Medicine Department, GMC, Surat and IMA Gujarat State Vice President

⁸Pulmonologist and Chest Physician, Assistant Editor, Journal of Association Physician of India

⁹Consultant Pulmonologist, Specialist in Interventional Pulmonology and Sleep Disordered Breathing, Chennai

¹⁰Managing Director, Santhwana Hospitals Pvt Ltd, Trivandrum

¹¹Head, Medical & Technical Affairs – India Cluster, Procter & Gamble Health Limited

¹²Senior Manager, Medical and Technical Affairs, Procter and Gamble Health Limited, Mumbai

Received on : 22/11/2021

Accepted on : 10/12/2021

Editor's Comment :

- Upper respiratory tract disorders are on the rise in India.
- Indoor and Outdoor pollution both contribute to the position.
- Nasal saline spray are cost effective and safe remedy for this condition.

A higher incidence of Asthma has been noted in Urban children compared to Rural children. Furthermore, an increase in incidence of Allergic Rhinitis in general population (40%) and Asthmatics (99.6%) has been noted^{2,3}.

Online Advisory board meetings were held in February and March, 2021 to assess the current literature related to Pollution-induced Upper Respiratory Tract Disorders, explore the current scenario related to the identification and management of pollution-induced upper respiratory tract disorders in India and form guidelines for the identification and management of pollution-associated upper respiratory tract disorders and nasal hygiene. The advisory board included renowned Pulmonologists; Ear, Nose and Throat surgeons; and allergy/immunology experts from different parts of India.

Exposure to Pollutants in Urban and Rural Settings in India :

Household air pollution and Ambient Air Pollution (AAP) in India account for about 6% and 3% of the national burden of diseases, respectively. Household air pollution is considered responsible for 1.04 million premature deaths and 31.4 million Disability-Adjusted Life Years (DALYs) while AAP accounts for 627,000 deaths and 17.8 million DALYs⁴.

A study conducted in Shahdara and Shahzada Bagh, two industrial areas of Delhi has reported a high incidence of Upper Respiratory Tract Infections (URTIs) as well as rhinitis⁵. Another study has shown that there is an increased risk of Acute Respiratory Infections (ARI) in children who lived in homes without a separate kitchen, due to the combined effects of biomass fuels and households⁶.

About 64% of families in India use solid fuels for cooking. The use of this type of biomass fuel is considered responsible for the production of organic compounds such as formaldehyde, benzene-1, 3-butadiene and polyaromatic hydrocarbons. The concentration of these compounds tends to remain higher with indoor cooking, especially when there is a lack of proper smoke outlets⁷. Further, studies have reported alarming levels of Indoor Air Pollution (IAP) in Nepal, Pakistan, Bangladesh and India with the reported levels of PM₁₀ and PM_{2.5}, 2–65-, 3–30-, 4–22-, 2–28- and 1–139-, 2–180-, 3–77-, 1–40-fold higher than World Health Organization (WHO) standards for indoor PM₁₀ (50 µg/m³) and PM_{2.5} (25 µg/m³), respectively⁸.

Elevated temperatures and high Carbon Dioxide (CO₂) levels have increased the pollination cycle of weeds, thereby increasing the pollen load in the air in India. Fungal spores, insects and dust mites have also been considered as major contributors to the aeroallergen load in the indoor environment. Low levels of sanitation, rapid urbanization and deforestation are the other key factors contributing to allergen distributions in ambient environments⁹.

Expert comments/opinion/consensus :

- Both indoor and outdoor pollution increase the risk of adverse effects on upper respiratory health in India.
- Vehicular exhaust is a major source of outdoor pollution in India. Bursting of crackers is also a significant source, especially during festivals.
- The source of indoor pollution in India varies with the region: Rural—burning of biomass; Urban—volatile and semivolatile compounds, dust mites, pollen, etc.
- Lifestyle changes have increased the risk of exposure to indoor allergens.

Impact of Air Pollution on Nasal Health :

Chronic Rhinitis and Rhinosinusitis are among the most common conditions Worldwide with significant morbidity and decreased quality of life. Aeroallergens have been associated with mucosal inflammation in

pathology ranging from reactive airway disease to Allergic Rhinitis¹⁰.

Air pollutants has numerous adverse effects on the nasal mucosa, which includes the structural alterations in the nasal cells by disintegrating the tight junctions and disorganizing the strand network. Drying up of the vocal folds, thereby, leading to the disruption of the epithelial layer of the vocal fold and activation of the chemoreceptors present in the nasal cavity leads to triggering of the respiratory reflexes. This results in coughing, sneezing and laryngospasm and activation of the receptors of the afferent nerves, initiating the symptoms of irritation¹¹.

Some of the common pollutants that can have an impact on nasal health include Carbon Monoxide (CO), Diesel Exhaust Particles (DEP), Nitrogen Oxides (NOx), Particulate Matter (PM), pT-butylstyrene (TBS), Ground-level Ozone (O₃), House Dust Mite (HDM), Internal Air Pollutant (IAP), Ultrafine particles (UFPs), and Volatile Organic Compounds (VOCs)¹². There is an overlap of outdoor and indoor pollutants in the majority of the cases, especially in urban settings.

Indoor Pollution :

Women and children less than five years of age, who spend most of their time at home are primarily effected by the indoor air pollution⁷. Several air pollutants have been recognized to exist indoors, including NOx, SO₂, O₃, CO, volatile and semivolatile Organic Compounds (VOCs), PM, Radon and Microorganisms. Some of these pollutants (eg, NOx, SO₂, O₃, and PM) are common to both indoor and outdoor environments, while a few of them may have originated outdoors¹³.

Numerous combustion products including ETS (COx, NOx, SO₂, PM, wood/coal smoke) can lead to respiratory symptoms. Particularly, VOCs (alkanes, formaldehyde, esters, ketones) can cause upper respiratory tract irritation while allergens (Pollens, Molds, Mites, Cockroaches, Insects, Dander, Feathers) can lead to sensitization (specific/total immunoglobulin E), Respiratory Allergic Diseases, and Rhinitis¹⁴.

Outdoor Pollution :

Pollutants, such as DEP can have varying impacts on the nasal epithelium and Allergic Rhinitis through their effects on nasal epithelial cells/cell surface molecules and nasal fibroblasts¹⁵. Additionally, continuous exposure to air pollutants, such as DEP, residual oil fly ash, cigarette smoke, nanoparticles, and Asian sand dust, can aggravate allergic disorders¹⁶. Further, symptoms of respiratory diseases are often aggravated following exposure to air pollutants¹.

Vulnerable Groups :

Children, elderly patients, individuals with comorbidities, frequent commuters, and individuals at risk of occupational exposure are at a high risk of developing upper airway disorders.

Children are at a high risk as the immune and antioxidant defense mechanisms are in a developing phase. As children have a higher respiratory rate in comparison to the adults, they inhale larger doses of pollutants. Children are also exposed to higher level of pollutants as they spend more time outside in the playground¹¹.

Aged individuals also have increased risk of suffering from chronic respiratory illnesses like asthma, bronchitis and chronic cough on exposure to indoor or outdoor pollution¹¹.

Individuals with co-morbidities are also at increased risk of suffering from the adverse effects on exposure to pollutants¹¹. A high risk of development of allergic disorders has also been noted in frequent commuters, office workers and individuals working in hazardous working conditions due to recurrent exposure to pollutants: Depending upon the mode of transport, individuals travelling in the cities are exposed differentially to particulate matter. People working in high-rise buildings are exposed to ozone¹¹.

Expert comments/opinion/consensus :

- The elderly, women and young children are most affected by pollution in India.
- There is an association between respiratory infection and air pollution—strong agreement.

Management of Pollution-induced Rhinitis :

The management of Pollution-induced Rhinitis must involve a detailed evaluation of the symptoms, history, home/school/office environment, family history, and medical history, followed by a thorough physical evaluation¹⁷.

The treatment for Allergic Rhinitis is mainly symptomatic. The treatment options include avoidance of allergens; use of oral antihistamines, nasal saline irrigation, intranasal corticosteroids, combination of antihistamine sprays and intranasal corticosteroids, leukotriene receptor antagonists and allergen immunotherapy¹⁷. These options can be broadly categorized into nonpharmacological and pharmacological approaches.

Nonpharmacological Approaches :

These include the steps that can be taken to reduce indoor pollutants. Adequate ventilation should be

ensured within the house and the use of nonpolluting sources for cooking should be preferred in rural settings. Individuals who smoke should stop smoking indoors. Another measure that can be useful in regions with low temperatures is ensuring adequate heat in the rooms to prevent the growth of mold. Indoor plants that help in improving air quality can be placed indoors in Urban areas. These plants need to be exposed to sunlight at least once a week¹⁸.

Masks are highly recommended for daily commuters to protect them against environmental pollutants. Masks made of fabrics help in preventing the entry of large particles only. However, for optimal protection, adequate sealing around the edges of the face should be ensured while wearing masks and fabrics¹¹.

Pharmacological Approach :

The pharmacological approach has been enumerated in Fig 1. Second- generation oral anti-histamines are the first line for treatment for Allergic Rhinitis. They have been found to successfully reduce the symptoms like itching, sneezing and rhinorrhea specially during flare of symptoms or on exposure to allergens¹⁷.

In case of mild persistent or moderate/severe symptoms, intranasal corticosteroids are considered as first-line therapeutic options alone or in combination with oral antihistamines¹⁷.

In case of failure of intranasal corticosteroids in controlling the symptoms, a combination of corticosteroid/antihistamine spray can be used¹⁷.

Leukotriene Receptor Antagonists have been considered to be less effective than intranasal

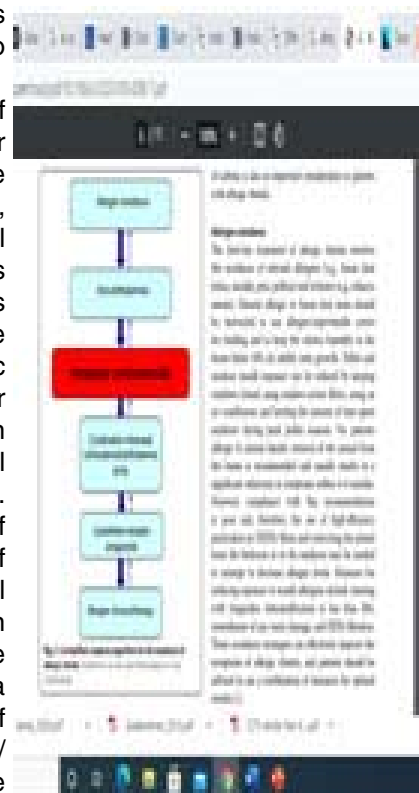


Fig 1

corticosteroids in management of allergic rhinitis¹⁷.

Expert comments/opinion/consensus :

- There are unmet needs in the diagnosis and management of pollution-related URTIs.
- Steps to reduce allergens at home/office include improving ventilation, bedroom hygiene and smart cleaning. Keeping indoor plants is also helpful in improving air quality.
- A detailed evaluation should include checking for the allergic source, recording medical/medication history, and assessing the presence of symptoms, occupation history, and lifestyle.
- Creating public awareness, changing the pattern of fuel use—biogas instead of direct combustion of biomass fuels, and modification of cooking stove designs help reduce indoor pollution at the rural level.
- While the majority of the experts agreed that intranasal corticosteroids can be used as a first-line approach, 25% of the experts noted that intranasal corticosteroids are beneficial, but not as a first-line approach.
- Oral antihistamines could be the first-line approach in pollution-induced upper airway disorders.
- Decongestants could be used as short-term management for symptomatic relief.
- Antitussives should be avoided but may be useful in the management of allergic cough.
- There is no proven efficacy of dietary supplements in the prevention of allergic symptoms.

Role of Nasal Saline Sprays :

Rinsing of nasal cavity with saline (saltwater) helps in thinning the mucus, making it easier to be removed. It also helps in removing allergens, thus decreasing the irritation of nasal mucosa¹⁹.

A recent Cochrane review by Head *et al* evaluated the advantages of nasal saline irrigation in adults and children¹⁹. It has been found that nasal saline irrigation is better than no saline irrigation for relieving allergic rhinitis in both adults and children. No adverse effects has been noted with saline nasal irrigation. However, it was doubtful whether addition of nasal saline irrigation along with pharmacological treatment was useful in improving allergic rhinitis symptomatically as compared to pharmacological treatment alone. Further, there was no clear evidence to suggest that nasal saline irrigation was better, worse, or had the same benefits as

intranasal steroids. There is also a lack of studies which compares nasal saline irrigation against oral antihistamines¹⁹.

Nevertheless, it was suggested that saline nasal irrigation is safe, cheap and acceptable alternative to pharmacological treatment like intranasal steroids and antihistamines. High quality and adequately powered research done in this field could help in improving the acceptability of this approach¹⁹.

Expert comments/opinion/consensus :

- Nasal saline sprays are useful for symptom relief in allergic rhinitis.
- The exact mechanism of action is not known—could be because of thinning of mucus, making it easier to remove.
- Further long-term efficacy studies are necessary to highlight the efficacy of nasal saline sprays in pollution-induced allergic rhinitis.

Conclusion :

Pollution-induced upper airway disorder is a cause of concern among children as well as adults. The avoidance of allergens and pollutants along with the use of an appropriate mask can be a useful approach. The regular use of steroids, antihistamines and other pharmacological measures may not be an appropriate option. saline nasal irrigation is safe, cheap and acceptable alternative to pharmacological treatment like intranasal steroids and antihistamines. High quality and adequately powered research done in this field is warranted.

REFERENCES

- 1 Siddique S, Ray MR, Lahiri T — Effects of air pollution on the respiratory health of children: a study in the capital city of India. *Air Qual Atmos Health* 2011; **4(2)**: 95-102.
- 2 Chiu AM, Paramesh H — Nelson Essentials of Pediatrics First Asian Edition 2016.
- 3 Paramesh H — Allergic Rhinitis. In: Gupta A (ed) Partha's comprehensive manual for Pediatric and Adolescent practice. India; Jaypee Publishers. First Ed. 2020; pp. 262-263.
- 4 Balakrishnan K, Sambandam S, Ramaswamy P — Establishing integrated rural–urban cohorts to assess air pollution-related health effects in pregnant women, children and adults in Southern India: an overview of objectives, design and methods in the Tamil Nadu Air Pollution and Health Effects (TAPHE) study. *BMJ Open* 2015; **5**: e008090. doi:10.1136/bmjopen-2015-008090
- 5 Nagar JK, Kumar R, Shrivastava JP — Indoor Air Pollution Around Industrial Areas and Its Effect: A Case Study in Delhi City. In: Hussain C. (eds) Handbook of Environmental Materials

- Management. Springer, Cham 2018; pp 1-17. Available at: https://doi.org/10.1007/978-3-319-58538-3_158-1 Accessed: 10 Oct 2020
- 6 Mondal D, Paul P — Effects of indoor pollution on acute respiratory infections among under-five children in India: Evidence from a nationally representative population-based study. *PLoS One* 2020; **15(8)**: e0237611.
 - 7 James BS, Shetty RS, Kamath A — Household cooking fuel use and its health effects among rural women in southern India—A cross-sectional study. *PLoS ONE* 2020; **15(4)**: e0231757. <https://doi.org/10.1371/journal.pone.0231757>
 - 8 Junaid M, Syed JH, Abbasi NA — Status of indoor air pollution (IAP) through particulate matter (PM) emissions and associated health concerns in South Asia. *Chemosphere* 2018; **191**: 651-63.
 - 9 Bhattacharya K, Sircar G, Dasgupta A — Spectrum of Allergens and Allergen Biology in India. *Int Arch Allergy Immunol* 2018; **177(3)**: 219-237.
 - 10 London NR Jr, Lina I, Ramanathan M Jr — Aeroallergens, air pollutants, and chronic rhinitis and rhinosinusitis. *World J Otorhinolaryngol Head Neck Surg* 2018; **4(3)**: 209-15.
 - 11 TCBI. The effects of air pollution on the upper respiratory tract: A systematic review. 2018. Available at: https://www.thecleanbreathinginstitute.com/content/dam/cf-consumer-healthcare/tcbi/master/ResourcesLP/PDFs/TCBI_Effects_of_Air_Pollution.pdf Accessed: 10 Oct 2020
 - 12 Naclerio R, Ansoteguib IJ, Bousquet J — International expert consensus on the management of allergic rhinitis (AR) aggravated by air pollutants. *World Allergy Organization Journal* 2020; **13**: 100-6.
 - 13 Leung DY— Outdoor-indoor air pollution in urban environment: challenges and opportunity. *Front Environ Sci* 2015; **2**: 69.
 - 14 Hulin M, Simoni M, Viegi G — Respiratory health and indoor air pollutants based on quantitative exposure assessments. *Eur Respir J* 2012; **40(4)**: 1033-45.
 - 15 Li CH, Sayeau K, Ellis AK — Air Pollution and Allergic Rhinitis: Role in Symptom Exacerbation and Strategies for Management. *J Asthma Allergy* 2020; **13**: 285-92.
 - 16 Nabe T, Mizutani N— Aggravation of Allergic Rhinitis by Air Pollution: Demonstration by an Animal Model of Pollenosis, *Advanced Topics in Environmental Health and Air Pollution Case Studies*, Moldoveanu A (Ed.), 2011. ISBN: 978-953-307-525-9. InTech, Available from: <http://www.intechopen.com/books/advanced-topics-in-environmental-health-and-air-pollution-casestudies/aggravation-of-allergic-rhinitis-by-air-pollution-demonstration-by-an-animal-model-of-pollenosis> Accessed: 10 Oct 2020
 - 17 Small P, Keith PK, Kim H— Allergic rhinitis. *Allergy Asthma Clin Immunol* 2018, **14(Suppl 2)**: 51.
 - 18 Cleveland Clinic — 17 Simple Ways to Prevent Air Pollution in Your Home. Available at: <https://health.clevelandclinic.org/17-simple-ways-prevent-air-pollution-home/> Accessed: 10 Nov 2020
 - 19 Head K, Snidvongs K, Glew S — Saline irrigation for allergic rhinitis. *Cochrane Database Syst Rev* 2018; **6(6)**: CD012597. Published 2018. doi:10.1002/14651858.CD012597.pub2

Review Article

Diagnostic Laparoscopy — A Useful Diagnostic Tool

Sandeep Verma¹, Navneet Kumar Chaudhry²

Diagnostic Laparoscopy (DL) is a minimal invasive surgical procedure for diagnosis of intraabdominal diseases through direct inspection of various intra-abdominal organs and peritoneal cavity. Owing to the lower recovery time, less post-procedural pain, decreased hospital stay and fewer complications compared to open surgery, it is a safer and effective option for both patient and the surgeon. It has been proven to be an extremely useful tool in the management of surgical emergencies. The advent of DL represents a landmark in surgery that initiated a shift from an era of open abdominal surgery to minimally invasive surgery. The aim of this review is a critical examination of available literature on the role of diagnostic laparoscopy.

[*J Indian Med Assoc* 2021; **119**(12): 62-62]

Key words : Diagnostic laparoscopy, MIS, NSAP, Abdominal trauma, Malignancy.

The word laparoscopy is derived from the Greek laparo, meaning “flank,” and scope, meaning “an instrument for observation.” Laparoscopy is examining the peritoneal cavity. It was first attempted in 1901 by George Kelling who called this examining procedure “Celioscopy”. The experiments were performed on live dogs. He insufflated the canine’s abdomen with oxygen filtered through sterile cotton and utilizing a cystoscope to inspect the abdominal contents¹. Laparoscopy was developed in the beginning of 20th century, and it was promoted as a valuable adjunct to the diagnosis of abdominal diseases.

The origin and development of minimal access surgery are rooted in men’s insatiable curiosity. The recent meteoric rise of elective laparoscopic surgical procedures has ignited the interest in the possible role of laparoscope in the evaluation of various abdominal conditions. Diagnostic laparoscopic (DL) also termed as explorative laparoscopy, is a minimally invasive surgery (MIS) for the diagnosis of intraabdominal diseases.

DL facilitates direct inspection of intraabdominal organs, the acquisition of biopsy specimens, cultures and aspirates, allows the use of laparoscopic ultrasound and makes therapeutic interventions possible. DL is a safe, well tolerated procedure that can be performed in an inpatient or outpatient setting under general anesthesia (GA) or occasionally local anesthesia (LA) with intravenous sedation in carefully selected patients. DL has been proposed as a diagnostic tool in the management of suspected intraabdominal trauma².

The goal of this review article is to provide assessment of the value of DL in intraabdominal diseases and injuries. The indications,

¹MBBS, Senior Resident

²MBBS, Postgraduate Trainee, Department of Surgery, SPS Hospital, Ludhiana 141003

Received on : 03/06/2021

Accepted on : 20/07/2021

Editor's Comment :

- Diagnostic Laparoscopy has proven to be a useful tool in the management of various abdominal pathologies, both in elective and emergency surgical conditions.
- It allows for safer and effective management of various intraabdominal surgical conditions, with fewer complications as compared with conventional open surgery.
- The ongoing advancements in the instrumentation and training of surgeons provides a wider scope for Diagnostic Laparoscopy.

contraindications, risks, benefits, diagnostic accuracy of procedure and associated morbidity are discussed.

Indications :

Trauma :

Diagnostic laparoscopy is uniquely useful in the evaluation of hemodynamically stable patients who have sustained blunt or penetrating trauma. It can provide accurate diagnosis of intra-abdominal injuries, thereby reducing non-therapeutic laparotomies and associated complications. In trauma settings, DL has safely been used as a diagnostic tool where the mechanism of injury and clinical presentation needs closer inspection. Yet after years of experience surgeons are reluctant to use laparoscopy in trauma for definitive treatment³.

Indications of DL in hemodynamically stable trauma patients include:

- Suspected intra-abdominal injury despite a negative initial workup after blunt trauma.
- Abdominal stab wounds with proven or equivocal penetration of fascia where abdominal organ injury is suspected.
- Diagnosis of diaphragmatic injury from penetrating trauma to thoracoabdominal area.
- Abdominal gun shots wound with doubtful intraperitoneal trajectory.
- Creation of a transdiaphragmatic pericardial window to rule out cardiac injury.

In United Kingdom (UK), National Institute for Health and Care Excellence (NICE) guidelines for major trauma are under consideration but each major trauma centre developed their own protocol based on local resources and experience⁴.

Laparoscopy reduces the incidence of non-therapeutic laparotomy. Patients undergoing DL require fewer opioids doses as compared to patients undergoing laparotomy⁵. Laparoscopy has specificity and sensitivity rates of 100% and 92% respectively, in detecting injuries⁶.

Direct visualization using laparoscopy is more accurate than Computed Tomography (CT) and Ultrasonography (USG) in detecting solid organ injuries and diaphragmatic tears or ruptures⁷.

According to European Association for Endoscopic Surgery (EAES), consensus statement on laparoscopy for abdominal emergencies 2012 by Italian Society of Endoscopic Surgery (SICE):

- After penetrating trauma of the abdomen, laparoscopy may be useful in hemodynamically stable patients with documented or equivocal penetration of anterior fascia [Grade of Recommendation (GOR) -B].

- Laparoscopy should be considered in hemodynamically stable blunt trauma patients with suspected intra-abdominal injury and equivocal findings on imaging studies or even in patients with negative studies but with a high clinical likelihood for intraabdominal injury (unclear abdomen) to exclude relevant injury (GOR-C)

- To optimize results, the procedure should be incorporated in institutional diagnostic and treatment algorithms for trauma patients (GOR-D)⁸ (Fig 1).

The universal application of DL in trauma patients is limited by prolonged operating room (OR) time to set up equipment, which may delay therapeutic intervention and the difficulty to identify certain injuries, such as bowel injuries and retroperitoneal injuries.

Acute abdominal pain :

NSAP is defined as acute abdominal pain which extends for duration of less than seven days where the diagnosis remains uncertain after baseline examination and diagnostic tests. The most common causes for acute abdominal pain includes the nonspecific abdominal pain (NSAP) followed by acute appendicitis, acute biliary disease, bowel obstruction and diverticulitis⁹.

DL is helpful in the diagnosis of nonspecific abdominal pain (NSAP). NSAP has been treated either with open exploratory laparotomy for presumed conditions or with active observation. But these approaches are associated with prolonged hospital stays, negative laparotomies, higher numbers of radiologic imaging studies and patient dissatisfaction if

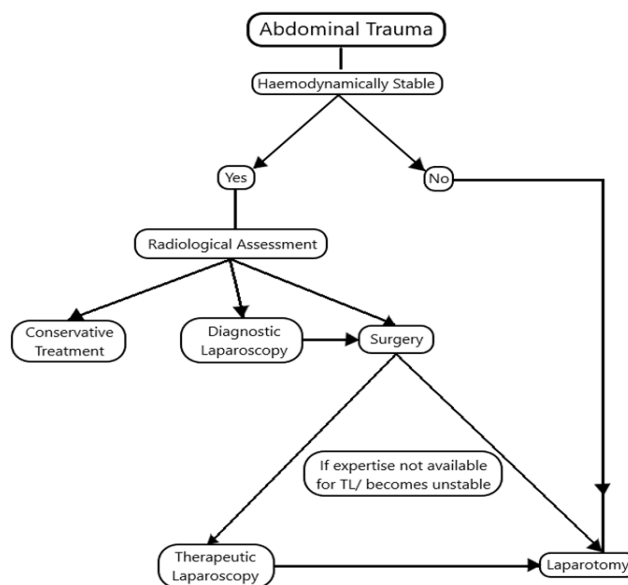


Fig 1 — Flowchart of management of abdominal trauma⁹

the diagnosis cannot be established. This scenario is more prevalent in pregnant women and obese patients, in whom availability of or access to imaging studies is limited by the gestational age or the patient's size¹⁰.

DL has several advantages as it allows the visualization of the entire abdominal cavity, localization of intra-abdominal pathology, can take peritoneal fluid for cultures or cytology and ability to irrigate the peritoneal cavity to decrease contamination. In most of cases where causes are identified, therapeutic intervention make it more useful tool¹¹.

Many studies have demonstrated the feasibility, high diagnostic accuracy and safety of DL using GA for patient with acute abdomen pain^{12, 13}.

In a randomized trial for acute NSAP documented that early DL significantly improve diagnostic accuracy in comparison to an observation group (81% versus 36%)¹².

In a prospective study of 100 patients concluded that the best approach in abdominal pain is to do DL rather than going for open laparotomy¹³.

DL is recommended in NSAP as it is technically feasible and can be applied safely for selected patients with acute NSAP after a complete diagnostic work-up (GOR-A)^{8,10}.

DL should be avoided in patients with hemodynamic instability and may have a limited role in patients with severe abdominal distension or a clear indication for laparotomy (GOR- C).

DL should be considered in patients without a specific diagnosis after appropriate clinical examination and imaging studies (GOR- C)¹⁰.

Malignancy :

Frequently on exploration, it is found that the disease is inoperable because of metastasis or locally advanced

disease, despite negative preoperative workup which suggested primarily resectable disease¹⁴.

DL for accurate staging of intra-abdominal malignancies is known as staging laparoscopy and is a standard part of the staging workup for a number of cancer subtypes. Staging laparoscopy is useful in evaluation of intraabdominal malignancies—

- To identify resectability of primary tumour like oesophagus, stomach, pancreas, cholangiocarcinoma.
- To stage the malignancy, prior to administration of neoadjuvant chemotherapy or radiation therapy.
- To assess the equivocal magnetic resonance imaging (MRI), contrast enhanced computer tomography (CECT) scan, positron emission tomography (PET) scan findings for primary, regional, or distant disease.
- To assess the inconclusive histology following radiographic-guided fine needle aspirations (FNA) of suspicious sites of disease.
- To assess for resectability of liver metastasis in patients with colon or rectal cancer.

DL is cost effective if malignancy is found to be unresectable and patient is spared from laparotomy but overall DL increases the cost of whole procedure¹⁵.

Many studies showed that DL has an accuracy of 89-100% for staging, avoids non-therapeutic laparotomy in 13-57% of gastric patients despite a negative preoperative imaging workup and identifies occult metastasis or unresectable disease¹⁴.

DL in gastric malignancies, it was found that DL had accuracy, sensitivity, specificity in finding metastasis ranging from 85% - 98.9%, 64.3 - 94% and 80 - 100% respectively. Thus, DL has substantial value in staging patients with gastric cancer and helps to avoid unnecessary laparotomy¹⁶.

DL should be considered in localised or locally advanced T3 or T4 tumour patients despite a high-quality preoperative imaging. Unsuspected metastatic disease is found in 13% to 57% of patients. For detecting hepatic metastasis DL is more sensitive (96%) than CT (52%) or USG (37%). DL can be safely performed for patients with oesophageal cancer, pancreatic cancer, hepatocellular carcinoma, biliary tract tumour and colorectal cancers and can alter the staging of disease and management. Diagnostic accuracy is higher in larger tumors, tumors of pancreatic body, neck and tail, high level of CA 19.9¹⁰.

Intensive Care Unit (ICU) :

DL has excellent accuracy in diagnosing common causes of ICU related conditions like intra-abdominal abscess, ischemic bowel, calculus or gangrenous cholecystitis and perforated viscus.

Transporting critically ill patients to and from the radiology department for diagnostic testing is associated

with significant risk of adverse events. Bedside DL performed for critically ill patients who are unstable, require mechanical ventilator or inotropic support is performed within ICU with local anaesthesia or IV sedation to enable therapeutic intervention, facilitate the diagnosis and avoid morbidity of laparotomy¹⁷.

DL is indicated in patients in ICU with following conditions like unexplained sepsis, SIRS, multiorgan failure, unexplained metabolic acidosis, abdominal pain with signs of sepsis and without obvious indication for laparotomy and increased abdominal distension that is not a consequence of bowel obstruction¹⁸.

Despite numerous indications adoption of MIS to ICU patients remains in relatively in few case series. DL has succeeded in decreasing in the number of non-therapeutic laparotomies.

Bedside DL in ICU patient is safe, feasible, accurately diagnose the intraabdominal pathologies in properly selected, critically ill patients. The procedure appears to be have excellent accuracy in diagnosing acalculous cholecystitis, ischemia and avoid the unnecessary laparotomy. However, DL is still underutilised in ICU setups.

Pyrexia of Unknown Origin (PUO) :

Pyrexia of Unknown Origin (PUO) is defined as fever of 38.3°C (101°F) or higher for more than 3 weeks under study without an established diagnosis.

Despite advancement in various investigating tools, the origin of the fever remains undetermined in 7% to 20% of patients. Several studies showed that number of patient require laparotomies for the diagnosis¹⁹.

DL is found to be most useful (76.6 %) in those patients with physical signs or biochemical results suggestive of an abdominal disorder. In absence of clinical sign and symptoms of abdominal disease, it is very difficult to decide which patient should undergo exploration²⁰.

Consistent advancement in Laparoscopic technique have led to a protocolized exploration by laparoscopy which includes wedge and tru-cut biopsy of liver, retroperitoneal lymph node biopsy and splenectomy²¹. DL is found to have an overall sensitivity of 90.9% and a specificity of 100% and is a useful last-step procedure in the diagnostic work-up for patients with POU²².

Abdominal tuberculosis (TB) is the sixth most common form of extra-pulmonary site of infection after lymphatic, genitourinary, bone and joint, miliary and meningeal TB. It remains a diagnostic challenge as it mimics different abdominal diseases causing delayed diagnosis. A high degree of suspicion is needed for diagnosis of this condition. Moreover, radiological investigations (USG and CECT) have nonspecific findings. CT scan can miss small granuloma in miliary

TB of liver and require biopsy for the diagnosis.

Therapeutic trial with antitubercular treatment is not warranted. Thus, histological evidence holds a great importance. DL is helpful for the diagnosis of abdominal TB, especially in the presence of peritoneal involvement. Differentiation between Crohn's disease and abdomen TB is very difficult and DL is a useful procedure in this situation²³.

Technique Consideration :

Patient education and consent :

Patient should be counselled regarding the inherent risks associated with laparoscopic procedure such as conversion to open surgery due to failure to progress, intestinal injury, haemorrhage, fat gas embolism, pneumothorax, hypercarbia.

Equipment :

The basic equipment necessary to perform DL include laparoscope, video camera, light source, display monitor, insufflation system (insufflator tubing, chosen gas for pneumoperitoneum, Veress needle), instrument for grasping and dissection, incising and haemostasis, clipping and stapling, biopsy and specimen retrieval, suction, irrigation and retractors.

Patient preparation :

Povidone iodine solution is used for scrubbing and draping from nipple to mid-thigh. A prophylactic antibiotic first or second-generation cephalosporin is to be given. DL is most commonly performed under general anaesthesia and skeletal muscle relaxant. Positioning of majority of the abdominal DL is performed in supine position whereas for pelvic pathologies lithotomy position is favoured.

Technique :

Before making skin incision, light source, carbon dioxide tank, irrigation aspiration unit, electro cautery unit, insufflation system is checked. According to the suspected pathology the access port, camera port, any additional trocars are placed either supraumbilically or infraumbilically. Detailed examination of the peritoneal cavity is performed after placement of port.

In acute pain abdomen, depending on suspected site of pathology (appendicitis, cholecystitis, and diverticulitis) grossly examine for erythema, fibrinous exudates, inflammatory adhesions, or formation of phlegmon. Nontraumatic intestinal graspers are used to deal with the intestine and omentum. Fluid in the peritoneal cavity or pelvis should be aspirated and send for relevant tests²⁴.

In patients with intra-abdominal malignancy, a systematic examination of the primary tumour site, all abdominal viscera and the pelvis is performed to identify evidence of metastasis. The primary tumour is assessed to detect direct extension into contiguous organs. If there is evidence of widespread or peritoneal-

based disease or liver metastasis or if there is a direct extension of the primary tumour to surrounding structures that renders the tumour unresectable, diagnostic laparoscopy is terminated after confirmatory biopsy specimens are taken²⁵.

In case of trauma patients who are hemodynamically stable, DL is started with examining diaphragm, liver, gall bladder, spleen, anterior wall of stomach, gastro colic ligament, posterior wall of stomach, pancreas, duodenum above and below of mesocolon, whole remaining small bowel from ligament of Treitz to ileocaecal junction, colon and pelvic organs. Suctioning of blood clots, gastrointestinal contents and bleeding should be controlled with nontraumatic grasper followed by laparoscopic vascular clamp, clips, energy sources or ligation. If bleeding is uncontrollable laparoscopically, convert to laparotomy to manage bleeding. Examination of intraperitoneal and retroperitoneal region is done systematically, which is guided by preoperative imaging or clinical findings. If retroperitoneal penetration is present then may require inferior vena cava and aorta exploration, otherwise usually not required²⁶.

Port closure :

Meticulous examination is done to ensure haemostasis. Any port site 10mm or above must be closed. Finally, skin can be closed with nylon or subcuticular sutures.

Contraindications of DL:

Patient selection for DL with identification of relative or absolute contraindications is vital to a successful outcome from a laparoscopic procedure.

Absolute contraindications of DL include patients who cannot tolerate pneumoperitoneum, any obvious indication for laparotomy like peritonitis, bowel obstruction causing massive dilatation, coagulopathy and abdominal compartment syndrome. In trauma patients, hemodynamic instability or clear indication of bowel injuries such as presence of bile or evisceration are contraindications of DL.

Morbid obesity, cardiopulmonary compromise, pregnancy, aortoiliac aneurysmal diseases, ICU patients who cannot tolerate pneumoperitoneum, anterior abdominal wall cellulitis are relative contraindications²⁷.

Complications :

Complications of DL includes —

- Anaesthesia related complications include same risk of complications seen with general anaesthesia in any open procedure but specifically in DL reduced oxygenation and hypercarbia due to raised intraabdominal pressure.
- Access related complications include bowel injury, solid organs injury, omental injury, bladder injury,

extra peritoneal insufflation and vascular injuries.

- Insufflation related complications include air embolism, hemodynamic instability, pneumothorax, subcutaneous emphysema.
- Inadequate visualisation leads to delay in diagnosis, missed injuries, delay in definitive treatment.
- Postoperative complications include port site hernia, bleeding, hernia and port site recurrence⁽²⁸⁾.

CONCLUSION

Laparoscopic surgery is a viable, safe, effective and beneficial option to both patient and the surgeon. It has improved the management of surgical emergencies and is now an essential part of surgeon's armamentarium in certain conditions. With advancements in instrumentations, anesthesia and better training of surgeons, the role for DL will expand.

REFERENCES

- Spaner SJ, Warnock GL — A brief history of endoscopy, laparoscopy, and laparoscopic surgery. *J Laparoendosc Adv Surg Tech A* 1997; **7(6)**: 369-73. doi: 10.1089/lap.1997.7.369. PMID: 9449087.
- Stefanidis D, Richardson WS, Chang L — The role of diagnostic laparoscopy for acute abdominal conditions: an evidence-based review. *Surg Endosc* 2009; **23**: 16. <https://doi.org/10.1007/s00464-008-0103-x>
- Bain K, Meytes V, Chang GC, Timoney MF — Laparoscopy in penetrating abdominal trauma is a safe and effective alternative to laparotomy. *Surg Endosc* 2019; **33(5)**: 1618-25. doi: 10.1007/s00464-018-6436-1. Epub 2018 Sep 12. PMID: 30209608.
- Chakravarty S, Sarma DR, Noor M, Panagiotopoulos S, Patel AG — Laparoscopy has a therapeutic role in the management of abdominal trauma: A matched-pair analysis. *Int J Surg* 2017; **44**: 21-5. doi: 10.1016/j.ijssu.2017.05.035. Epub 2017 May 18. PMID: 28529193.
- Khubutiya M, Yartsev PA, Guliaev AA — Laparoscopy in blunt and penetrating abdominal trauma. *Surg Laparosc Endosc percutaneous Tech* 2013; **23**: 507e512.
- Kaban GK, Novitsky YW, Perugini RA, Haveran L, Czerniach D, Kelly JJ, et al — Use of laparoscopy in evaluation and treatment of penetrating and blunt abdominal injuries. *Surg Innov* 2008;
- Ivatury RR, Simon RJ, Stahl WM — Selective celiotomy for missile wounds of the abdomen based on laparoscopy. *Surg Endosc* 1994; **8**: 366-9. doi: 10.1007/BF00642432.
- Agresta F, Ansaloni L, Baiocchi GL, Bergamini C, Campanile FC, Carlucci M, et al — Laparoscopic approach to acute abdomen from the Consensus Development Conference of the Società Italiana di Chirurgia Endoscopica e nuove tecnologie (SICE), Associazione Chirurgi Ospedali Italiani (ACOI), Società Italiana di Chirurgia (SIC), Società Italiana di Chirurgia d'Urgenza e del Trauma (SICUT), Società Italiana di Chirurgia nell'Ospedalità Privata (SICOP), and the European Association for Endoscopic Surgery (EAES). *Surg Endosc* 2012; **26(8)**: 2134-64. doi: 10.1007/s00464-012-2331-3. Epub 2012 Jun 27. PMID: 22736283
- SAGES. 2010 — Guidelines for Diagnostic Laparoscopy - A SAGES Publication. [online] Available at: <<https://www.sages.org/publications/guidelines/guidelines-for-diagnostic-laparoscopy/>> [Accessed 2 May 2021].
- Pearl JP, Price RR, Tonkin AE, Richardson WS, Stefanidis D — SAGES guidelines for the use of laparoscopy during pregnancy. *Surg Endosc* 2017; **31(10)**: 3767-82. doi: 10.1007/s00464-017-5637-3. Epub 2017 Jun 22. PMID: 28643072.
- Schieltroma M, Cappelli S, Carlei F, Pescosolido A, Lygidakis NJ, Amicucci G — Acute abdomen": early laparoscopy or active laparotomic-laparoscopic observation? *Hepatogastroenterology* 2007; **54(76)**: 1137-41. PMID: 17629056.
- Decadt B, Sussman L, Lewis MP, Secker A, Cohen L, Rogers C, et al — Randomized clinical trial of early laparoscopy in the management of acute nonspecific abdominal pain. *Br J Surg* 1999; **86**: 1383-138.
- Subramaniam R — Diagnostic laparoscopy in acute abdominal pain. *International Surgery Journal* [Online] 2019; **6(4)**: (26th March 2019)
- Mayo SC, Austin DF, Sheppard BC, Mori M, Shipley DK, Billingsley KG — Evolving preoperative evaluation of patients with pancreatic cancer: does laparoscopy have a role in the current era? *J Am Coll Surg* 2009; **208(1)**: 87-95. doi: 10.1016/j.jamcollsurg.2008.10.014. PMID: 19228509.
- Yeola ME, Gode D, Bora AK — Diagnostic Laparoscopy as an Effective Tool in Evaluation of Intraabdominal Malignancies. *World J Lap Surg* 2018; **11(2)**: 68-75.
- Leake PA, Cardoso R, Seevaratnam R, Lourenco L, Helyer L, Mahar A, et al — A systematic review of the accuracy and indications for diagnostic laparoscopy prior to curative-intent resection of gastric cancer. *Gastric Cancer*. 2012 Sep; **15** Suppl 1:S38-47. doi: 10.1007/s10120-011-0047-z. Epub 2011 Jun 11. PMID: 21667136.
- Peris A, Matano S, Manca G, Zagli G, Bonizzoli M, Cianchi G, et al — Bedside diagnostic laparoscopy to diagnose intraabdominal pathology in the intensive care unit. *Crit Care* 2009; **13(1)**: R25. doi: 10.1186/cc7730. Epub 2009 Feb 25. PMID: 19243621; PMCID: PMC2688143.
- Zemlyak A, Heniford BT, Sing RF — Diagnostic Laparoscopy in the Intensive Care Unit. *Journal of Intensive Care Medicine* 2015; **30(5)**: 297-302. doi:10.1177/0885066613492102
- Mori M, Bohle U — The indications for laparoscopy in internal medicine. *Dtsch Med Wochenschr* 1993; **45**: 1649-51
- Solis-Herruzo JA, Benita V, Morillas JD — Laparoscopy in fever of unknown origin - study of seventy cases. *Endoscopy* 1981; **13(5)**: 207-10. doi: 10.1055/s-2007-1021685. PMID: 6456143.
- Herrera MF, Lozano-Salazar RR, Bezaury P, Ce' sarman G, Hema' ndez G, Sa' nchez SA, et al — Esplenectomia laparoscópica en pacientes con pu' rpuratrombo- citope' nica autoinmune. *Rev Invest Clin* 1998; **50**: 127-32.
- Arch-Ferrer JE, Velázquez-Fernández D, Sierra-Madero J, López-Karpovitch X, Angeles-Angeles A, Gamino R, et al — Laparoscopic approach to fever of unknown origin. *Surg Endosc* 2003; **17(3)**: 494-7. doi: 10.1007/s00464-002-8589-0. Epub 2002 Nov 20. PMID: 12436232.
- Safarpor F, Aghajanzade M, Kohsari MR, Hoda S, Sarshad A, Safarpor D — Role of laparoscopy in the diagnosis of abdominal tuberculosis. *Saudi J Gastroenterol* 2007; **13**: 133-5
- Morsy MM, Mostafa TA, Hassan MM — Role of laparoscopy in acute abdomen. *Egypt J Surg* 2020; **39**: 540-6.
- Nair C, Kothari K — Role of diagnostic laparoscopy in assessing operability in borderline resectable gastrointestinal cancers. *Journal of Minimal Access Surgery* 2012; **8(2)**: 45. doi:10.4103/0972-9941.95533
- Koto MZ, Matsevych OY, Aldous C — Diagnostic Laparoscopy for Trauma: How Not to Miss Injuries. *J Laparoendosc Adv Surg Tech A* 2018; **28(5)**: 506-513. doi: 10.1089/lap.2017.0562. Epub 2018 Jan 2. PMID: 29293406.
- Buote NJ, Mcclaran JK — Laparoscopic Contraindications, Complications, and Conversion. *Small Animal Laparoscopy and Thoracoscopy* 2015; 93-102. doi:10.1002/9781118845912.ch10
- Kindel T, Latchana N, Swaroop M — Laparoscopy in trauma: An overview of complications and related topics. *Int J Crit Illn Inj Sci* 2015; **5(3)**: 196-205. doi:10.4103/2229-5151.165004.

Case Report

A Neglected Case of Hirschsprung's Disease Presenting in Adulthood : A Difficult Encounter

Pankaj Halder³, Aheli Ghosh Dastidar², Sandip Kumar Halder³, Sagnika Ukil⁴, Ankit Goel⁴, Subhabrata Das⁵

Hirschsprung's Disease (HD) is characterized by the congenital absence of Ganglion Cells in all or part of the Colon. Neonate with HD presents with constipation since birth while chronic constipation is prominent in early childhood. The median age of presentation of the disease is 2-6 months. The condition is extremely rare in adulthood. We present an 18-year-old male who had features of long standing constipation and recurrent intestinal obstruction. We successfully treated it by diversion colostomy and rectal biopsy followed by modified Duhamel Operation. The rectal tissue biopsy report suggested HD. [J Indian Med Assoc 2021; 119(12): 67-8]

Key words : Chronic constipation, Hirschsprung's disease, Adult, Contrast, Duhamel procedure.

Hirschsprung's Disease (HD) is rare (1 in 5000 births) but, surgically correctable congenital disease. About 90% of the cases are diagnosed in the neonatal period or early infancy¹. Sometimes, milder symptoms may go undiagnosed or misdiagnosed until adulthood and represented as HD in adulthood. Here, we present a case of HD in an 18-year-old male to highlight the diagnostic dilemma and difficulties in surgical management.

CASE REPORT

An 18-year-old patient presented with abdominal distention and chronic constipation since childhood with occasional acute exacerbation for which he was admitted to a rural hospital several times. He had a poor socio economic background with minimal family support. There was the expulsive release of liquid stool and air on performing a digital rectal examination. An abdominal x-ray revealed dilated gut loops up to the distal colon. Conservative management in the form of Nasogastric Aspiration, Saline Infusion and Enemas provided significant clinical improvement. Unfortunately, the patient left against medical advice before further investigations.

Three months later, he was re-admitted with similar symptoms. After re-suscitation, a contrast-enhanced Computed Tomography (CT) was done, which revealed a spectacular dilation of the proximal colon and a narrow terminal colon and rectum with a transition zone (Fig 1). In accordance with history, clinical findings and the CT report, we inferred it may be a case of HD presenting in adulthood. We took a consultation from our Paediatric surgical team and planned for two-stage surgical management.

R G Kar Medical College & Hospital, Kolkata 700004

¹MS, MCh, Associate Professor, Department of Paediatric Surgery

²MBBS, 3rd year Professional Student and Corresponding Author

³MS, Assistant Professor, Department of Surgery

⁴MS (General surgery), Postgraduate Trainee

⁵MS, Professor, Department of Surgery

Received on : 18/03/2021

Accepted on : 01/04/2021

Editor's Comment :

- The awareness of the possibility of HD in small children with constipation is important among doctors which reduces the delay in appropriate referral. The parents often may interpret it as a minor physiological deviation and remain falsely reassured.
- The parents must also be counselled regarding the benign nature of the disease and explained that surgery is the only available option for a possible cure with associated possible risks. The referral to the appropriate paediatric surgical team, suitable for the family, should be done without any delay.

Initially, we fashioned a leveling colostomy in the descending colon, excised the extraordinary large sigmoid colon up to a point just proximal to the rectum to create a distal Sigmoid Mucous Fistula. Full-thickness biopsy samples were taken from the rectum (spastic segment) and the colostomy site (descending colon) which showed a complete absence of intramural Ganglion cell and normal ganglion cells respectively. Postoperative (PO) recovery was uneventful and the patient was discharged on the 6th PO day.

The patient was re-admitted after 3 months for a modified Duhamel pull-through operation. The stoma was dismantled and the colon was brought down through retro-rectal space and an astonished at the level of 2 cm above the dentate line. We used two linear cutter gastrointestinal stapler (100 mm) to fashioned side-to-side anastomosis between the aganglionic rectal pouch and pull-through colon (posterior wall of the native rectal wall and anterior wall of the pull through the colon). The PO period was stormy as the patient developed additional medical complications due to Dengue viral infection. However, we managed the case successfully and could discharge the patient finally on the 28th PO day. At follow-up, after 2 months he was found to have developed a regular bowel habit with complete symptomatic relief, which was found to be maintained at 9 months follow-up too. Keeping in mind the patient's background and special needs, he is being closely followed up to avoid further neglect of any delayed complications.



Fig 1 — Computed tomography with oral contrast showed hugely distended colon with distal narrowing

DISCUSSION

Diagnosis of the HD after 10 years was regarded as adult HD though, Natsikas *et al* made it 18 years². In 1950, Rosin first described a case of HD in adult patients³. Grover *et al* stated that about 2% of patients with mild symptoms may go undiagnosed until adulthood. Acquired aganglionosis in adults due to neuronal degeneration by autoimmune response following parasitic infections can present with similar symptoms⁴.

The symptoms of adult HD are similar to that of classic HD in childhood like; long-standing constipation and sometimes hospital admission for acute exacerbation. Additional history of dietary modification and psychosocial inhibition due to fecal soiling may be obtained⁵. Radiological evidence of distal narrowing and proximal dilatation in contrast (barium) Enema study (CES) is suggestive. However, CES sometimes become technically difficult in the adult because of the hugely loaded colon and or faecaloma. In such condition, a contrast CT is advocated⁶. The absence of recto-anal inhibitory reflex in anorectal manometry is another supportive evidence of HD. However, a rectal biopsy is a gold standard for the diagnosis of HD⁷.

Management of adult HD practically a challenging task for General Surgeons because they are unfamiliar with the procedure as the surgery is hardly ever performed on adults. On the other hand, unfamiliarity with the adult organ proportions with a hugely dilated colon, posed a major challenge to the Paediatric surgeons too. A multidisciplinary approach (a collaboration of General and Paediatric Surgeons) is preferred to overcome these technical difficulties. Two-stage surgery is recommended to overcome the problems due to over-distended and elongated proximal colon⁸. Initial operation includes a leveling colostomy through the normally innervated colon, de-functioning stoma in the distal colon and rectal biopsy for tissue diagnosis⁹. The distal stoma permits cleansing of the caudal colon while the proximal colon reverts to near normal caliber, usually within 2 to 6 months (Fig 2). For definite reconstruction, Swenson abdominal pull-through, Soave endorectal pull-through and Duhamel pull-through procedures are described in the literature. Duhamel procedure is preferable when a considerable

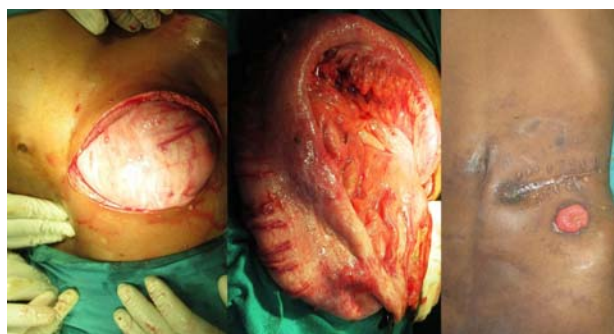


Fig 2 — Pictures during levelling colostomy and after three months showed hugely distended sigmoid

luminal discrepancy remains between the ganglionic and aganglionic segments of the colon¹⁰. Qiu *et al* showed that one-stage modified Martin-Duhamel or Rehbein's procedure may be a feasible surgical option for adult HD¹¹. Irrespective of the surgical techniques, Postoperative bowel functioning is not always satisfactory. Patient's awareness about the complications (enterocolitis, constipation and fecal incontinence), regular check-ups in follow-up clinics and timely diagnosis of any unwanted complications are imperative to achieve good functional outcomes after surgery in adult patients.

Sources of Support/ Funding: Nil

Conflicts of interest: Nil

REFERENCES

- Vorobyov GI, Achkasov SI, Biryukov OM — Clinical features diagnostics and treatment of Hirschsprung's disease in adults. *Colorectal Dis* 2010; **12**: 1242-8.
- Baraket O, Karray O, Ayed K, Baccar A, Moussa M — Hirschsprung's Disease in Adult Treated by Coloproctectomy and Colo-Anal Anastomosis. *J Case Rep Stud* 2016; **2**: 210-4.
- Zaafouri H, Mrad S, Mabrouk M, Haoues N, Salah MBH, Noomene R, *et al* — Hirschsprung's disease in adults: Clinical and therapeutic features. *Int Res J Surg* 2015; **2**: 9-17.
- Smith VV, Gregson N, Foggensteiner L, Neale G, Milla PJ — Acquired intestinal aganglionosis and circulating autoantibodies without neoplasia or other neural involvement. *Gastroenter* 1997; **112**: 1366-71.
- Martinez JP — Adult Hirschsprung's disease. *CJEM* 2015; **17**: 704-5.
- Kim HJ, Kim AY, Lee CW, Yu CS, Kim JS, Kim PN, *et al* — Hirschsprung Disease and Hypoganglionosis in Adults: Radiologic findings and differentiation. *Radiology* 2008; **247**: 428-34.
- Sahoo BS, Karma R, Singhal S, Chhetri A — Hirschsprung's Disease in an adult male – An unusual presentation. *International Journal of Science and Research* 2017; **6**: 872
- Hashish AA. Hirschsprung's Disease in Adolescents and Adults. *Annals of Pediatric Surgery* 2005; **1**: 72-8.
- Rebollar RE, Canovas RE, Pelaez RP — Hirschsprung's Disease in an Adult Patient. *Rev Col Gastroenterol* 2016; **31**: 50-3.
- Adhi M, Khan S, Zafar H, Arshad M — Duhamel's procedure for adult Hirschsprung's disease. *Journal of the college of physicians and surgeons Pakistan* 2012; **22**: 395-7.
- Qiu JF, Shi YJ, Hu L, Fang L, Wang HF, Zhang MC — Adult Hirschsprung's disease: report of four cases. *Int J Clin Exp Pathol* 2013; **6**: 1624-30.

Case Report

Post COVID-19 Vaccination Fatality with Cerebral Involvement

Samadhi Dandeniya Arachchi¹, Rohan Ruwanpura², Ruwan Nanayakkara³

The vaccination is reckoned to be the most appropriate preventive measure to prevent COVID-19 pandemic infection. There are about seven varieties of Anti-COVID-19 vaccines available with relatively limited information about their effectiveness and adverse outcomes. We present a rare fatal case of severe postimmunization complication following COVISHIELD vaccination and is recorded as the first death postvaccination for COVID-19 in Sri Lanka.

The deceased was a 39-year-old previously healthy adult who succumbed to his illness following the second week of vaccination with thrombosis and thrombocytopenia. The findings may be helpful for the clinical management for prompt recognition and effective management of postvaccination reactions.

[*J Indian Med Assoc* 2021; **119**(12): 69-72]

Key words : COVID-19, Covishield Vaccine, Post vaccination reactions.

The SARS-COV-2, that appeared to be originated from Wuhan China has now been reported from almost all parts of the World. Following lineages of RNA virus has been detected in Sri Lanka: B.1.1.7 (UK variant), B.1.428 (Denmark/European/Middle East variant), B.1.411 (Sri Lankan variant), B.1.525 (Nigerian variant) and the B.1.351 (South African variant). Since there is no specific antiviral medicine for the disease so far, the symptomatic treatment is administered according to the severity and complications of the disease. There had been over 121,000 infected cases are reported and the number of deaths has gone over 1000 by end of April, 2021, in Sri Lanka since the onset of the pandemic in March, 2020. Apart from adherence to the Methods of Respiratory Hygiene, the Health Authorities of Sri Lanka have initially opted for AstraZeneca Oxford COVID-19 (COVISHIELD)¹ vaccine from Serum Institute of India under the COVAX facility of the World Health Organization (WHO) as the most effective method of Prevention and Control the Disease².

However, the adverse effect of the vaccine and its consequences should always be closely monitored and the serious complications are extremely rare but do occur, probably around five cases per one million vaccinated [There had been ~ one million doses given and five serious reactions including three fatalities]. The causal link between them with vaccination has led to hesitancy with regards the 'vaccine safety' among some populations.

Forensic Medicine Unit, Teaching Hospital, Karapitiya, Galle, Sri Lanka

¹MBBS, MD, Senior Registrar in Forensic Histopathology

²MD, DLM, MD, DFM (RCPA), DMJ Clin et Path (Lond), Consultant Forensic Pathologist and Corresponding Author

³MBBS, DLM, MD, Consultant Forensic Pathologist

Received on : 16/09/2021

Accepted on : 06/11/2021

Editor's Comment :

- In midst of the COVID pandemic, Sri Lanka had opted for Covishield of all vaccines to Prevent & Control the disease.
- There has been very few serious complications recorded with only 3 fatalities against one million doses given.
- This case report deals with thrombocytopenia and intracerebral haemorrhage after 2 weeks of vaccination in a 39 years old previously healthy adult.

We report a case of a young adult died following vaccination for COVID-19 in the second week of the postvaccination period.

CASE REPORT

A 39-year-old previously healthy male hotel worker received the first dose of the COVISHIELD vaccine on 28th February, 2021 with no immediate reactions following administration. His postvaccination reactions which, began in 10-12 hours, comprised of usual discomforts such as mild fever, headache and myalgia for two days. However, his condition furthered over the next couple of days with severe headache, mild drowsiness, mild petechial rash on upper limbs and the platelet count was 130,000/ml while he was examined by a general practitioner on the 10th day of vaccination. He was admitted to the local hospital and the CT imaging showed mild intracerebral haemorrhage (Fig 1) in the right parietal lobe. He was suffering from severe headache while his consciousness became gradually altered. After initial management, the patient was transferred to the Tertiary Care Hospital in Galle for further management where his platelet count was found further decreased to 10,000 /ml. Intracranial haemorrhages progressed into the intraventricular spaces on repeated CT Scans. The serological investigations excluded Dengue and leptospirosis. The victim remained unconscious and had been managed conservatively. He succumbed to his

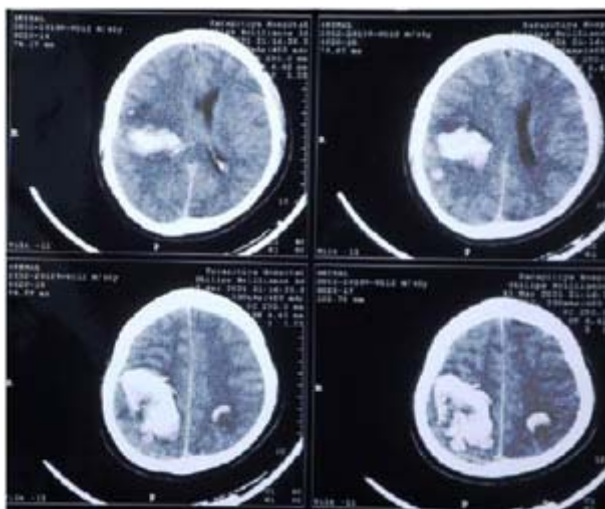


Fig 1 — CT images and brain shows intra-cerebral haemorrhages and sagittal sinus thrombosis (white arrow)

illness on the fifteenth day of vaccination in spite of medical management.

Autopsy findings :

Autopsy examination was conducted on the same day following negative postmortem PCR for COVID-19, the body was that of an average built adult male. External examination was unremarkable except for having a faded petechial rash over the lateral aspect of both upper limbs.

There were widespread petechial haemorrhages in serosal and mucosal surfaces. The brain was edematous and showed Cerebral Venous Thrombosis including the sagittal sinus (Fig 1) and massive intracerebral haemorrhage in the right parietal lobe, which was bursting into the intraventricular and subarachnoid spaces. There were multiple thrombi in pulmonary, renal and hepatic vasculature associated with hemorrhagic infarctions (Figs 2 and 3). The heart was flabby and showed multiple subepicardial petechial haemorrhages. Bone marrow was unremarkable. The findings were further confirmed with appropriate microscopic examination. (Figs 4 and 5). The COVID-19 antibodies were present in the postmortem blood sample. There were no signs of any other illness and all other primary and secondary causes for severe thrombocytopenia and bleeding

disorders were excluded (Figs 6-9).

DISCUSSION

Vaccination is a simple but most effective way of preventing people from harmful bacterial and viral agents, before they come into contact with them, using the body's natural defences to build specific antibodies against infections² Sometimes the combinations are used to enhance the protective efficacy of the vaccine³.

However, almost all vaccines are associated with side effects. In agreement with the World Health Organization, these reactions can be classified as follows, depending on the cause: vaccination-induced reactions (due to an effect of the vaccine itself or to an idiosyncrasy); reactions due to errors in storage, manipulation and/or administration and coincidental reactions (no causal relationship with the vaccine)⁴. The COVISHIELD vaccine is a mRNA compound of another virus of the adenovirus family that has been modified to contain the gene for making a protein from SARS-CoV-2 and the benefits of the vaccine outweigh its risks in adults of all age groups except for the very rare cases of blood clots with low blood platelets occurred following vaccination. According to the manufacturer's data of phase III clinical trials from the UK, Brazil and South Africa, COVID-19 Vaccine



Fig 2 — Brain shows thrombosis of superficial veins (yellow arrow)with bursting intracerebral haemorrhage into the subarachnoid space (white arrow)



Fig 3 — Remnants of thrombi in sagittal sinus (green arrow)



Fig 4 — Pulmonary thrombi (White arrows)

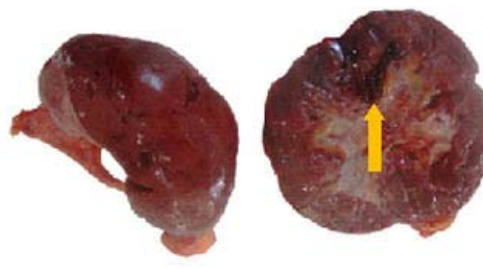


Fig 5 — Hemorrhagic infarction of kidney

AstraZeneca is safe and effective at preventing COVID-19 with no severe cases and no hospitalisations, more than 22 days after the first dose^{5,6}.

Nevertheless, the clinical history and autopsy findings of the presenting case are convincingly linked to the administration of the particular vaccine. The victim of this case, who was previously well, gradually developed severe thrombocytopenia together with the persistent postvaccination symptoms. A similar clinical scenario about postvaccination acquiring of unusual clotting defect known as Immune Thrombotic Thrombocytopenia mediated by platelet-activating antibodies against PF4 that may resemble autoimmune heparin-induced Thrombocytopenia⁷ is occasionally reported in the literature. It has also been referred to as Thrombosis with Thrombocytopenia Syndrome (TTS)⁸ which is very rare with a few reported fatal cases^{9,10}.

In fact, the victim of this case exhibited the signs of cerebral involvement at the very early stages of the disease process due to the formation of venous thrombi in cerebral vasculature including the sagittal sinus. The CT imaging is quite easy to miss the early stages of Sagittal Sinus Thrombosis¹¹, the fact, which is obvious in the presenting scenario as well, hence needs a higher vigilance of clinical suspicion. Involvement of the renal vasculature indicates more severe forms of thrombosis as it is considered to be one of the critical sites at the end-stage. The findings are in keeping with the widespread intravascular coagulation apparently in response to ingestion of heterogeneous protein compound, though the exact biochemical initiating point of which is yet to be studied. The European postvaccination observations showed several cases of such thrombosis including unusual cases of Cerebral Venous Sinus Thrombosis associated with Thrombocytopenia. However, There the reported incidents of disseminated intravascular coagulation associated with severe cerebral haemorrhages following vaccination are very scanty. The thrombocytopenia, widespread intravascular coagulation and liver involvement would also have been contributed to the rapidly progressing extensive cerebral haemorrhages. Some experts do not accept the casual relationship of the adverse effects and express their view on these rare

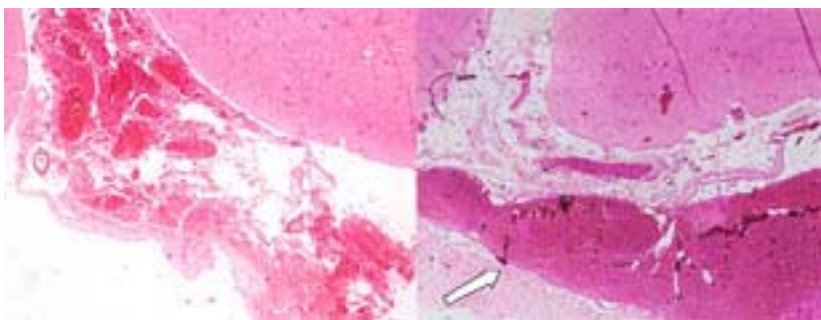


Fig 6 — Microphotograph shows the presence of subarachnoid hemorrhage (H&E X 50)

Fig 7 — Cerebral venous thrombosis (White arrow) with infarction of adjoining brain tissues (H&E X 50)

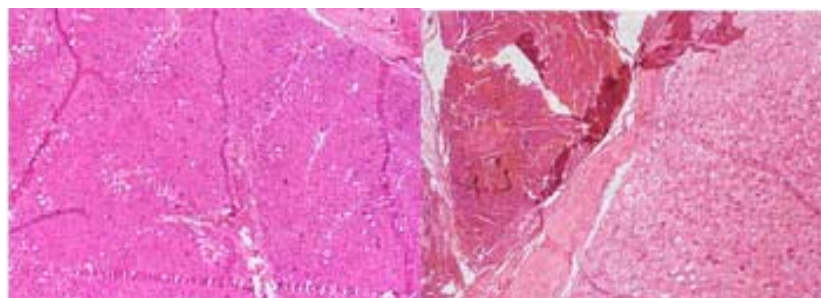


Fig 8 — Microphotograph shows the presence of fibrin thrombus in hepatic vasculature (H&E X 40)

Fig 9 — Renal tissues with adjacent infarction (H&E X 20)

occurrences as the normal complications of the disease the victims already suffered. Nevertheless, the deceased in this case was previously well and all the other possibilities responsible for his illness were excluded with antemortem and postmortem investigations.

However, the serious side effects from COVISHIELD are extremely rare and the risk of getting Thrombosis is much higher with COVID-19 infection. Incidents of severe anaphylactic reactions also hardly reported during the immediate postvaccination phase¹². Hence, it needs safety monitoring to be continued from weeks to months to identify the more possible side effects. This is the first reported and thoroughly investigated death following vaccination with COVISHIELD in Sri Lanka though there were three cases of recovery from vaccine-related thrombogenic complications. Policy decisions were made by the Epidemiology Unit in Sri Lanka and the Health Care and all the other frontline authorities were expected to report the suspicious Postvaccination case immediately for careful monitoring, thorough investigation whenever a patient present with unusual symptoms even after two weeks of vaccination.

CONCLUSION

The clinical features and the autopsy findings of the presenting case of a death of a healthy adult following two weeks of COVISHIED vaccination are in keeping with

the characteristic but rare fatal adverse outcome of COVID-19 vaccination. These findings may be helpful for the clinical management for prompt recognition and effective management of postvaccination reactions. Finally, the existence of rare complications against COVID-19 vaccination is outweighed by the benefits of forced immunization of the community.

REFERENCES

- Menni C, Klaser K, May A — vaccination in users of the COVID Symptom Study app in the UK: a prospective observational study. *Lancet Infect Dis* 2021; Online First. Available at [https://doi.org/10.1016/S1473-3099\(21\)00224-3](https://doi.org/10.1016/S1473-3099(21)00224-3)
- Vaccine and immunization — World Health Organization. At <https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination?>
- AstraZeneca's COVID-19 vaccine: benefits and risks in context. European medicines agency. 2021. Available At <https://www.ema.europa.eu/en/news/astrazenecas-covid-19-vaccine-benefits-risks-context>
- Eseverri JL, Ranea S, Marin A — Adverse reactions to vaccines. *Allergologia et immunopathologia* 2003; **31(3)**: 125-38.
- Voysey M, Clemens SA, Madhi SA, Weckx LY, Folegatti PM, Aley PK, *et al* — Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *The Lancet* 2021; **397(10269)**: 99-111.
- Voysey, Meryn, Costa Clemens — Oxford COVID Vaccine Trial, Single-dose Administration, And The Influence Of The Timing Of The Booster Dose On Immunogenicity and Efficacy Of ChAdOx1 nCoV-19 (AZD1222) Vaccine. Available at: <https://ssrn.com/abstract=3777268> or <http://dx.doi.org/10.2139/ssrn.3777268>
- AstraZeneca's COVID-19 vaccine: benefits and risks in context. European medicines agency. 2021. Available At <https://www.ema.europa.eu/en/news/astrazenecas-covid-19-vaccine-benefits-risks-context>
- CDC. CDC recommends use of Johnson & Johnson's Janssen COVID-19 vaccine resume. Updated April 25, 2021. <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/JJUpdate.html>. (Accessed April 26, 2021).
- Government of Canada. AstraZeneca COVID-19 vaccine and COVISHIELD risk of thrombosis with thrombocytopenia. Updated April 17, 2021. <https://healthycanadians.gc.ca/recall-alert-rappel-avis/hc-sc/2021/75211a-eng.php>. (Accessed April 26, 2021).
- European Medicines Agency. AstraZeneca's COVID-19 vaccine: EMA finds possible link to very rare cases of unusual blood clots with low blood platelets. April 7, 2021. <https://www.ema.europa.eu/en/news/astrazenecas-covid-19-vaccine-ema-finds-possible-link-very-rare-cases-unusual-blood-clots-low-blood>. (Accessed April 26, 2021).
- Ganeshan D, Narlawar R, McCann C, Jones HL, Curtis J — Cerebral venous thrombosis—a pictorial review. *European Journal of Radiology* 2010; **74(1)**: 110-6.
- World Health Organization— Interim recommendations for use of the ChAdOx1-S [recombinant] vaccine against COVID-19 (AstraZeneca COVID-19 vaccine AZD1222, SII Covishield, SK Bioscience): interim guidance, first issued 10 February 2021, updated 21 April 2021. World Health Organization; 2021.

Disclaimer

The information and opinions presented in the Journal reflect the views of the authors and not of the Journal or its Editorial Board or the Publisher. Publication does not constitute endorsement by the journal.

JIMA assumes no responsibility for the authenticity or reliability of any product, equipment, gadget or any claim by medical establishments/institutions/manufacturers or any training programme in the form of advertisements appearing in JIMA and also does not endorse or give any guarantee to such products or training programme or promote any such thing or claims made so after.

— **Hony Editor**

Case Report

Acrodermatitis Enteropathica In Adolescence — A Rare Presentation of Malabsorption

Salma Barlaskar¹, Bhaskar Kanti Nath², Prithwiraj Bhattacharjee³

Acrodermatitis Enteropathica (AE) is a rare, inherited or acquired disorder due to Zinc Deficiency. It is characterized by a triad of Acral Dermatitis, Alopecia and Diarrhoea. The acral and periorificial distribution of the rash is considered as a pathognomonic cutaneous marker for Zinc Deficiency. It is inherited as an autosomal recessive disorder and usually manifests in weaning children. Acquired cases can manifest at any age and occur secondary to malabsorption, dietary insufficiency, pancreatic insufficiency, chronic alcoholism etc. Supplementation with Zinc produces excellent clinical improvement and reduces mortality.

In our case, we diagnosed an adolescent girl with AE secondary to malabsorption who presented with periorificial ulcers, chronic diarrhoea and alopecia.

This case highlights the importance of keeping a low threshold for suspicion of Zinc Deficiency in patients with such skin manifestation. Otherwise the patient might be misdiagnosed as skin infection and thus not respond to treatment. Prompt diagnosis facilitates proper therapy and complete recovery in a condition which can be debilitating and fatal if not treated.

[J Indian Med Assoc 2021; 119(12): 73-5]

Key words : Acrodermatitis Enteropathica, Zinc, Periorificial, Alopecia, Diarrhoea, Malabsorption.

Swedish dermatologist Thore Brandt first described a case of severe Zinc Deficiency in 1936 and thus named it as Brandt's Syndrome, also known as Acrodermatitis Enteropathica. It may be inherited or acquired. We report here a case of acquired Acrodermatitis Enteropathica in an adolescent girl.

CASE REPORT

A 13 year female hailing from a village in Silchar presented to Medicine OPD with complaints of erythematous scaly & crusting lesions at multiple sites, chronic diarrhoea, easy fatigability and lethargy for the last 1year. The skin lesions initially started around the perineal region, tips of fingers & toes as blackish discoloration & itching. It gradually progressed and there was excoriation, reddening & crust formation. With time, the lesions started appearing around her eyes & mouth. The patient had visited several local physicians who treated her as a case of Cellulitis. She also took many over the counter medications for her skin lesions but it did not improve.

There was no history of any diagnosed hereditary disease in the family. There was no H/O similar complaints in the family. There is a H/O sibling death

Department of Medicine, Silchar Medical College and Hospital, Silchar, Assam 788014

¹MBBS, Postgraduate Trainee and Corresponding Author

²MBBS, MD, Assistant Professor

³MBBS, MD, Professor and Head

Received on : 06/02/2020

Accepted on : 20/02/2020

Editor's Comment :

- This case highlights the importance of a correct diagnosis in treating a patient with a debilitating disease and the satisfying result of prompt intervention.
- The threshold for suspicion of zinc deficiency in patients with such skin manifestation should be low. Otherwise the patient might be misdiagnosed as skin infection and thus not respond to treatment.

around 1month after birth but the exact cause of death is not known. At present, the patient has 2 siblings who are in good health.

On examination, patient was afebrile, conscious, oriented & irritable. Built was asthenic, BMI=14.7kg/m². Pallor, bilateral pitting oedema and ascitis were present. Periocular, perioral, perineal & acral lesions with desquamation & crusting were seen (Fig 1). Bilateral ectropion was present. Hair was scanty and coarse with brown discoloration. (Fig 2). Other systemic examination were not significant.

Investigation revealed a microcytic hypochromic anaemia, Red Cell Indices showed (WBC-5.41*10³/μL, RBC-2.82*10⁶/μL, Hb-6.9g/dL, HCT-25.7%, MCV-91.1fL, MCH-28pg, MCHC-30.7g/dL, PLT-310*10³/μL, RDW-CV-14.1%, MPV-10.9fL, DLC. Neutrophil-76.4%; Lymphocyte-20.6%; Monocyte-2.7%; Basophil-0.3%; Eosinophil-0%), hypoalbuminaemia, hypokalemia, and hypochloremia & iron deficiency. Serum Zinc level was 15ug/dL. Ultrasonography of the abdomen was normal except for moderate ascitis. Ascitic fluid showed (Protein-1.6g/dL,



Fig 1 — Periorificial & acral lesions at presentation

Glucose-78mg/dL, Total cell count-6/ μ L, RBC-0, WBC-6/ μ L, PMN-4/ μ L, MN-2/ μ L, SAAG-1.3). Stool routine examination was normal and stool culture was sterile. Other investigations including autoimmune markers, anti tTG were non reactive.

On the basis of history, examination & investigations we came to the diagnosis of Acrodermatitis Enteropathica secondary to malabsorption. The patient was supplemented with Oral Zinc Acetate Tablets 50mg twice daily along with ORS, probiotic therapy, vitamin A, Iron Folic acid supplementation and Doxycycline 100mg twice daily for 2 weeks. Diet rich in protein, vitamins and minerals was advised. Local application of topical corticosteroids was advised. She also received 1 unit of packed RBC transfusion.

By 2 weeks patient improved dramatically. The skin lesions cleared up and the diarrhoea subsided. General well being of the patient also improved (Fig 3).

DISCUSSION

Inherited Acrodermatitis Enteropathica is a rare autosomal recessive disorder. It usually begins within days to weeks after birth in infants bottle fed with animal milk or soon after weaning from the breast in older infants¹.

Acquired Acrodermatitis Enteropathica usually occurs in patients receiving prolonged total parenteral nutrition, or secondary to chronic alcoholism, pancreatic or dietary insufficiency and malabsorption. The clinical

syndrome consists of a triad of acral dermatitis, alopecia and diarrhoea. The acral and periorificial lesions are in fact pathognomonic cutaneous marker for Zinc deficiency. Other clinical features include apathy, irritability, growth retardation, failure to thrive, stomatitis and delayed wound healing. Response to Zinc therapy confirms the diagnosis².



Fig 2 — Scanty & coarse hair with brown discoloration



Fig 3 — Improvement of the patient by 2 weeks

Zinc is an important constituent of the human body because it forms an integral part of many metalloenzymes. Unmilled cereals, beans, cheese, whole wheat bread, meat, shellfish, nuts and legumes are good sources of bioavailable Zinc². The requirement of Zinc for adolescent male and female are 15mg and 12mg /day respectively¹. The supplementation of Zinc

sulphate for Acrodermatitis Enteropathica was first introduced in 1973³⁻⁵. Dosage is based on the amount of elemental Zinc present in the preparation. As observed in a study treatment with Zinc Sulphate 1mg/kg/day helped clear the symptoms in 5 days⁶. In yet another case report, Zinc Sulphate was used in a dosage of 5mg/kg/day⁷. There was rapid improvement of diarrhoea within 24 hours and the skin lesions within 1 to 2 weeks⁸.

Our case highlights the importance of a correct diagnosis in treating a patient with a debilitating disease and the satisfying result of prompt intervention. The threshold for suspicion of Zinc deficiency in patients with such skin manifestation should be low. Otherwise the patient might be misdiagnosed as skin infection and thus not respond to treatment.

The exact cause for malabsorption could not be found out. Ultrasonography of abdomen was normal except for moderate ascitis. Her stool examination was normal and stool culture showed commensal flora of gastrointestinal tract. Our patient was advised for endoscopic intestinal biopsy but the attendants refused to give their consent for the procedure.

REFERENCES

- 1 Ghai OP, Piyush Gupta, Paul VK — Ghai Essential paediatrics 6th edn; 2005: 123.
- 2 Jameson JL, Kasper DL, Longo DL, Anthony S — Fauci, Stephen L. Hauser, Joseph Loscalzo. Harrison's Principles of Internal Medicine 20th edition; 2019.
- 3 Saritha M, Gupta D, Chandrashekar L, Thappa DM, Rajesh NG — Acquired zinc deficiency in an adult female. *Indian J Dermatol* 2012; **57**: 492-4. Online link for the reference - Available from : <http://www.e-ijd.org/text.asp?2012/57/6/492/103073>
- 4 Michaelsson G — zinc therapy in acrodermatitis enteropathica. *Acta Derm Venereol (Stockh)* 1974; **54**: 377-81.
- 5 Vasantha K, Kannan KA — Acrodermatitis enteropathica-A case report. *Indian J Ophthalmol* 1989; **37**: 197-8. Online link for the reference- Available from: <http://www.ijo.in/text.asp?1989/37/4/197/26046>
- 6 Sivasubramaniam KN, Henkin RI — Behavioural and dermatological changes and low serum zinc concentrations in two premature infants after Parenteral alimentation. *J Paediat* 1978; **93**: 847-51.
- 7 Pai K, Baliga P, Pai S, Sharma S — Acrodermatitis Enteropathica in an adult: a case report. *Our Dermatol Online*. 2015; **6**(2): 201-3.
- 8 Kaur S, Thami GP, Kanwar AJ — Acrodermatitis enteropathica in a full term breast fed infant . *J Journal of Paediatrics* 2002; **69**(7): 631-33.

If you want to send your queries and receive the response on any subject from JIMA, please use the E-mail or Mobile facility.

Know Your JIMA

Website : <https://onlinejima.com>
For Reception : **Mobile** : +919477493033
For Editorial : jima1930@rediffmail.com
Mobile : +919477493027
For Circulation : jimacir@gmail.com
Mobile : +919477493037
For Marketing : jimamkt@gmail.com
Mobile : +919477493036
For Accounts : journalaccts@gmail.com
Mobile : +919432211112
For Guideline : <https://onlinejima.com>

Case Report

A Challenging Case of Chest Discomfort and Breathlessness

S Arulraj¹, Ramasubramanian², Sundaralingam³, Aarathy Kannan⁴, Chandrakumar⁵, Manikandan⁵, M D Faizur Rahman⁶

Esophagopleural Fistula (EPF) presents with some nonspecific symptoms which may lead you to other provisional diagnosis first but a close workup and considering every differential diagnosis very carefully will take you to the final diagnosis. The unfamiliarity of this condition, along with non-specific clinical presentations and elusive imaging findings makes it a diagnostic challenge. The causes of EPF may be due to Post Pneumonectomy for any pathological condition of lung, Oesophageal Malignancy or Carcinoma lung. Benign causes are rare and can be due to infection or trauma¹. Among infections Tuberculosis is the most common cause for Esophagopleural Fistula. We hereby describe a case of 45 years old male with an Esophagopleural Fistula on left side that has been treated conservatively and recovered.

[J Indian Med Assoc 2021; 119(12): 76-7]

Key words : Esophagopleural Fistula, Tuberculosis, Pleural effusion.

EPF is one of the most common form of Esophagorespiratory Fistula that occur secondary to oesophageal perforation. The perforation most commonly arises due to Esophagoscopy examination, remaining being foreign bodies (Fishbone), Carcinoma, gastric intubation, Chest trauma and Chest operations. But rarely spontaneous rupture of esophagus (Boerhaave's Syndrome) may occur due to sudden rise of intraesophageal pressure (by contraction of cricopharyngeus muscle and closing of pyloric sphincter) associated with forceful vomiting or retching, classically after overeating or excessive drinking. A minor variety (Mallory Weiss Tears) are mucosal tears caused by forceful or long-term vomiting, retching or coughing and usually heal spontaneously. Characteristically, this spontaneous rupture almost always involves the lower esophagus just above the diaphragm².

CASE REPORT

A 45 years old male patient presented to our emergency with complaints of left sided chest pain associated with breathlessness since 2 weeks and two episodes of Hematemesis. The patient was a binge Alcoholic since last few years. There was no history of

Sundaram Arulraj Hospitals, Thoothukudi, Tamil Nadu 628002

¹MD, PhD, FRCP(G), FRCP(L), MBA, Professor and Head, Chief Physician & Intensivist, Department of Internal Medicine and Corresponding Author

²DM (Gastro), Professor, Consultant Medical Gastroenterologist

³DTCD, Consultant Pulmonologist

⁴MD, Dip Diab, Consultant Physician & Dialectologist

⁵DNB (General Medicine), Postgraduate Trainee, Department of Internal Medicine

⁵DNB (General Medicine), Postgraduate Trainee, Department of Internal Medicine

⁶MD, Faizur Rahman, DNB (General Medicine), Postgraduate Trainee, Department of Internal Medicine

Received on : 14/09/2021

Accepted on : 23/09/2021

Editor's Comment :

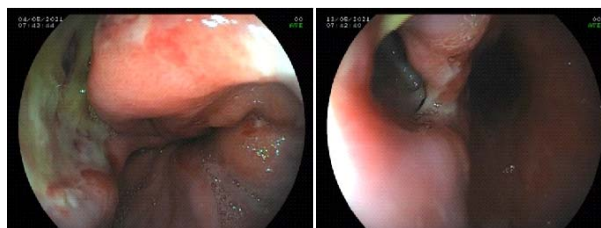
- Every Breathlessness is not Cardio respiratory can be Oesophageal Perforation too.
- All pleural effusion not due to TB may be due to Oesophago pleural Fistula too.
- Oesophageal ulcer can be Tuberculosis too.

any endoscopic intervention, tuberculosis or any type of dysphagia or breathlessness before.

The treatment of the patient was started considering upper GI bleed secondary to? Mallory weiss tear? Boerhaave Syndrome? Variceal bleed as provisional diagnosis

The treatment has been started with Vitamin K, Antifibrinolytics, Proton pump inhibitor, Stomach wash with cold water through Ryles tube and other supportive care.

After that patient was taken up for the upper GI Endoscopy, which reveals Excavating ulcer lower oesophagus with signs of active bleed.



Upper GI bleed stops but still the chest discomfort and breathlessness persists.

X-ray chest of the patient was showing left sided pleural effusion for that pleural tapping was tried but was unsuccessful, as only dry tap we found,

Then an Ultrasound guided tapping is planned which shows multiple loculated pockets of collection, which were drained individually under Ultrasound guidance.

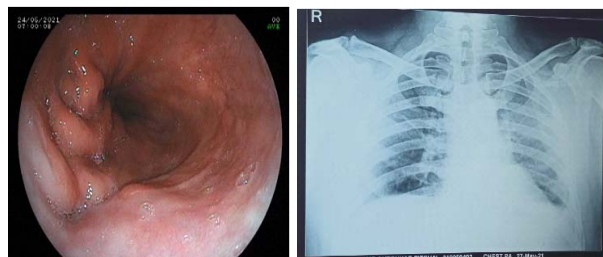
Pleural fluid sent for analysis in which MTB was detected through CBNAAT and patient was started on Antitubercular medications.

But still the chest comfort persists....

Cardiac evaluation was done to see if any ischemic change in heart, ECG doesn't show any ischemic changes.

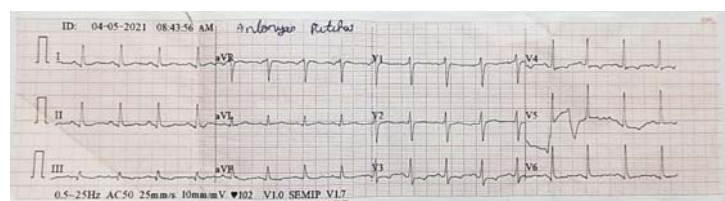


Upper GI endoscopy repeated which shows a healed ulcer which was detected earlier.



DISCUSSION

It is very difficult to diagnose the EPF as clinical signs and symptoms are non-specific. An injury to oesophagus should be considered if patient presented with Retrosternal chest pain, Dysphagia, Dyspnoea, Fever especially when patient gives previous history of instrumentation or Surgery like Pneumonectomy³. but in this case

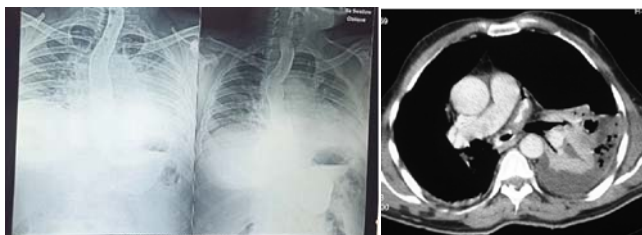


ECHO also doesn't show any regional wall motion abnormality, Cardiac markers values were also within the normal limits.

Key Findings :

- Binge Alcoholic
- Hematemesis
- Lower Oesophageal Ulcer
- Left Sided Pleural Effusion – Tuberculous etiology

By linking all these key findings an oesophageal leak was suspected, for that barium swallow X-ray was taken, but x ray was not conclusive to any leak. To confirm we tried for oral contrast CT chest, which shows a small defect with contrast leak seen at the left lateral wall of lower oesophagus just above the GE junction- Oesophageo Pleural Fistula likely with left sided pleural effusion.



Since his pleural fluid aspirate report suggestive of Tuberculous etiology – we suspected lower esophageal Tuberculous ulcer hence undergone repeat UGI scopy, biopsy taken and sent for detection of Tuberculosis with TB – RTPCR

Biopsy report came as Lower oesophageal TB ulcer with superadded Candidiasis. In view of the findings patient continued with ATT and antifungal started.

For next one week Ryles tube feeding with high protein diet was continued and Follow up X-ray showed minimal effusion and clearance of consolidation patch. Patient showed good improvement on Antitubercular drugs so oral diet started.

there was no such history and leak was also very small which could not be detected in Barium swallow. This is the reason that is why this type of EPF could be missed. Rarely EPF heals spontaneously, oesophageal leaks are associated with very high mortality so it should be treated as soon as possible. Therapeutic options include conservative management with antibiotics, ATT with cessation of oral intake, surgical repair or resection. Endoscopic intervention may be tried with clip, fibrin glue, metallic stents and suturing^{4,5}.

Key Notes :

- EPF with left sided pleural effusion - tubercular aetiology has been managed medically and recovered well.
- EPF is an uncommon entity with nonspecific clinical presentation.
- Gastroscopy is the key.
- CECT of chest is a very useful modality for early diagnosis and management of EPF.
- It should be performed in patients with pleural effusion presenting with nonspecific clinical symptoms before any intervention or drainage.

REFERENCES

- 1 Wychulis AR, Ellis FH, Jr, Andersen HA — Acquired nonmalignant esophagotracheobronchial fistula. Report of 36 cases. *JAMA* 1966; **196**: 117-22. [PubMed] [Google Scholar]
- 2 Liu PS, Levine MS, Torigian DA— Esophagopleural fistula secondary to esophageal wall ballooning and thinning after pneumonectomy: Findings on chest CT and esophagography. *AJR Am J Roentgenol* 2006; **186**: 1627-9. [PubMed] [Google Scholar]
- 3 Takaro T, Walkup HE, Okano T — Esophagopleural fistula as a complication of thoracic surgery. A collective view. *J Thorac Cardiovasc Surg* 1960; **40**: 179-93. [PubMed] [Google Scholar]
- 4 Michel L, Grillo HC, Malt RA— Operative and nonoperative management of esophageal perforation. *Ann Surg* 1981; **194**: 57-63.
- 5 Ghanem N, Althoefer C, Springer O, Furtwangler A, Kotter E, Schafer O, *et al* — Radiological findings in Boerhaave's Syndrome. *Emerg Radiol* 2003; **10**: 8-13.

Case Report

A Case Report on A Very Rare Hernia : Primary Anterior Perineal Hernia

Sudipta Chatterjee¹, Satyaprakash Kuila², Ankit Agarwal³

Introduction : The entity of primary Anterior Perineal Hernia (APH) is very rare and almost exclusive to female gender. The contributing factors are chronic constipation, prolonged and difficult labour, atrophy of Levator Ani muscle and disease of Pudendal Nerve. This study presents a successfully treated case of primary anterior perineal hernia. Till date reported cases in literature so far are less than 50.

Case presentation : A 32-year-old female presented with a hanging soft Globular Swelling in the right anterior perineal region. High resolution USG and MDCT (lower abdomen with pelvis) diagnosed this to be a primary APH with omentum as its content. Patient was successfully treated with mesh by combined open abdomino-perineal approach.

Discussion : Literature shows many treatment approaches, like open or Laparoscopic mesh repair by perineal, abdominal and combined approaches. Our case confirms that Mesh repair by combined open abdominoperineal approach is also feasible and successful in case of a large irreducible hanging APH.

[J Indian Med Assoc 2021; **119(12)**: 78-80]

Key words : Perineal hernia, Mesh repair, Anterior perineal hernia.

CASE REPORT

A 32-year-old female presented with chief complaint of a Swelling hanging on the medial aspect of right thigh with dragging sensation without any chronic constipation. She also had para vulvar protrusion. The hanging Mass in the perineal region protrudes through urogenital triangle anterior to the transversus perinei muscle, measured about 10 cm in size and was globular in shape. Patient had a history of one assisted vaginal delivery but had not undergone any Perineal Surgery. On examination, a smooth globular hanging swelling 10 cm in diameter with a stalk was observed in the anterior region of perineum originating from the urogenital triangle. The Swelling was non tender, soft in consistency, compressible, non-reducible, non-pulsatile with palpable cough impulse. There were no signs of strangulation. Transillumination was negative. Bimanual, per-vaginal, and per-rectal examination excludes cystocele or rectocele. HRUSG showed tissue lesion deep to anterior part of right side of perineum. MDCT showed herniation through a defect of 2 cm in size, containing omentum and fat, protruding through a gap in urogenital diaphragm anterior to transversus perinei muscle. Coronal sections showed the Hernia measuring 10cm x 9cm.

Department of General Surgery, Midnapore Medical College and Hospital, Midnapore 721101

¹MS, FMAS, FIAGES, Assistant Professor

²MS, DNB, Senior Resident

³MBBS, 3rd Year Postgraduate Resident and Corresponding Author

Received on : 07/07/2021

Accepted on : 09/07/2021

Editor's Comment :

■ A case report on very rare primary Anterior Perineal Hernia, successfully treated with combined abdominoperineal approach using prolene Mesh repair in a female patient.

Management and Outcome — The patient was positioned in the Lloyd Davis position under General Anesthesia. Sub umbilical midline incision was made. Content was passing anterior to broad ligament and lateral to bladder. Entire omentum and sac could not be reduced by abdominal manipulation as the sac was very large with omental adhesions. So, we had to approach perineally with a longitudinal incision and redundant sac with omental adhesions was excised. Defect of around 2 cm in the urogenital diaphragm was identified and closed with Vicryl 2-0 and Polypropylene Mesh was used for repair in anterior compartment of perineum and secured anteriorly to Inferior Iliopubic Rami and pelvic floor, medially to lateral vaginal wall, posterolaterally to transversus perinei, posteriorly to the perineal body and laterally to ileococcygeus with Prolene 2-0 suture. Intra-abdominally peritoneum apposition was done with few stitches. Closure of abdominal wall and skin concludes the Surgery with placement of closed suction drain in the perineum. Drain was removed on 3rd postoperative day and patient was discharged after fifth postoperative day.

DISCUSSION

Perineal Hernia is a rare entity, among them primary APH is way rarer, less than 50 cases accounted till date. First reported case was done by Scarpa⁸ in 1821 however, this entity was mentioned first by De Garengot⁸ in 1731.

In 1936 first reported case is noted by Kondo in 26-year-old female, in which abdominal approach is done to repair perineal hernia. Similarly, Amos, Richard and Ruben, Sato *et al*, Vincent *et al*, Rebecca *et al*, Ito *et al*, Kuruki, Amano, Preiss *et al*, Dirk *et al*, Washiro *et al*, Jorge and Juan also repair the perineal Hernia through abdominal approach through consecutive years².

Total 29 cases were reported till now where primary perineal Hernia is reported and repair is done with either abdominal approach and abdominoperineal approach, by open or laparoscopic method².

Kondo, Amos, Richard and Ruben, Sato *et al*, Vincent *et al*, Amano, Preiss *et al* done the repair with sutures².

Many authors done the repair with suture and Mesh both whereas many authors done the repair with only Mesh.

Our case is number 30 in the published literature and we approach through combined abdomino-perineal approach and repair is done with suture and mesh both.

Primary perineal Hernias are focal, acquired defects within the pelvic floor that typically occur in women because of pelvic attenuation associated with vaginal delivery or chronic conditions involving increased abdominal pressure (eg, Chronic Cough, Constipation, Ascites). Congenitally deep elongated pouch of Douglas is a contributing factor in females^{1,2}. Secondary perineal Hernias are Hernias within the pelvic floor that result from prior Perineal Surgery like abdominoperineal resections. Other factors may be Obesity, ascites and Pelvic Infections. Our case is a primary one with history of assisted vaginal delivery being the possible contributing factor³.

Herniation can be through the anterior or posterior compartments of the pelvic floor. Anterior perineal Hernias occur exclusively in women; no confirmed cases in men have been reported till now⁴. Anterior Perineal Hernias occur through the

urogenital diaphragm within the triangular regions lateral to each side of the vaginal vestibule, bounded laterally by Ilio-coccygeus muscle, medially by Bulbo-Cavernosus muscle and posteriorly by transversus perinei muscle. Our case is an anterior type as diagnosed by imaging and confirmed during surgical exploration. Posterior Perineal Hernias occur posterior to the transversus perinei muscles and anterior to the ventral borders of the Gluteus Maximus muscles. They typically occur midway between the anus and the Ischial Tuberosity within a levator ani defect, in the space between the Pubo-Coccygeus and Ischio-Coccygeus portions of the levator ani muscle.

The Hernial sac of a perineal Hernia may contain one or more of the Abdomino-Pelvic viscera like small or large Bowel, Bladder, Omentum, Ovary and fallopian tube⁷, in our case the content was omentum.

Treatment modality is Surgery and in literature there are three approaches: Abdominal, Perineal and Combined. Among them Abdominal approach being the preferred one because of better delineation of Hernia sac and more secure repair^{5,6}. Perineal approach is a direct one but with lesser exposure being its drawback.

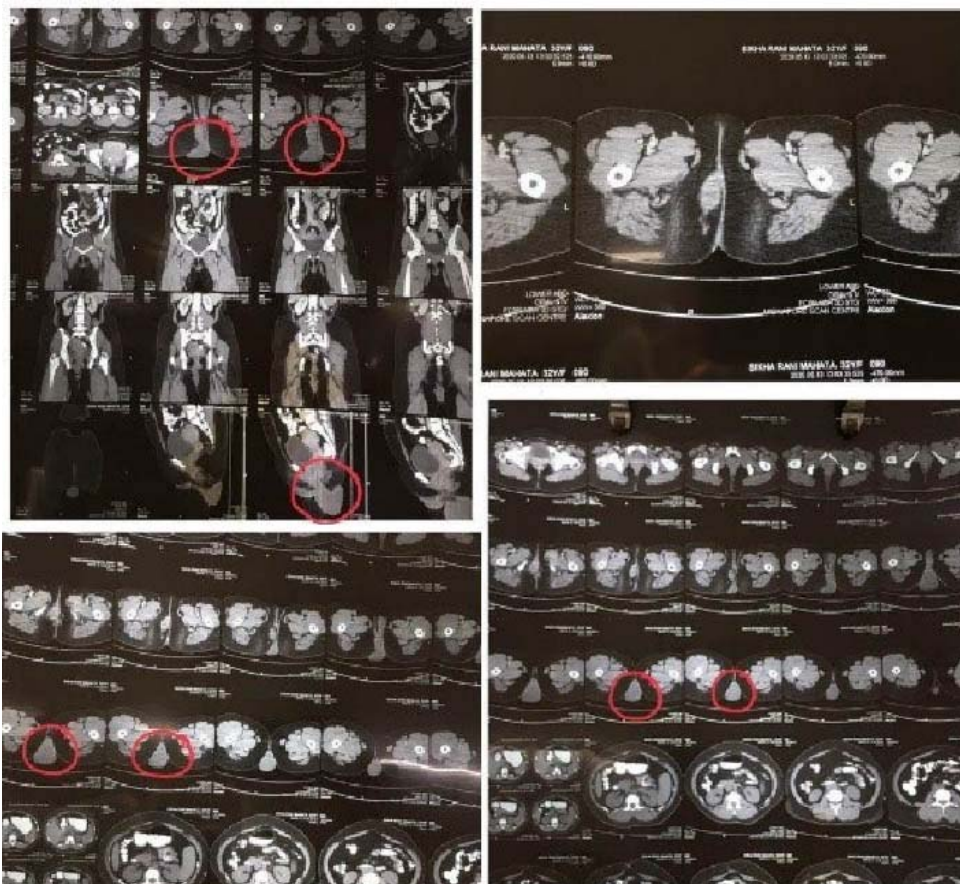


Fig 1 — MDCT showing primary anterior perineal hernia (encircled)

In extreme cases, where contents cannot be reduced, combined approach is used for Surgery. As in our case fat contents could not be reduced and Perineal Swelling protruding through the defect, though we started with abdominal approach but perineal dissection of sac had become compulsory. Because of atrophied muscle suture repair has been associated with high recurrence rates and Mesh fixation is usually required. In this case we used a polypropylene Mesh which has been practiced by most Surgeons in the available literature.

Follow up has been done for one year which is uneventful.

Radiology and Operative Photograph (Figs 1&2):

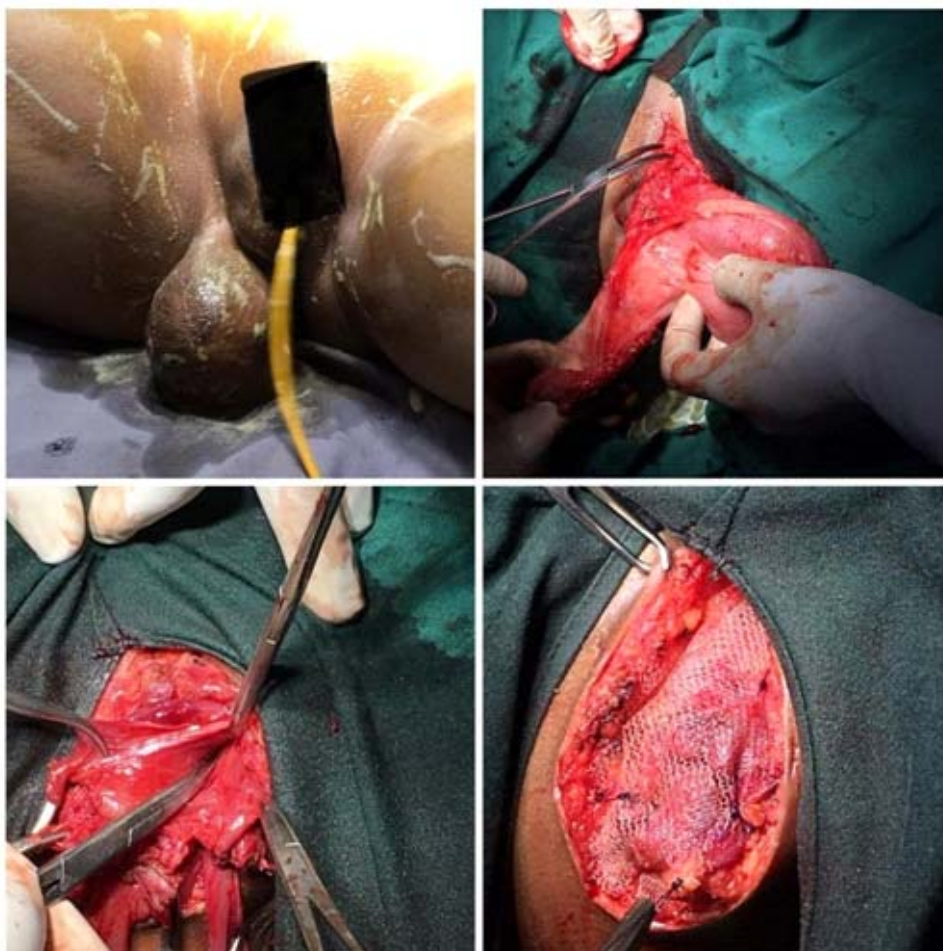


Fig 2 — Pre-operative and postoperative photographs.

REFERENCES

- 1 Cali RL, Pitsch RM, Blatchford GJ, Thorson A, Christensen MA — Rare pelvic floor hernias. Report of a case and review of the literature. *Dis Colon Rectum* 1992; **35(6)**: 604-12. Reference from journal.
- 2 RK Pearl, LM Nyhus, RE Condon, eds — Perineal hernia. *Hernia*. 3rd ed. Philadelphia, PA: Lippincott; 1989: 442-6. Reference from journal.
- 3 Stamatiou D, Skandalakis JE, Skandalakis LJ, Mirilas P — Perineal hernia. *Surgical anatomy, embryology, and technique of repair*. *Am Surg*. 2010; **76**: 474- 479. Reference from journal.
- 4 Thomas TG — Vulvar and vaginal enterocele. *NY Med J* 1885; **42**: 705-11. Reference from journal.
- 5 Wilensky AO, Kaufman PA — Vaginal hernia. *Am J Surg* 1940; **49**: 31-41. Reference from journal.
- 6 Ekberg O, Nordblom I, Fork FT, Gullmo A — Herniography of femoral, obturator and perineal hernias. *Röfo* 1985; **143**: 193-9. Reference from journal.
- 7 Sorelli PG, Clark SK, Jenkins JT — Laparoscopic repair of primary perineal hernias: the approach of choice in the 21st century. *Colorectal Dis* 2011; **14**: 72-3. Reference from journal.
- 8 Maingot's abdominal operations, chapter 14, page number: 542-4. Reference from book.

Case Report

Computed Tomographic Findings of Invasive Mucormycosis in COVID-19 Patients on Steroid Therapy at A Tertiary Care Centre — A Case Series

Srijak Bhattacharyya¹ Raj Saha¹, Prasun Das¹, Swadha Priya Basu², Subhargha Mandal³, Tanuka Mandal⁴

Background : As India continues to cope with the existing rise in COVID-19 infections, Mucormycosis has emerged as a formidable complication in COVID infected Diabetics on Steroid Therapy.

Case presentation : We describe the imaging findings in 6 cases of invasive Mucormycosis in Sero-positive COVID-19 patients on Steroid Therapy (5 of whom were also diabetic). 4 cases had predominantly varying involvement of the paranasal sinuses with extension into the orbital compartment and 2 were also associated with pulmonary involvement.

Conclusions : Mucormycosis leads to aggressive Necrosis of the Para-nasal sinuses extending to the brain as well as the orbit. Pulmonary Necrosis is also common owing to its angioinvasive nature. Delay in treatment is often fatal so prompt treatment must be initiated even before histological confirmation using the knowledge of risk factors and characteristic radiological imaging appearances.

[J Indian Med Assoc 2021; 119(12): 81-4]

Key words : COVID-19, Mucormycosis, Bird's Nest Sign.

Mucormycosis is a fungal infection caused by members of Zygomycetes, order Mucorales. It is seen in patients debilitated by Immune or Metabolic Disorder¹. Phagocytes are the main defence mechanism against Mucormycosis² by preventing the multiplication of fungal spores. They are inhibited by corticosteroids. Angio invasiveness with Vessel Thrombosis and Tissue necrosis is characteristic of Mucormycosis³. Diabetes Mellitus, especially if uncontrolled along with use of corticosteroids in the treatment of COVID-19 infection are one of the main risk factors⁴. Neutropenia, intravenous drug use, malnutrition, solid organ or stem cell transplantation and severe skin damages due to burns and surgical suture sites are the other notable risk factors⁵. COVID-19 had wreaked havoc on the World since the first detected case on December, 2019. Of late the situation has been complicated with a rise in the number of co-infections notably Mucormycosis especially in India. High mortality rate of over 50% has been recorded in patients suffering from mucormycosis⁶. Recently, Chest Computed Tomography (Axial and coronal

Editor's Comment :

- COVID-19 patients on long term steroid therapy, diabetic or immunosuppressed to coexisting ailment are susceptible to infection by Mucormycosis.
- NCCT PNS is a useful tool for early detection of mucor infection during follow up of such patients who complain of nasal discharge, blockage, facial pain, epistaxis.
- Obliteration of retroantral fat is a reliable sign for involvement of PNS.
- Concomitant HRCT of the chest may also be done to look for pulmonary involvement, classically the Bird's nest sign.
- Although confirmed by histopathology, early imaging diagnosis can aid in prompt treatment and reduce mortality.

sections) has given a highly accurate and non-invasive modality of accurately imaging and early treatment of invasive mould Pneumonia in immunocompromised patients⁷. Based on clinical details, radiology findings and histopathology- the final diagnosis of Mucormycosis was made. We have come across 6 cases of Invasive Mucormycosis following COVID-19 infection with varying involvement of Lung parenchyma, Paranasal air sinuses and Orbits. In order to confirm the diagnosis, histopathological evaluation of the nasal specimen of all 6 cases was done on Potassium Hydroxide (KOH) wet mount.

CASE SERIES

The six patients suffering from Invasive Mucormycosis, all of whom had history of seropositive COVID-19 in recent past were reviewed by us retrospectively during their admission and treatment

Nil Ratan Sircar Medical College and Hospital, Kolkata 700014

¹MBBS, Postgraduate Trainee, Department of Radiodiagnosis

²MBBS, Dip (Card), MD (Radiodiagnosis), Professor & Head, Department of Radiodiagnosis and Corresponding Author

³MBBS, Postgraduate Trainee, Department of Pathology

⁴MD (General Medicine), Senior Resident, R G Kar Medical College and Hospital, Kolkata 700004

Received on : 01/12/2021

Accepted on : 08/12/2021

under the Department of Otorhinolaryngology. Their medical records, clinical data and demographics were reviewed along with Radiological and Histopathological findings. All the patients were previously treated or currently undergoing treatment for COVID-19 at our hospital and they subsequently developed symptoms namely facial pain, nasal blockage with or without discharge, Epistaxis, Chemosis and Swelling of the eye and even loss vision in one patient. The mean age of the subjects were 54.1 years (range 42-73 years). 5 of the 6 patients were Diabetic. All 6 patients had received steroids for at least 10 days. Remdesivir had also been administered to 5 patients. All the patients bar one had other co-morbidities like Hypertension, Chronic Kidney Disease (CKD) and Chronic Obstructive Pulmonary Disease (COPD). In 2 patients had severe COVID-19 infection while the rest had moderate disease based on past CT severity score. CT scan of the Paranasal Sinus (PNS) and Thorax revealed thickening of the mucosa of the paranasal sinuses with adjacent bone erosion and even extension into the orbit in some cases. A few cases also revealed a central cavity with irregular intersecting lines surrounded by consolidation referred to classically as a BIRD'S NEST sign.

DISCUSSION

Mucormycosis is an invasive fungal infection first described by Paulltauf A in 1885⁸. Even though it can involve different organs the most common type is the Rhino Cerebral Form⁹. In our case series we observed 6 patients with recent history of proven moderate to severe

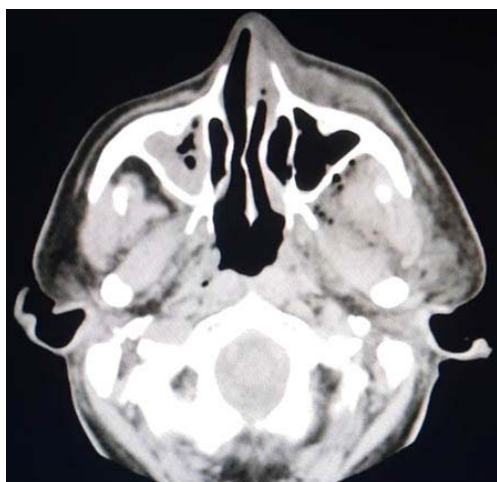


Fig 1 — Axial section of NCCT PNS shows obliteration of the left retro antral fat plane with mucosal thickening in adjacent maxillary antrum. There is also partial obliteration of the retro antral fat plane on the right with near complete opacification of the maxillary sinus

COVID-19 infections, 5 of them were diabetic with one having coexisting kidney disease and another suffering from Chronic Obstructive Pulmonary Disease (COPD). All of them had received systemic steroid therapy for at least 10 days. In the Computed Tomography scan of the head and paranasal sinuses, obliteration of the left retro antral fat plane with mucosal thickening of the adjacent maxillary antrum was seen. Along with it partial obliteration of the retro antral fat lane with nearly complete opacification of the maxillary sinus was noted. (Fig 1) This raised the suspicion that the pathology responsible was something other than simple sinusitis. In another patient, absolute opacification of the maxillary sinus along with the anterior ethmoidal air cells that had a central collection of air without any air-fluid level was noted. Corresponding Osteomeatal Unit (OMU) was blocked. There was a small defect involving the inferomedial and posterior-lateral wall of maxillary sinus on the same side. In one of the cases we found mucosal thickening in bilateral sphenoid and maxillary sinus and left ethmoidal sinus. Irregular outlined soft tissue density lesion seen at inferomedial aspect of left orbit and left side of mid cheek anterior to left maxillary antrum (Fig 2). The lesion is communicated within left anterior ethmoid sinus through small bony erosions. Inflammatory changes noted in left retromaxillary region. Both maxillary ostia

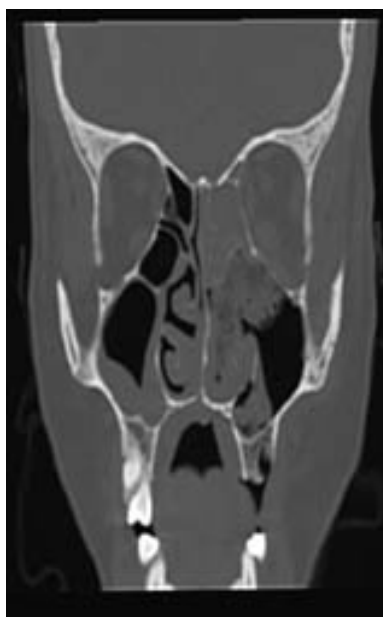


Fig 2 — Coronal NCCT PNS shows mucosal thickening of the left maxillary sinus. Invasion into the adjacent nasal cavity. Mucosal thickening also noted on the right side. Erosion of the medial wall of the maxillary antrum noted with thinning of the inferior and medial walls of the orbit

are blocked associated with left sided proptosis. In 2 of our cases we also did HRCT thorax to look for pulmonary involvement. In one case we found a few thick-walled cavitating lesion with few residual Fibrotic Opacities (Fig 5). In another, we found a cavity surrounded by a dense area of consolidation with few intersecting irregular areas of stranding within it resembling the classical reverse halo sign or Bird's nest sign (Fig 3). Gamba *et al* had showed in their study previously that mucosal thickening without air fluid level on CT scan is a sign of early disease activity¹⁰ while Silverman *et al* in their study had described that the presence of orbital, facial and retro antral fat stranding is a sign of aggressive disease activity¹¹. A similar case was

Serial Number	1	2	3	4	5	6
Age (Years)	54	49	52	42	73	55
Sex	Female	Male	Male	Female	Male	Male
Co-morbidities	DM HTH	DM COPD	DM HTN	NONE	DM HTN CKD	DM HTN
Addiction	None	Smoker	None	None	None	None
Severity of COVID-19	Moderate	Severe	Moderate	Moderate	Severe	Moderate
Steroids	Yes	Yes	Yes	Yes	Yes	Yes
Presentation	Facial Pain and Nose Block	Epistaxis, Loss of Vision	Swelling of the Left Eye	Left Eye Pain and Chemosis	Chemosis With Loss of Vision in Right Eye	Facial Pain and Nasal Discharge
HPE and Fungal Smear (Broad Aseptate Hyphae)	Yes	Yes	Yes	Yes	Yes	Yes
CT Findings	Yes	Yes	Yes	Yes	Yes	Yes

DM - Diabetes Mellitus, HTN - Hypertension, HTH - Hypothyroidism, CKD – Chronic Kidney Disease, COPD – Chronic Obstructive Pulmonary Disease



Fig 3

reported by Sethi HS *et al*, who had peripheral ground glass opacities in both the lungs (a typical radiological sign found in patients suffering from COVID-19) along with mucosal thickening in right ethmoidal and both the maxillary sinuses with small defect in the infero-medial and postero-lateral wall of the maxillary sinus in the right. This was associated with slight soft tissue thickening of the orbit on the right side infiltrating into the inferior rectus muscle and blocking the osteo-meatal complex¹². In the study done by Mandeep garg *et al*¹³, they found that the most frequent CT findings were consolidation and cavitation, while the 'reverse halo' was seen in two patients. All the patients were operated on at the Department of Otorhinolaryngology and the surgical specimens were sent for Histopathology to the

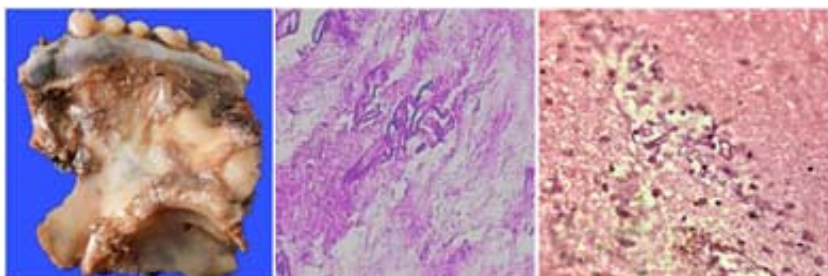


Fig 4

Department of Pathology. In one of our cases on gross specimen we found part of maxilla with necrotic material and congestion throughout the specimen. On H & E stain we found wide areas of Necrosis and some fungal elements. PAS stain confirmed Mucormycosis by showing broad branching PAS positive fungal hyphae.

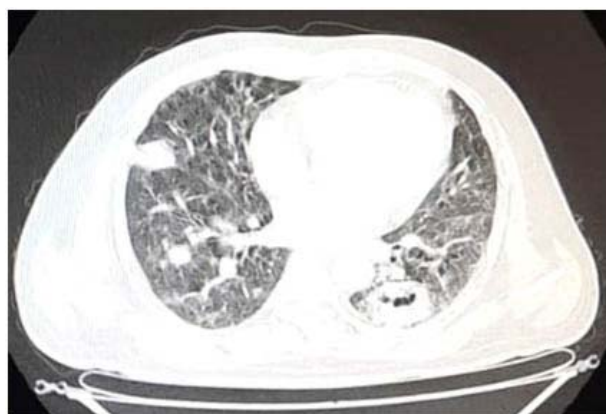


Fig 5 — Axial HRCT thorax shows a thick-walled cavitating lesion in the left lower lobe with few nodular opacities seen in the right lower lobe. Patchy Fibrotic opacities were seen throughout the lung (notpictured)

Sunil V Jagtap *et al*, in case report described an immunocompromised patient on ART for last 10 years, who was suffering from Maxillary Mucormycosis after being infected with COVID-19 and receiving steroids. The PAS and Grocott's Methanamine silver stain done on the tissue sent from the necrotic area of the nasal cavity showed fungal hyphae of Mucormycosis (Fig 4).

CONCLUSION

We propose that, patients with moderate to severe COVID-19 infection with compromised immunity due to Diabetes, Chronic Lung and Kidney Disease and prolonged Systemic Steroid Therapy are susceptible to mucormycosis because of impairment of barrier defense, dysfunction of phagocytes and lymphocytes. Early diagnosis can be made from imaging features seen on CECT, PNS and HRCT thorax which can aid treating clinicians for prompt treatment of secondary fungal infections and substantially reduce morbidity and mortality.

REFERENCES

- Rippon J — Medical Mycology. Philadelphia, PA: WB Saunders. 982: 615-37.
- Waldorf AR, Ruderman N, Diamond RD — Specific susceptibility to mucormycosis in murine diabetes and bronchoalveolar macrophage defense mechanisms against *Rhizopus*. *J Clin Invest* 1984; **74(1)**: 150-60.
- Bouchara JP, Oumeziane NA, Lissitzky JC, Larcher G, Tronchin G, Chabasse D — Attachment of spores of the human pathogenic fungus *Rhizopus oryzae* to extracellular matrix components. *Eur J Cell Biol* 1996; **70(1)**: 76-83.
- Dyer O — Covid-19: India sees record deaths as "black fungus" spreads fear. *BMJ* 2021; 373.
- Berdai MA, Labib S, Harandou M — Rhinocerebral mucormycosis complicating ketoacidosis diabetes. *Presse Med* 2016; **45**: 145-6.
- Centers for Disease Control and Prevention — Mucormycosis statistics. <https://www.cdc.gov/fungal/diseases/mucormycosis/statistics.html>
- Caillot D, Mannone L, Cuisenier B, Couaillier JF — Role of early diagnosis and aggressive surgery in the management of invasive pulmonary aspergillosis in neutropenic patients. *Clin Microbiol Infect* 2001; **7 (Suppl. 2)**: 54-61
- Diego A, Herrera ABD — Imaging findings of rhinocerebral mucormycosis. *Skull Base Off J North Am Skull Base Soc* 2009; **19**: 117-25.
- Petrikos G, Skiada A, Lortholary O, Roilides E, Walsh TJ, Kontoyiannis DP — Epidemiology and clinical manifestations of mucormycosis. *Clin Infect Dis* 2012; **54**: S23-34
- Gamba JL, Woodruff WW, Djang WT, Yeates AE — Craniofacial mucormycosis: assessment with CT. *Radiology* 1986; **160**: 207-12.
- Silverman CS, Mancuso AA — Periantral soft-tissue infiltration and its relevance to the early detection of invasive fungal sinusitis: CT and MR findings. *Am J Neuroradiol* 1998; **19**: 321-5.
- Sethi HS, Sen KK, Mohanty SS — COVID-19-associated rhino-orbital mucormycosis (CAROM) — a case report. *Egypt J Radiol Nucl Med* 2021; **52**: 165.
- Garg M, Prabhakar N, Muthu V, Farookh S, Kaur H, Suri V, Agarwal R — CT Findings of COVID-19-associated Pulmonary Mucormycosis: A Case Series and Literature Review. *Radiology* 2021; **31**: 211583.
- Jagtap — IP Archives of Cytology and Histopathology Research 2021; **6(2)**: 135-9.

Pictorial CME

Large Aneurysmal Bone Cyst of Proximal Tibia in A 10 Year Old Child Treated by Bone Graft from Mother

Santanu Banerjee¹

A 10-year-old thin built female presented with pain and swelling over upper aspect of left leg for 2 months. The pain was diffuse and dull aching which aggravated on walking and was relieved on rest. This was associated with an ill defined swelling over upper aspect of left leg. It was tender, not adherent to underlying structures and did not have any overlying skin changes. General examination revealed no abnormalities.

A plain X-ray of the left leg showed an expansive large well defined Osteolytic lesion in Metaphyseal region of upper Tibia with extension upto the shaft starting from 8mm below the epiphyseal line. CT angio revealed an expansile well defined lucency with a very thin cortex in medial, lateral and posterior aspect of left upper Tibia showing thin internal strands of bone with possible fluid level. The lesion measured approximately 3.8cm x 2.9cm x 5.5cm in size radiologically. MRI Scan of left upper Leg suggested Neoplastic Nature Solid Cystic Lesion in Proximal Diaphysis of Tibia with expansile thinning of bone, periosteal hyperintensities and underlying myositis. D/D consisted of Giant Cell Tumour, Ewings Tumour and Aneurysmal Bone Cyst.

Needle Biopsy of the tumour was performed because the lesion was suspected to be malignant. Histology revealed that it was not malignant (Figs 1-4).

Surgical treatment consisted of : (1) Curretage of the lesion. (2) Stabilization of the Tibia by plate and screws as the Tibia had chance of fracture sooner or later due to the extensive nature of the Osteolytic Lesion taking care that the epiphyseal line was not damaged during operation. (3) The cavity was huge and the patient's iliac crest inadequate for any graft. Moreover bone cement could not be used due to the age and growth potential of the patient . So the huge defect was reconstructed using her Mother's Cortico Cancellous Graft from Iliac crest.

Histopathology reported cyst wall showing proliferation of Uniform Plump Spindle Fibroblast - like cells and osteoclasts. Woven Blue bone is noted in the wall suggestive of Aneurysmal Bone Cyst.

Partial weight bearing was allowed at 3 months and full weight bearing at 4 months after the graft was taken up satisfactorily. Follow up showed good healing without the re appearance of symptoms at 1 year.

Our case is different from those reported in literature because of the massive size of the osteolytic expansile lesion of a weight bearing bone in a growing child with chance of a pathological fracture due to 3 cortices involvement of the Tibia, proximity to the epiphyseal line,

inadequate source of bone graft from the child and the limitations of using bone cement due to age. The Reconstruction of the defect was done by taking bone graft from mother who was AB positive and the child is A positive. The



Fig 1 — AP and LAT views of plain X-ray showing a large expansile osteolytic lesion in left upper Tibial Metaphysis with extension upto shaft



Fig 2 — The deep cavity after surgical exposure revealing the size of the tumour to be 4.2cm x 3.5cm x 7.5cm



Fig 3 — Tibia osteolytic lesion of child packed with mother's iliac crest bone graft

result of the case is highly satisfactory. Informed consent of the guardian of the patient was taken before publication of this clinical case.

ACKNOWLEDGEMENTS

Dr Sudipto Bandyopadhyay, MS(Orthopaedics), Dr Sudipto Mukherjee, DNB (Orthopaedics), Dr Monojit Ghosh, MD, (RadioDiagnosis).



Fig 4 — Postoperative X-ray showing bone graft and fixation of Tibia

REFERENCES

- Freiberg A, Loder R, Heidelberger K — Aneurysmal Bone cysts in young children. *J Pediatr Orthop* 1994; **14**(1): 86-91. [Pub Med]
- Martinez V, Sissons HA — Aneurysmal Bone cyst : A review of 123 cases including primary lesions and those secondary to other Bone Pathology. *Cancer* 1988; **61**(11): 2291-304. [Pub Med]

¹MS (Orthopaedics), Department of Orthopaedics, Panacea Nursing Home, Barrackpur, 24 Pgs North, West Bengal

Special Article

COVID Calls for an Urgent Change in UG & PG Medical Examination System in India

Georgi Abraham¹, Arjunan Tamilselvi², Sunil Shroff³, Tarun K George⁴

With 542 Medical Colleges and over seventy thousand aspiring students joining for MBBS yearly, the technological advances in Medical Science is not reflected in the Undergraduate, Postgraduate and sub speciality examinations. The questions are out dated essays and short notes, unlike Multiple Choices Questions (MCQ) or Short Best Answers (SBA) that focus on the best choice reflecting current medical advancement. The MCQ and SBA format ensures that the whole syllabus in a subject is covered, eases stress on Universities in employing examiners to evaluate the answer papers of the candidates and reduces overall costs and creates efficiency. MCQs and SBAs will ensure that the written, theory examination focusses on uniformity of questions and answers across India. The practical examination should be time bound for each candidate and should examine a candidate's reaction to common problem that they encounter in everyday clinical situation and the appointed examiners themselves should undergo appropriate training before allowed to examine the candidates. Above all the examiners require following ethical standards and maintaining sanctity of their position. As the pandemic of COVID-19 requiring social distancing, masks and hand hygiene, the practical examination should be using Skills and simulation laboratory's with well-equipped mannequins, simulators, box and Visual Reality (VR) trainers in a skill training workstation can be the best resources in this regard. The COVID is an opportunity to revamp the examination system in India both at Undergraduate and Postgraduate level and this would be of great benefit to all our students in times to come.

[J Indian Med Assoc 2021; 119(12): 86-9]

Key words : Medical sciences, Reformation of theory and practical examination, Reform undergraduate medical examination, Reform postgraduate medical examination Pandemic COVID-19.

The COVID-19 pandemic has thrown up the unprecedented challenge for reforming the Medical Examination System to suit a new normal. The authors, who are Medical professionals closely involved with the process, propose innovations in theory and practical's that can make examinations possible without raising the risk for doctors, students and patients.

With over 542 Medical Colleges functioning in India under National Medical Commission (NMC), the examination system for awarding diplomas and degrees during the COVID-19 pandemic has to be looked into critically and redefined¹.

As in developed countries, the Graduate and Postgraduate theory examinations should be implemented uniformly and in a similar pattern across the country. The authors, who have been writing the

Editor's Comment :

- The examination methods of Indian medical graduates have remained static and rudimentary over time. We have to reflect on what our limitations are, how we can learn from other systems and incorporate technology to ensure more efficient and fair assessments.
- The Covid-19 pandemic had brought added challenges that enforced a paradigm shift requiring us to be innovative through virtual examinations, using mannequins, scripted scenarios and weighing more on formative internal assessments. As students strive to learn the art and science of medicine, teachers should strive to make assessments relevant to the changing needs and times.

theory examination from 1st year MBBS to Postgraduate examination in India from 1970 to 1980's have observed no significant change in the examination pattern, both theory and practical.

While India adopted the British system of examination after independence, UK Colleges have overhauled their examination pattern many times, taking into account the advances made in Medical Sciences. The objective of any examination must be clearly defined and capable of measuring the training the candidate had over the years^{2,3}. To achieve this, revamping of the theoretical and practical components of medical examinations has to be addressed.

¹MD, FRCP, Eminent Medical Teacher Awardee, National IMA 2017, Professor, Department of Nephrology, MGM Healthcare, Chennai 600029 and Corresponding Author

²FRCOG, Consultant Urogynaecologist, Madras Medical Mission Hospital, Chennai 600050

³MS, FRCS, D Urol, Consultant Urologist, MGM Healthcare, Chennai 600029

⁴MD, DNB, MRCP, MHS, FRCP, FSHM, Associate Professor in General Medicine, Christian Medical College, Vellore 632002

Received on : 18/10/2021

Accepted on : 03/12/2021

Role for Theory Component Revision :

The theory examination should be able to test factual knowledge, application of that knowledge and the clinical reasoning behind a decision using the modified examination pattern⁴⁻⁶.

The Undergraduate degree MBBS seems to carry very little value in the current era. Is it because the patients want to see only a specialist? This may partly be the reason but at the end of the Undergraduate training, most doctors feel ill-equipped to take care of patients. This lack of confidence obviously becomes transparent to patients even at the first visit.

The current theory examination is made up of essays and short notes. Our current examination system meticulously explores the theoretical knowledge of the student in a limited section of the subject. Examinations are designed to ascertain what the student knows only a particular condition in depth. The examination evaluates whether the student remembers all the basic sciences related to the field chosen and the knowledge base is assessed through a couple of essays and several short notes. When one screens the questions in the final exams and compares them with the burden of diseases in India, we note that there is a significant disconnect in the assessment and the needs of the population. For example students end up having to know in depth details of Multiple Sclerosis and are not adequately appraised on Common Diabetic Complications such as Diabetic Foot.

Technological advancements have made great strides in Medical Sciences and doctors apply these in day-to-day practice. But the aforementioned examination pattern largely remains unchanged³. The metric used remains the same for decades. The question papers are set by each university separately and lacks uniformity in assessing the knowledge of the candidate, although the text books followed by the Graduate and Postgraduate Medical Students, have been rewritten with new editions both by National and International Authors, have made significant changes redefining platforms for learning and acquiring knowledge in all specialities.

Clearly, there is a need to evaluate the overall competency of the student in several domains^{7,8}. Theoretical assessment is important to identify the knowledge base. Instead of asking students to write about 10 or 12 topics in the theoretical examination, the knowledge application over several topics can be tested. This can be achieved by implementing Multiple Choice Questions, Single Best Answers and/or Extended Matching Questions (EMQ). Using these

examination pattern, clinical reasoning and application of knowledge in almost all sections of the curriculum can be tested.

In an era where India strives to become self-reliant on local and relevant research, teaching and testing basic statistics and epidemiological understanding should become an essential part of the curriculum and examination^{7,8}. It is this knowledge, which helps in planning research projects and thesis hypothesis later in the career. This can become the first step in bridging the gap between the plethora of clinical cases in India and the paucity of research.

The introduction of the common examination system with time bound MCQ's, SBA's and EMQ questions will sharpen the clinical acumen of the candidate, to choose the right answers testing in depth their knowledge base.

To ease the task of each University setting questions, a central pool of question can be created with tens of thousands of questions with the correct answers and these can serve as a common platform for setting up questions for future examinations. These central question banks can be updated every year as per the new knowledge base from rapid advancements in Medicine. Each University can chose from this bank and add to it. Each question can also be given a weightage depending on the correct or wrong answers the candidate give and each paper can examine a candidate by setting a distributed pattern to include both easy must know to more difficult questions. As we proceed to build this repertoire, we should be cognizant of ensuring that the database sufficiently reflects clinical and relevant questions that reflect everyday problems.

This pattern of selecting questions for each examination is practised in developed countries and in some neighbouring countries. The question and answers can be evaluated through digital systems, avoiding precious time of examiners being wasted at university centres for many days, evaluating the theory paper of essays and short notes. This year the Imperial College London had conducted final online exams in an open-book and time bound manner. This reflects the dynamic and responsive innovation during unusual times⁹.

The downside of the currently followed system of theory evaluation is the bias factor, with no uniformity in the metric used and marks offered³. The expenses for the enormous quantity of papers used for theory examination and the examiners' evaluation fees can be offset by digital evaluation of answers.

Answers for essay questions and short notes are

often like a soap opera, in our opinion, as the first author had been an Examiner in Medicine in the current Indian system for 24 years. There are instances where the University or the Examination body felt the incompetency of the examiner evaluating the theory and called for re-evaluation. The author did this a few times thereby exposing the weakness and the downside to the essays-and-short-notes based theory examination. This practice leads to delay in the declaration of results, which is unheard of in developed countries.

To evaluate the potential of Medical Students, especially in final year Undergraduate, Postgraduate and sub-speciality examination, the primary objective is to assess the practical learning and ethics embedded in Medical Education. We should always remember the Hippocratic oath stating the obligations and proper conduct of doctors, formally taken by those beginning medical practice. The current examination system lacks in the primary objectives in many ways.

When the first author passed the MRCP UK Medicine Examination in 1981 at a London centre including Part I and Part II, it was time bound multiple choice questions with negative marking for wrong answers. However, this practice of negative marking was abolished later as the examination reform committee felt that every examinee may tick some wrong answers and punishing the candidates by negative marking was inappropriate.

New System of Practical examination :

The practical examination should be conducted under secrecy with utmost security with anonymity of patients, their medical condition and diagnosis, enabling the candidate to examine with confidence, humility and politeness³. This practical examination should be time-bound for each candidate to assess his or her competency, be it Undergraduate, Postgraduate or Sub-speciality examinations⁴.

Evaluation of professional skills and attitudes, communication skills and awareness of Legal and Ethical Knowledge is needed¹⁰. Communication skill should look at the ability of a student to communicate with the patient and the ability to liaise with the Senior and Junior Colleagues, Nursing and other Paramedical staff.

What about Postgraduates who specialise? Can their overall competency in the field they have chosen be assessed and the confidence needed instilled?

The capability to adapt the theoretical knowledge to a particular patient, identifying the possibilities in that patient and arriving at a treatment plan is important. Communicating the management plan, using terms

the patient understands and with necessary empathy is the next task. In doing so, being aware of any ethical dilemmas or legality issues is important. If the speciality is a surgical field, the Postgraduate days are spent in acquiring the skills needed for the practice. The current examination pattern, however, is not able to judge the competency of the surgical or procedural skills of the candidate. If the person is able to memorise the steps of a procedure and relay it during the examination, they are deemed to be competent. This cannot be the ideal way of assessment.

The authors, who are examiners for both Indian Examination and UK Examination System, find that the downside to the Indian examination is exposed in terms of examiners mostly turning up late at examination wards, lack of application in time spent on each candidate, no guidance from Universities/non-compliance by examiners on stipulated level of assessment of knowledge for each candidate, instances of intimidation of the candidates through conversation by examiners which goes beyond the rule of examination and the use of mobile phones by examiners during practical examination are some of the many deficiencies and poor practices of our practical examination system which require reform⁴.

The clinical competency relies on taking an appropriate history, conducting an examination and planning further tests and management. Practical clinical skills can be judged from the candidate performing the procedure in front of the examiners. Obviously, patients or volunteers cannot be subjected to this demonstration. Advances in simulation labs to test skills of the candidates with well-equipped mannequins, simulators, box or VR trainers in a skill training workstation should be part of all Medical School Teaching Programs and can be the best resources in this regard for assessment as well.

Scripted Scenarios, Surrogates and Examinees :

Creating scenario-based questions on different aspects, with each scenario taking only 10-15 minutes for assessment is the next step. This process should ensure that there is no ambiguity in the questions or in the answer expected. Using scripted scenarios and volunteers trained to be role players, communication skills can be assessed. With the examination pattern standardised, containing questions for different components and a set of trained examiners, the whole examination can be conducted over two days in each centre.

The challenge in this multiple domain assessment is the time factor spent for each candidate and standardisation. Looking at Medical Examinations

overseas, which have adapted to this model over the last few years, standardisation has been achieved through meticulous planning and training of examiners. Yes, training examiners is an important step in achieving standardisation.

The COVID-19 situation has also reinforced the importance of regular, competency-oriented, fair internal assessments that would routinely monitor performance.

These are COVID-19 times, which started in March, 2020, and the end is not on the horizon and with huge spread in India: nearly 50,000 to 60,000 people getting infected every day irrespective of age, gender, profession and socio-economic status. Over one hundred doctors have succumbed to COVID-19 and other health care workers are also infected.

A webinar was conducted on May 20 under the aegis of Nitte University Mangalore, led by Vice-Chancellor Prof Satheesh Kumar Bhandary. The panel included Prof S Sacchidanand Vice-Chancellor of Rajiv Gandhi University, Bangalore. Dr Shiva Kumar Mishra Vice-President of the National Board of Medical Examination and Dr Rajen Sharma, National President of the Indian Medical Association, besides the authors.

The changes to be made in the Medical Sciences examination pattern were discussed. Prof PV Vijayaraghavan, Vice-Chancellor, SRIHER, Chennai strongly suggested distance based use of standardised patients and computer assisted mannequin based assessment for future practical examinations. National Board of Examinations have already introduced Objective Structured Clinical Examination (OSCE) as a path forward.

As social distancing, masks and hand sanitisation are the primary preventive methods recommended by WHO and the Indian Council of Medical Research, it was felt that the practical examination in medical sciences requires revamping to prevent the spread of infection from different individuals who are asymptomatic carriers of COVID-19.

The health of the individual patient used in a hospital ward for practical examination, the examinees, other supportive staff and examiner are at risk of COVID-19 infection. The purpose of conducting a practical is to test the skills of individuals who are appearing for the

examination to give a pass or fail. Thus close contact, non use of mask and compromise of hand hygiene, present a real world risk of infection for all stakeholders.

Recommendations for Effective Solutions for Practical Examinations :

- (1) Conduct practical's by virtual examination using digital technology/computer assisted mannequins.
- (2) Time-bound practical examination to avoid lengthy questioning and assessment of examinees.
- (3) Training of examiners through webinars prior to practical examination and strictly follow guidelines.
- (4) Examiners to maintain the sanctity of examination.
- (5) Multiple choice questions, Short best answers or Extended matching questions for theory examination; maintain uniformity nationally. Avoid essays and short notes to reduce University Examination Costs.
- (6) Use internal marks obtained by candidates as a platform for their performance in the practical examination.

REFERENCES

- 1 <https://www.mciindia.org/CMS/information-desk/for-students-to-study-in-india/list-of-college-teaching-mbbs>
- 2 Abraham G, George TK — Rethinking postgraduate medical education in today's India – a comparison with western systems. *Future Hospital Journal* 2016; **3(2)**: s24.
- 3 Abraham G, George TK — Rethinking the Postgraduate Teaching Program and Examinations in Today's India. *Journal of The Association of Physicians of India* 2015; **63**: 78-80.
- 4 Solanki A, Kashyap S — Medical education in India: Current challenges and the way forward. *Medical Teacher* 2014; 1-5.
- 5 Patwardhan K — Medical education in India: Time to encourage cross-talk between different streams. *J Ayurveda Integr Med* 2013; **4(1)**: 52-5.
- 6 Regulations on Graduate Medical Education. New Delhi. Medical Council of India. 1997.
- 7 Stern DT, Papadakis M — The Developing Physician — Becoming a Professional. *N Engl J Med* 2006; **355**: 1794-9.
- 8 Epstein RM — Assessment in Medical Education. *N Engl J Med* 2007; **356**: 387-96.
- 9 <https://www.theguardian.com/education/2020/mar/22/coronavirus-forces-medical-students-sit-final-exams-online>
- 10 Joint Royal Colleges of Physicians Training Board *Curriculum for Internal Medicine Stage1 Training*. JRCPTB, 2019. www.jrcptb.org.uk/sites/default/files/IM%20stage%201%20curriculum%20FINAL%20100519.pdf [Accessed 19 July 2019].

Drug Corner

Safety & Efficacy of the FLUCOLD Uncoated Tablet in the Treatment of Common Cold and Flu Syndrome : Postmarketing Surveillance Study

Pankaj Kumar^{1*}, Rashmi Menezes¹, Vinay Pinto¹, Deepak Arora¹, Bhupesh Tiwari¹, Harish S², Vinda Z¹, Tapas D¹

Background : Common cold and flu syndrome generally affects the upper respiratory tract in alliance with a low fever and some systemic symptoms such as sore throat, cough, nasal decongestion headache, etc. Different clinical studies showed that a combination of analgesics, antihistaminic and decongestant offers better symptomatic relief in the common cold. The current post-marketing surveillance study was conducted to investigate the safety and efficacy of marketed FLUCOLD tablets in the Indian population.

Methodology : In a prospective, interventional, single arm, multicenter, post-marketing clinical study 200 subjects were included out of which 199 completed the study. All patients were treated with FLUCOLD uncoated tablets for three days and follow-up performed for the next 6 days. The incidence of Adverse Events (AE) and Serious Adverse Events (SAE) was evaluated during the study. Efficacy of FLUCOLD uncoated tablet assessed by using VAS score changes from baseline to end of the treatment. The safety of the product was also assessed by evaluating blood biomarkers such as hemoglobin, platelet, SGOT, SGPT, and creatinine level.

Results : Results show the reduction in symptomatic score of common cold and flu syndrome observed after 3rd follow-up visit (11.141 ± 5.564 to 2.663 ± 3.699). During the study, no intervention-related adverse events were observed. Furthermore, no Serious Adverse Events (SAE) were observed during the study and follow-up period. No changes in levels of the blood biomarkers (Hemoglobin, Platelet, SGOT, SGPT and Creatinine) were observed in the study.

Conclusions : FLUCOLD tablet is safe and effective in the treatment of common cold and flu syndrome in the Indian adult population.

[J Indian Med Assoc 2021; 119(12): 90-4]

Key words : FLUCOLD tablet, common cold, flu syndrome, congestion, haemoglobin, etc.

Acute respiratory infections are frequent in the general population, with common cold, flu-like syndromes, tracheobronchitis, sinusitis, laryngitis, and pneumonia being among the most common. When the etiology is suspected to be bacterial, medications and symptomatic alleviation are used. The most prevalent clinical entities, common cold, and flu-like sickness, both have a viral etiology, therefore symptomatic therapy is still the conventional approach in most situations. In medical practice, the common cold is the most prevalent sickness¹. It generally affects two to four times a year and leads to 40% of work absences among the adult population.

The cold and flu syndrome usually disturbs upper respiratory airways in combination with low-grade fever and one or more symptoms such as dysphonia, throat,

cough, nasal decongestion, sore throat, headache, etc. Symptoms of the syndrome generally reach to peak at 2 to 3 days with a mean duration of 7 to 10 days^{3,4}. The flu-like syndrome is characterized by the sudden appearance of headache, fever, sore throat, nasal congestion, loss of appetite, and weakness. If remained untreated, complications like otitis, pneumonia, sinusitis may appear⁴.

The medical treatment options available for the common cold are anticholinergics, antihistaminic, alpha-adrenergic agonist, NSAIDs, ascorbic acid, zinc & herbal medications. The clinical study was conducted to investigate the effect of high doses of Vitamin C in common cold treatment and found that no clinical benefits were shown by Vitamin C in common cold⁵. In another study, the effect of *Echinacea purpurea* on the common cold was evaluated and no clinical benefits were observed during the study⁶⁻⁸.

In Cochrane meta-analyses, the symptomatic treatment of the common cold has been assessed. The first meta-analyses examined the use of

¹Wallace Pharmaceutical Pvt Ltd,

²ICBio Clinical Research Pvt Ltd,

*Corresponding Author's email : pankaj.kumar@wallacepharma.net

Received on : 07/12/2021

Accepted on : 08/12/2021

antihistamines in the treatment of the common cold and comprised 32 trials with a total of 8930 individuals. Monotherapy did not affect symptoms in either children or adults, according to the findings⁹. The results of the combined antihistamines and decongestants may improve symptoms in the adult population, but the results are diverse^{8,10}. In another investigation, meta-analyses show that the combination of antihistaminic, decongestants, and analgesics provided some benefit in adults and children¹¹.

The majority of influenza infections necessitate the use of medications to alleviate symptoms. Treatment focused on targeting the etiological agent is not common in clinical practice, although it has become much more common after the 2009 H1N1 pandemic [12]. Because of the epidemiological importance and severity of symptoms of flu-like syndromes and the common cold, patients continue to take drugs that provide symptomatic relief.

The current study investigated the safety and efficacy of FLUCOLD tablet [Fixed dose combination of paracetamol (500 mg), phenylephrine (10 mg), and chlorpheniramine maleate (2 mg)] in the treatment of common cold and flu syndrome in the adult population.

Currently, no clinical trial assessed for the efficacy and safety of FLUCOLD tablet or fixed-dose combination for common cold and flu syndrome in an adult. This was the first clinical trial conducted in India designed to assess the adverse events associated with fixed-dose combination.

MATERIAL AND METHODS

Study Design & Participant :

We conducted a prospective, interventional, single-arm, multicenter, post-marketing clinical study to determine the efficacy & safety of the FLUCOLD tablet. A total of 200 eligible participants with common flu and cold symptoms were included in the study. At the end of the study 199 participants were treated with FLUCOLD tablets (one tablet four hourly for three days) & completed the study. The total duration of the study for the patient was 9 days (03 days medications with 6 days of follow-up).

Patients or their families were asked to fill the printed questionnaire form in relation to the study. Informed consent to participate was obtained from all participants. Study was conducted in accordance with the ICMR guidelines, New Drugs and Clinical Trial Rules 2019 India, & the Declaration of Helsinki (Brazil 2013) & the ICH E6, R2, "Guidance on Good Clinical Practice" (GCP). Furthermore, the trial was approved by Royal Pune Independence Ethics Committee, Prakash Institutional

Ethics Committee & SPARSH Hospital Institutional Ethics Committee (ICBio/CR/WPPL/0309/110).

Inclusion Criteria :

The study comprised the volunteers of both genders aged between 18 to 55 years who are presented symptoms less than 72 hours. The common cold was described by the following symptoms: sneezing, rhinorrhea, nasal congestion, headache, muscle pain, discomfort in the throat, sore throat, dysphonia, cough, fever, the latter being of moderate to severe intensity through a symptom severity scale of 4 points (0 = none, 1 = mild, 2 = moderate, 3 = severe). The flu syndrome should consist of a fever of at least 38.1°C and a headache of moderate or severe intensity or myalgia/arthritis moderate or severe using a scale of severity of symptoms of 4 points (0 = none, 1 = mild, 2 = moderate, 3 = severe).

Exclusion Criteria :

Subjects were excluded from the study if they met any of the following condition: Patients who are not willing to give written informed consent; any known hypersensitivity to the study products; any history of seasonal or perennial allergic rhinitis; patients who have taken treatment for the presenting symptom within 7 days of screening; any history of drug abuse/chronic alcoholism; use of monoamine oxidase inhibitors or barbiturates; use of Vitamin C/ascorbic acid or taking supplements or fruits rich in vitamin C; Presenting the diagnosis of any disease activity in acute or chronic disease exacerbated (uncompensated), including hypertension, ischemic heart disease, narrow-angle glaucoma, symptomatic prostatic hyperplasia, chronic renal failure, liver diseases, infectious tracheobronchitis presumably bacterial pneumonia, pharyngitis strep, asthma or chronic obstructive pulmonary disease and any disease or condition that in the opinion of the investigator can modify the results of their study is not due to the drug under investigation or that puts the patient at significant risk; Patients who received influenza vaccine within 7 days of screening; patients who in the opinion of attending physician may need to receive antibacterial drugs for the treatment of acute respiratory infection; any lab findings or clinical findings that in the opinion of treating physician may appear as risk to the patient; participation in any clinical trials within 12 months of screening; any finding of clinical observation (clinical history or physical examination) that is interpreted by the physician investigator as a risk to the patient's participation in the study; severely immune compromised patients; patients with positive serology laboratory values; use of any investigational drug currently or within 30 days prior to study entry.

Participant Removal or Withdrawn Criteria :

The patient can be withdrawn from the study by the investigator for any of the following : occurrence of an adverse event associated with the administration of the IP and requiring its cancellation; the emergence of any diseases or conditions during the study that worsens the prognosis of the patient, as well as makes it impossible for the patient to continue his/her participation in the clinical study; the need for a forbidden concomitant therapy; pregnancy of the patient; violation of the study protocol; improper inclusion of the patient who did not meet the inclusion criteria and/or met the relevant exclusion criteria; other violations of the protocol, which, according to the investigators, are significant; withdrawal of the informed consent by the patient. One subject withdrew his consent because of a personal problem.

Recruitment :

Suitable subjects, who agree to participate in the study were recruited from 3 sites (Jyothi Multispecialty Clinic, Prakash Institute of Medical Science & Research & SPARSH Hospital). Each site recruited the participants who have voluntarily visited each trial site for enrollment.

Intervention :

After selection of the subjects, all were treated with FLUCOLD uncoated tablet (consisting of a fixed-dose combination of Paracetamol 500 mg + Phenylephrine HCl 10 mg + Chlorpheniramine maleate 2 mg) (Wallace Pharmaceutical Pvt. Ltd.) for three days and follow up of performed for the next 6 days (Fig 1).

Outcome Measures :

Primary outcome measure —

To evaluate the safety of fixed-dose combination of Paracetamol 500 mg + Phenylephrine HCl 10 mg + Chlorpheniramine maleate 2 mg uncoated tablet of

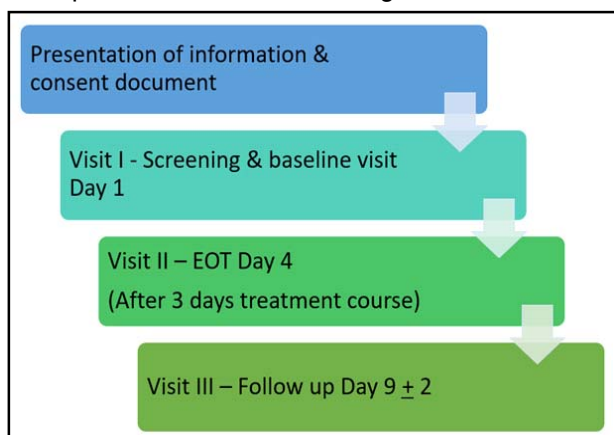


Fig 1 — Study Flow Chart

Wallace Pharmaceutical Pvt Ltd in the treatment of common cold and flu syndrome in the adult population. Treatment-Emergent Adverse Events (TEAE) and serious adverse events were assessed during the study.

Secondary Outcome Measures :

Secondary outcome measurement includes assessment of symptomatic relief of common cold and flu syndrome, changes in the Visual Analogue Score (VAS) from baseline to end of the treatment & assessment of safety of FLUCOLD (Biomarker evolution such as hemoglobin, platelet, SGOT, SGPT and serum creatinine).

Statistical Analysis :

A statistical analysis of the data was performed using statistical software SAS version 9.1 INC, CARY, USA. Descriptive statistics were presented for all continuous efficacy and safety indicators obtained during the study and frequency distribution is presented for all categorical variables available in the data. To test the hypothesis of significance, change from baseline to end of the treatment, the ANOVA and χ^2 test was used (for internal parameters with normal distribution in the population under consideration). Efficacy analysis was performed for the per-protocol (PP) population. Primary efficacy was based on PP patients' samples.

RESULTS

During the study, total of 200 patients were enrolled in the study from 3 sites out of which 1 patient withdrew from the study (Fig 2).

The mean age of the participants included in the study was 31.9 ± 8.5 years whereas average weight & height was 63.61 ± 11.18 kg & 162.19 ± 6.240 cm respectively. The average BMI calculated during the study was found to be at 24.139 ± 3.81 kg/m² (Table 1).

During the study, no intervention-related adverse events were observed. Furthermore, no Serious Adverse Events (SAE) were observed during the study and follow-up period.

The assessment reduction in total symptom score from day 1 to day 4 and follow-up visit was performed by using a 4-point scale (0- no symptom, 1-Mild, 2-Moderate, 3-severe). The statistical difference was observed in scores from baseline to end of treatment (significance at 0.05). The reduction in symptomatic score of common cold and flu syndrome was observed after 3rd follow-up visit (11.141 ± 5.564 to 2.663 ± 3.699) (Fig 3).

Visual Analog Score (VAS) was used to assess the effect of the intervention on the severity of the common cold and flu syndrome. The VAS score was

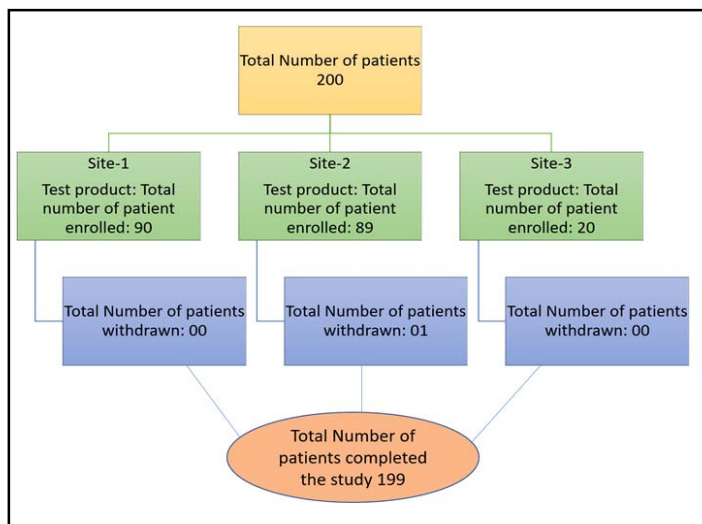


Fig 2 — Deposition of the patient

Statistics	Age (in years)	Weight (in Kg)	Height (in cm)	BMI (kg/m-2)
N	199	199	199	199
MIN	18	36	146	13.3
MAX	55	106	182	34.3
MEAN	31.930	63.614	162.196	24.139
STD	8.569	11.180	6.240	3.810

found to be decreased after the intervention in visit 2 (5.472 ± 0.920 to 2.111 ± 1.132) ($P < 0.001$). Findings showed that statistically significant difference was observed from baseline to End of the Treatment (EOT) for VAS score (Fig 4).

During the study, subject-wise data for intervention tolerability was analysed using the tolerability scale (Side effect observed or any change of treatment). Based on the values reported in the study (Table 2 & 3) no side effects were observed during the study. The data shows that FLUCOLD was well tolerated during the entire study period.

No treatment-related adverse events or serious adverse events were observed in the subject after the

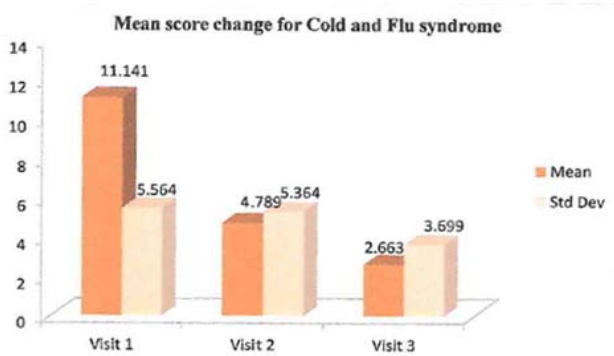


Fig 3 — Mean score change for cold and flu syndrome

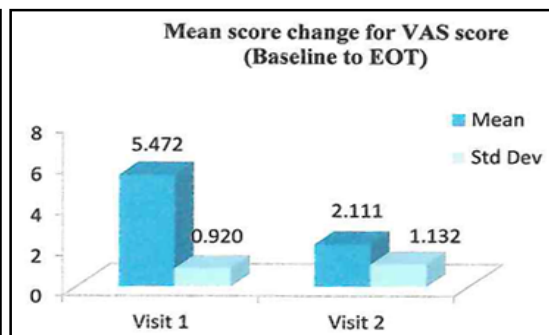


Fig 4 — Significant changes in VAS score from baseline to EOT

administration of FLUCOLD. The systemic biomarker values were assessed to evaluate the safety of FLUCOLD & no changes in mean scores of the serum values of haemoglobin, platelet count, SGOT, SGPT & creatinine was observed. The haematological test, liver function & kidney function test shows that tablet does not exert any adverse effect on their mean score. All test results were found to be normal (Table 4).

Visit	Statistics	Results
	N	199
	MIN	1
Visit	MAX	3
	MEAN	1.305
	STD	0.578

DISCUSSION

Although the common cold is a self-limiting disease with symptomatic treatment, it is also responsible for considerable absence from work, school, and daily life. By addressing the symptoms of the common cold, the patient can reduce the number of days missed due to the common cold. The occurrence of common cold and other viral infections is highly prevalent and often their treatment requires the use of drugs for symptomatic relief.

The prospective, interventional, single arm, multicenter, post-marketing clinical study was

Scale	No of Subjects
Very good (no side effects)	151
Good (insignificant side effects which do not cause serious problems to the patient)	37
Satisfactory (side effects which affect the patient's condition, but do not necessitate discontinuation of the formulation)	12
Unsatisfactory (adverse effects which significantly affect the patient's condition and necessitate discontinuation of the formulation)	00
Highly Unsatisfactory (adverse effects which necessitate discontinuation of the formulation & use of additional clinical measures)	00

Table 4 — Biomarkers of systemic safety after FLUCOLD treatment

Serum biomarker	Values at the EOT
Haemoglobin	14.043 ± 1.576
Platelet count	248.671 ± 99.960
SGOT	27.594 ± 5.845
SGPT	24.949 ± 10.184
Creatinine	0.804 ± 0.160

performed to assess the efficacy and safety of the FLUCOLD Tablet which contains paracetamol (500 mg), phenylephrine (10 mg), and chlorpheniramine maleate (2 mg). No treatment-related side effects were observed during the study. Furthermore, the FLUCOLD tablet is effective in relieving common cold and flu syndrome. The decline in symptomatic score of common cold and flu syndrome was observed after 3rd follow-up visit (11.141 ± 5.564 to 2.663 ± 3.699). The VAS score was found to be declined after the treatment with FLUCOLD in visit 2 (5.472 ± 0.920 to 2.111 ± 1.132).

During the study total of 200 patients from 3 sites were enrolled in the study out of which only 199 subjects completed the trial. The efficacy analysis was executed to assess the incidence rate of treatment-related adverse events and serious adverse events. Study findings indicate that there were no treatment-related adverse events observed during the study. Furthermore, FLUCOLD tablet is found to be effective in the treatment of common cold and flu syndrome in an adult.

Picon et al investigated the effectiveness and safety of chlorpheniramine maleate, paracetamol, and phenylephrine for the treatment of common cold in phase III trial (n=146). At the end of the treatment (after 10 days), symptom scores were reduced from 14.09 to 3.54 (74.87% improvement) for the treatment group. The adverse events were comparable in both groups¹³.

In another phase IV open-labelled multicentric-study, efficacy and safety of the triple combination of paracetamol, chlorpheniramine maleate, and phenylephrine in the common cold were evaluated in adults. Reduction in total symptom score from 5.91 on day 1 to 3.57 on day 3 & 1.47 on day 5 was observed. The study concludes that combination is safe and effective in the treatment of common cold and allergic rhinitis¹⁴.

Our study results showed that symptoms of common cold and flu syndrome were resolved mostly on the second visit and no drug-related side effects were observed during the treatment and follow-up.

CONCLUSION

After 4 days of treatment with FLUCOLD tablet, significant improvement in symptomatic relief of common cold and flu syndrome was observed. The

safety results depict that FLUCOLD uncoated tablet is safe and well-tolerated by oral route.

ACKNOWLEDGEMENT

The Author would like to thank ICBio Clinical Research Pvt Ltd for carrying out Clinical studies

Funding : The Study was funded by Wallace Pharmaceutical Pvt Ltd

Conflict of Interest : The author has no conflict of interest to declare.

REFERENCES

- Mossad SB — Treatment of the common cold. *BMJ* 1998; 317: 33-6.
- Kirkpatrick GL — The common cold. *Prim Care* 1996; **23**: 657-75.
- Jackson GG, Dowling HF, Spiesman IG, Boand AV — Transmission of the common cold to volunteers under controlled conditions. I. The common cold as a clinical entity. *AMA Arch Intern Med* 1958; **101**: 267-8.
- Roll S, Nocon M, Willich SN — Reduction of common cold symptoms by encapsulated juice powder concentrate of fruits and vegetables: a randomized, double-blind, placebo-controlled trial. *Br J Nutr* 2011; **105**: 118-22.
- Audera C, Patulny RV, Sander BH, Douglas RM — Megadose vitamin C in treatment of the common cold: a randomised controlled trial. *Med J Aust* 2001; **175**(7): 359-62.
- Barrett BP, Brown RL, Locken K, Maberry R, Bobula JA, D'Alessio D — Treatment of the common cold with unrefined Echinacea. A randomized, double-blind, placebo-controlled trial. *Ann Intern Med* 2002; **137**: 939-46.
- Yale SH, Liu K — Echinacea purpurea therapy for the treatment of the common cold: a randomized, double-blind, placebo-controlled clinical trial. *Arch Intern Med* 2004; **164**: 1237-41.
- Linde K, Barrett B, Wölkart K, Bauer R, Melchart D — Echinacea for preventing and treating the common cold. *Cochrane Database Syst Rev* 2006; 1 CD000530.
- Sutter AI, Lemiengre M, Campbell H, Mackinnon HF — Antihistamines for the common cold. *Cochrane Database Syst Rev* 2005; 3 CD001267.
- Schroeder K, Fahey T — Over-the-counter medications for acute cough in children and adults in ambulatory settings. *Cochrane Database System Rev* 2004; 4 CD001831.
- Sutter AI, Lemiengre M, Kumar AA, Lesslar O, Skrt A — Oral antihistamine-decongestant-analgesic combinations for the common cold. *Cochrane Database Syst Rev* 2012; 2 CD004976.
- Panasniuk L, Lukas W, Paprzycki P, Verheij T, Godycki-Æwirko M, Chlabicz S — Antibiotics in the treatment of upper respiratory tract infections in Poland. Is there any improvement? *J Clin Pharm Ther* 2010; **35**: 665-69.
- Picon PD, Costa MB, da Veiga Picon R, Fendt LC, Suksteris ML, Saccilotto IC, et al — Symptomatic treatment of the common cold with a fixed-dose combination of paracetamol, chlorphenamine and phenylephrine: a randomized, placebo-controlled trial. *BMC Infectious Diseases* 2013; **13**(1): 1-8.
- Kiran M, Pawaskar L, Sheikh S, Waghambare P — Efficacy And Safety for The Combination of Paracetamol, Phenylephrine And Chlorpheniramine Maleate In Indian Paediatric Patients Of Common Cold And Allergic Rhinitis-Post-Marketing Surveillance Study. *International Journal of Medical Science and Diagnosis Research*, 5(7).

Image in Medicine

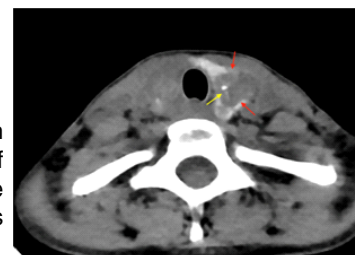
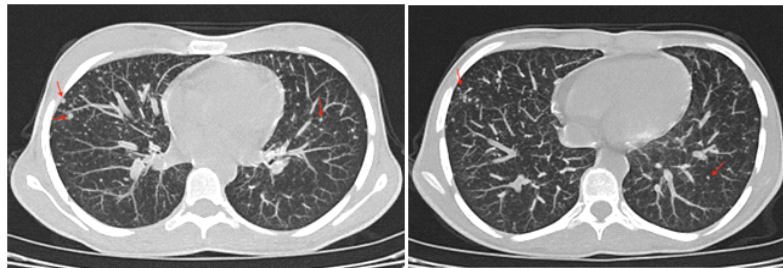
Bhoomi Angrish¹, Bhavin Jankharia²

Quiz 1

CT scan images of a 16 year old girl who presented with weight loss and change in voice.

Questions :

- (1) What is the diagnosis?
- (2) What are the causes of miliary metastases?
- (3) What are the common causes of miliary nodules in lung?



Answers :

(1) Multiple small (2-4mm sized) nodules are seen diffusely scattered in both lungs. CT scan sections through neck show a hypodense nodule with specks of calcification (yellow arrow) in left lobe of thyroid gland. Biopsy of the thyroid nodule was performed which turned out to be follicular carcinoma. The nodules in lungs were miliary metastases from thyroid malignancy.

(2) The common primary malignancy of miliary metastases are thyroid carcinoma, renal cell carcinoma, breast carcinoma, malignant melanoma, osteosarcoma, trophoblastic disease.

(3) The other common causes of miliary nodules are tuberculosis, fungal infection, varicella pneumonia, sarcoidosis, pneumoconiosis, hemosiderosis etc.

Quiz 2

A 80 year old man presented with long standing headache and recent history of frontal swelling since 15 days.

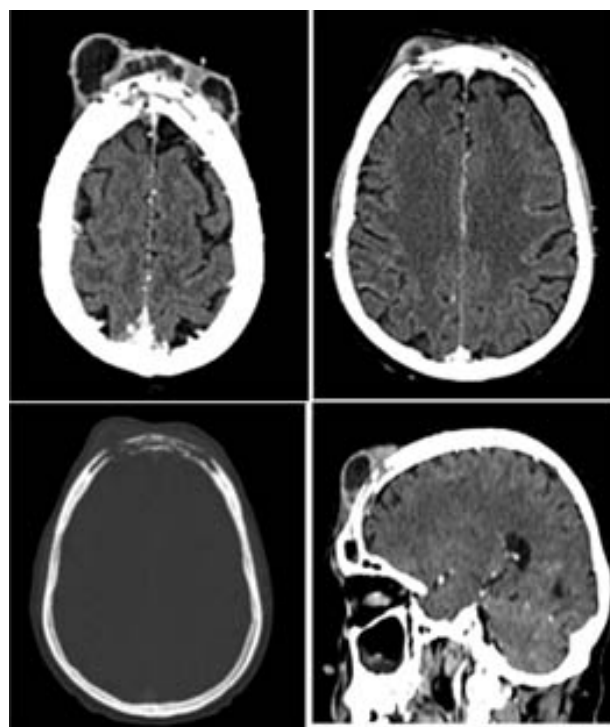
Questions :

- (1) What is the diagnosis?
- (2) What are the complications of this condition?
- (3) What is the differential diagnosis?

Answers :

(1) There is cortical irregularity and erosion of walls of frontal sinus associated with peripherally enhancing subgaleal collection. Small intracranial extension of the collection is also seen. Findings are suggestive of Pott's puffy tumour.

(2) Pott's puffy tumour is a non-neoplastic complication of acute sinusitis. It is characterised by subgaleal collection, subperiosteal abscess and osteomyelitis. It can be associated with intracranial extension resulting in epidural abscess, subdural empyema, meningitis and cerebral abscess.



(3) The common differentials are sinusitis and infected sebaceous cyst.

Department of Radiology, Picture This by Jankharia, Mumbai, Maharashtra 400004

¹MD, DNB (Radiology)

²MD, DMRD (Radiology)

Student's Corner

Become a Sherlock Holmes in ECG

M Chenniappan¹

Series 10 :

“Extraordinary systole”

This is the routine ECG of 67 years Diabetic male.

Questions :

- (1) What are the ECG findings ?
- (2) Why is this clue ?
- (3) What is practical implication ? What is practical implication?

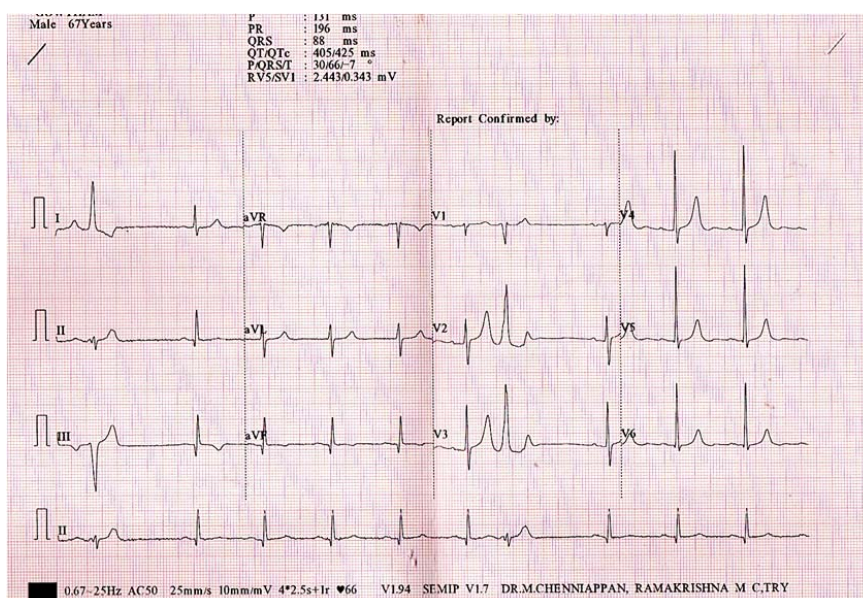
Answers :

(1) ECG Findings :

ECG shows sinus rhythm, right ward axis, high voltage QRS in left lateral leads with 2 VPDs. The inferior leads show narrow Q waves. The VPD has negative QRS in V1 and superior axis. So, it is probably arising from RV inflow region. The interesting point is that VPD in the chest leads has homophasic ST T changes (ST, T in the same direction of QRS). The VPD in limb leads, show classical secondary ST T changes.

(2) Why is this clue?

The homophasic ST T changes in VPD are considered to be subtle sign of ischemic heart disease (IHD). In this ECG, the VPD in chest leads shows homophasic ST T changes even though the sinus complexes in these leads are not showing significant IHD. The VPD in limb leads, arising from the same



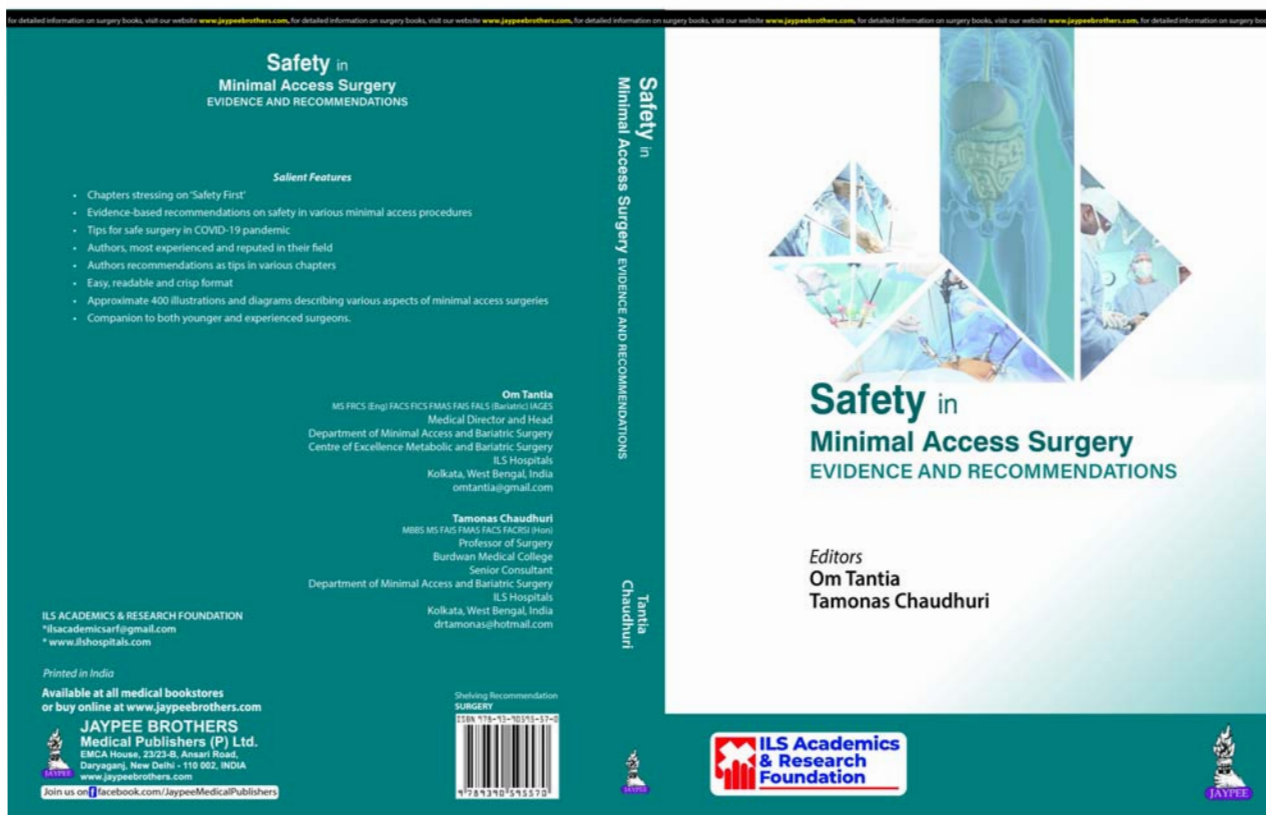
focus is not showing homophasic ST T changes indicating no significant ischemia in that region. So, the VPD in chest leads has unmasked CAD. In addition to that in the rhythm strip the T wave which forms VPD shows fluttering of T which is once again a subtle sign of IHD. This is named “Poor man’s Exercise Test” by Levine. So, this extrasystole, has given us extraordinary information about occult CAD, and hence this clue.

(3) Practical implication:

The VPD has unmasked IHD even though the sinus beats are not showing signs of IHD by 2 ecg signs which are homophasic ST T changes in VPDs in V3, V4 and post extra systolic T changes in LII. So, although the patient is asymptomatic, he needs further evaluation for IHD like MSCT CAG and management with statins, antiplatelet and beta blockers.

¹Adjunct Professor, Dr MGR Medical University, Tamilnadu; Senior consultant cardiologist, Tamilnadu; Ramakrishna Medical Centre, Apollo Speciality Hospital, Trichy

Book Review



Safety in Minimal Access Surgery Evidence and Recommendations by Prof Om Tantia and Prof Tamonas Chaudhuri, Publisher : Jaypee Brothers Medical Publishers Pvt. Ltd., 4838/24, Ansari Road, Daryaganj, New Delhi 110 002, INDIA, ISBN : 9789390595570, Edition : 1/e, Publish Year : 2021, Pages : 338, Size : 8.5" x 11", Cover Type : Paperback, With CD/DVD : No, Format : Four Color. Price : Rs. 3295/-.

Safety in Minimal Access Surgery – Evidence & Recommendations, edited by Dr Om Tantia and Dr. Tamonas Chaudhuri, makes an interesting reading. This is a first endeavour on this subject from Indian subcontinent & the editors have very carefully selected the topics pertinent to safety in minimal access surgery, starting from very basic to highly advanced procedure.

However, the editor have not included laparoscopic management of any malignancy in their book. Certain chapters like, “Ergonomics: What is Safe for Surgeon? Evidence and Recommendations”, “Safe Access in Minimal Access Surgery: Evidence and Recommendations”, “Safety in Surgery for Achalasia Cardia: Evidence and Recommendations”, “Safe Laparoscopic Trans-abdominal Pre-peritoneal (TAPP) Repair of Groin Hernia: Evidence and Recommendations” and “Safety in Abdominal Wall Reconstruction: Evidence and Recommendations” have been written very well. I hope this book will be an asset for students & faculty of Minimal Access Surgery in their day to day practice.

Professor & Head, Department of General Surgery
Institute of Post Graduate Medical Education & Research
Kolkata 700020

Abhimanyu Basu

Letter to the Editor

[The Editor is not responsible for the views expressed by the correspondents]

JIMA, September, 2021

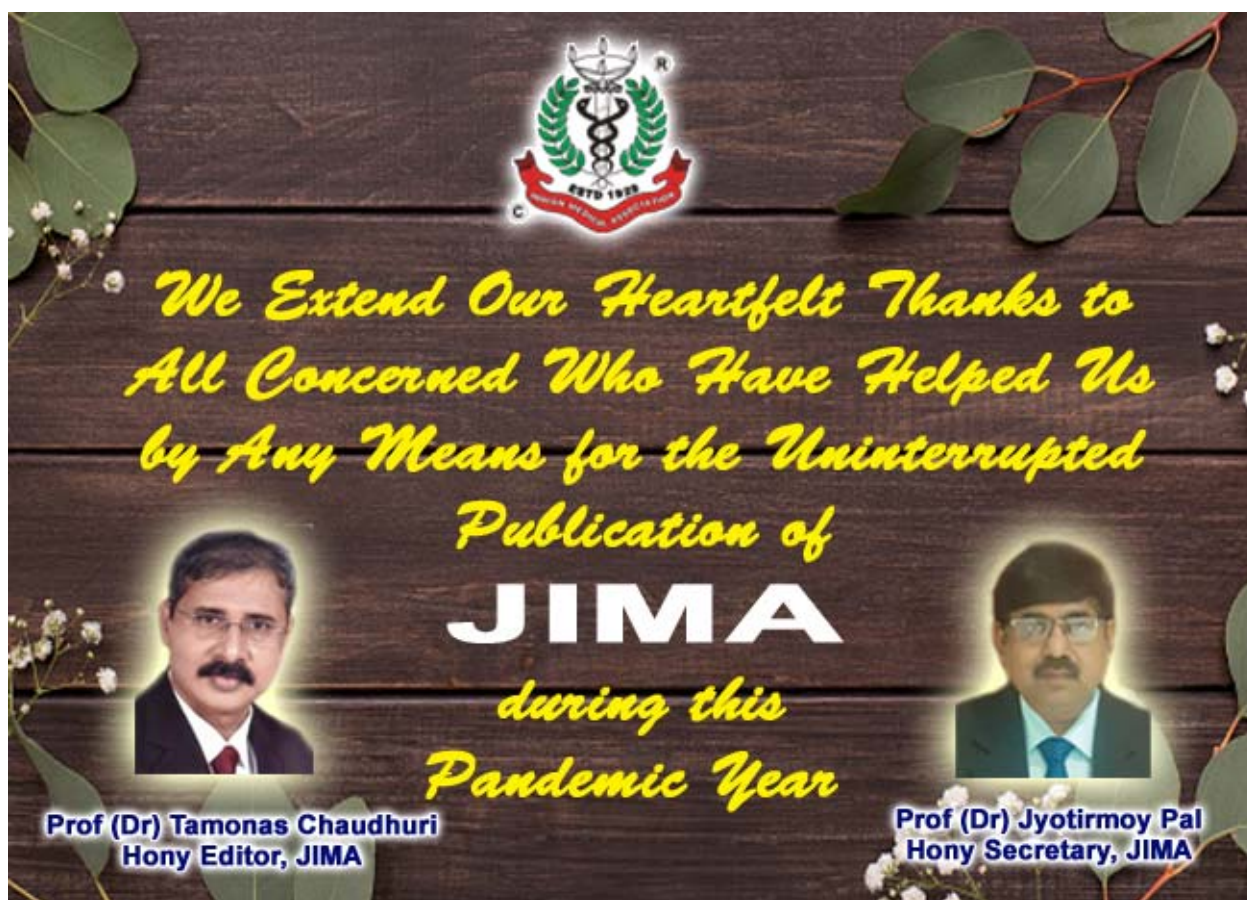
SIR — The original article entitled “Perception of undergraduate medical students about the current medical curriculum in India” Vol 119, No 9, September, 2021, Page No 27. This study is a need of the hour for new Competency Based Medical Education (CBME) which was implemented in 2019 by a National Medical Council (NMC). Such study we need to encourage to as whole in a different part of India.

The author has mentioned all three professional year students and interns as study participants. But this new curriculum was started 2019 batch. So interns were not being part of this CBME study. The study was conducted in 2021 (February-March). Similarly in 3rd professional CBME students have not at entered. The Study would be better if only focused on the first professional year. And compare with traditional (Previous Curriculum) method of curriculum and CBME curriculum of first- year students. The Second professional year is also not completed when data was collected but they were taught some of the competencies of final year subjects.

The Author also has mentioned the involvement of Govt and private colleges in the student ratio, but no comparison was mentioned between them. Because many of the colleges as mentioned by author infrastructure facilities like skill lab not at established. Therefore, the implementation of the CBME curriculum is challenging for medical faculty unless until all the colleges are following implementation as per NMC. Till one batch of students will come out with this curriculum. It is very difficult to give an opinion regarding this CBME curriculum. The Author has not mentioned which parts of India, students were enrolled so that in the future remaining part of the students can be covered. It is very important to take the perception of students and faculty regarding the CBME curriculum.

Professor
Department of Community Medicine
Member of Medical Education Unit
BLDE(DU) Shri B M Patil Medical College
Vijayapura 586103, Karantaka

REKHA UDGIRI



JOURNAL OF THE INDIAN MEDICAL ASSOCIATION

INDEX TO VOLUME 119

January – December, 2021



ABBREVIATIONS USED

(C) Correspondence, (CDM) Case Discussion in Medicine, (CDN) Case Discussion in Neurology, (CDU) Case Discussion in Urology, (CR) Case Report, (CS) Case Series, (DC) Drug Corner, (Ed) Editorial, (IM) Imaging in Medicine, (MH) Medical History, (OA) Original Article, (PCME) Pictorial CME, (RA) Review Article, (SC) Student's Corner, (SA) Special Article, (Spl C) Special Correspondence, (VE) Voice of the Expert

SUBJECT INDEX

A

Abdomen : Uncommon Presentation of a Common Disease A Man with Progressive Swelling of, **Medda A, Misra AK**, (CR), **119(11)**: 54-6.

Acid Therapy Completes 9 Decades — Originated in India, **Saraiya UB, Shah N**, (RA), **119(2)**: 33-5.

Acquired Diaphragmatic Hernia Laparoscopic Management of, **Rather AA, Hassan Y, Rather SA**, (CR), **119(4)**: 55-8.

Acute Abdomen — Case Based Approach For Clinicians, **Sharma D, Meena S, Anand G**, (CDS), **119(3)**: 50-3.

Acute Necrotising Pancreatitis Middle Colic Artery Pseudoaneurysms in, **Patel DD, Sangade VV, Jadhav M, Saraf V, Vasa DS, Rege SA**, (CR), **119(7)**: 66-7.

Acute Pancreatitis A Correlation Study between Red Cell Distribution Width and Ranson Score in Predicting Severity and Outcome of, **Patir RP, Doley R, Das AK**, (OA), **119(10)**: 22-5.

Acute Traumatic Pain Effectiveness and Safety of Nefopam in Indian Patients with, **Uikey S, C Rex, Sathaye CB, Shah K, Chaudhari O, Nahar A, Jain R**, (DC), **119(8)**: 59-62.

Adult Vaccination : Some Frequently asked Questions & Answers, **Muruganathan A**, (VE), **119(1)**: 37-40.

AES in West Bengal, India Orientia tsutsugamushi — A Leading Cause of, **Saha PS, Chakraborti R, Chowdhury A, Chattopadhyay S, Mondal S, Gupta B, Saha B, Bandyopadhyay B**, (OA), **119(6)**: 22-6.

All kudos to the brave hearts... **Chaudhuri T**, (Ed), **119(6)**: 12-5.

Allopathy (Modern Medicine), Ayurveda and AYUSH : Needs to be In Harmony, **Dixit HN, Kant S, Dubey P, Vajpayee VMG, Gupta G**, (SA), **119(6)**: 87- 90.

Amyotrophic Lateral Sclerosis Foot Drop as the Initial Presentation of, **Pillai SM, Jayakrishnan MP, Arora T, Malcolm JK, Kumar MS, Velayutham SS, Sowmini PR, Saravanan VR, Mugundhan K**, (PCME), **119(4)**: 63-4.

Anthropometric Measurements and Carotid Intima Media Thickness in Newly Diagnosed Type 2 Diabetes Mellitus Patients in a Tertiary Care Hospital in Eastern India A Study of Correlation Between, **Mondal HS, Kundu PK, Nag A, Dey D, Chandra A, Mukherjee AK**, (OA), **119(11)**: 29-32.

Anti Tubercular Drugs The Glitch with the web of — A Prospective Study on Adverse Drug, **Ghosh SK, Singh DP, Tiwari AK, Singh AK**, (OA), **119(1)**: 43-6.

Antidepressants in the Psychiatry Unit of a Tertiary Care Hospital A Drug Utilization Study of, **Kumar S**, (OA), **119(8)**: 25-31.

Are COVID-19 Survivors Likely to be Better Poised to Prevent Cancer or to Cope with it ? — A Contesting Viewpoint, **SS Samajdar, Moitra S, Joshi SR, Tripathi SK**, (SC), **119(10)**: 63-4.

Are We Marching away from Safety, **Om P**, (C), **119(3)**: 70.

Are we Marching away from Safety? **Chaudhuri T**, (Ed), **119(1)**: 11-2.

Artificial Intelligence and Medicine, **Chaudhuri T**, (Ed), **119(3)**: 10-2.

Artificial Intelligence, **Tewary K**, (C), **119(4)**: 84.

Asthma in Primary Care (2020) Executive Summary of the Recommendations on Management of, **Jindal SK, Lele J, Ghoshal AG, Nair S, Kant S, Parakh A, Banthia SK, Nagda VD, Joshi P, Masurkar T, Joshi SK**, (Spl A), **119(2)**: 67-70.

Asthma Managing: Must Know Areas for General Physicians, **Mukhopadhyay K, Halder I, Singh R**, (RA), **119(4)**: 39-43.

Atlas of Normal Child Development (1 month to 36 months), **Ghosh AK**, **119(1)**: 97.

Atrial Septal Defect Situs Inversus Totalis with: A Rare Association, **Dave M, Patel P, Jain S, Burli A**, (CR), **119(6)**: 60-1.

Autoimmune Encephalitis (Anti NMDA Receptor Antibody Encephalitis) — Our Experience, **Ramya N, Priyadarsani G, Sowmini PR, Kumar MS, Malcolm JK, Sakthivelayutham S, Viveka SR, Mugundhan K**, (CR), **119(11)**: 57-9.

B

Bariatric surgical Procedures and Postoperative Care during COVID-19 The Resumption and Management of — A Single Surgeon Experience from India, **Patolia H, Patolia S**, (RA), **119(5)**: 28-30.

Baricitinib : Delineating a New Treatment Option in COVID-19, **Venkitakrishnan R, Valsalan P, Parameswari AR, Ahmed S, Kunoor A, Philip S, Chinda M** (DC), **119(7)**: 89-93.

Become a Sherlock Holmes in ECG, **Chenniappan M**, (SC), **119(1)**: 66; **119(2)**: 58; **119(3)**: 59; **119(4)**: 74; **119(5)**: 59; **119(6)**: 85; **119(7)**: 77; **119(9)**: 82; **119(10)**: 66; **119(11)**: 75; **119(12)**: 96.

Benign Prostatic Hyperplasia (BPH) Case Based Discussion on, (CDU), **Gupta S**, **119(9)**: 75-7.

Best Practices In D-Dimer Testing; In COVID-19 and Beyond : Expert Group Recommendations, **Gandhi A, Ahluwalia J, Dayal N, Naithani R, Phatale R, Saxena R, Nair SC**, (C), **119(9)**: 84-5.

Bleeding per Vagina Approach to A Case Presented with, **Biswas S, Chetri A, Biswas SC**, (CDOB), **119(6)**: 73-6.

Blood Pressure Control Ambulatory Blood Pressure Monitoring for Ideal : A Kenyan Retrospective Review, **Gikonyo A, Irungu C, Kanyeki D, Omondi S, Teny R, Basem M, Musila B, Cimpaye E, Jeitah L, Ponoth P, Gikonyo D**, (OA), **119(10)**: 26-8.

C

Calling the Shots : A CS note on Covid Specific Vaccination, **Rajan CS** (C), **119(2)**: 73.

Cancer Awareness — The Basics, **Gupta A**, (Spl C), **119(2)**: 50-5.

Cardiac Tamponade Non-traumatic: Two Autopsy Case Reports, **Mohanty SK, Kumar V, Hussain AP J, Bhuvan V**, (CR), **119(2)**: 39-40.

Cardio-oncology Practice Drug Safety Issues in, **Kar M, Bhowmick S, Ikbal SKA**, (RA), **119(8)**: 41-8.

Cardiovascular Manifestations of Systemic Lupus Erythematosus in North Eastern India An Observational Study on the Special Characteristics of, **Baruah C, Biswas A, Mitra S**, (OA), **119(11)**: 23-8.

Challenges in Medical Education in India" (JIMA, Vol 118, No 12, December, 2020), **Wander GS**, (C), **119(1)**: 96.

Chest Discomfort and Breathlessness A Challenging Case of, **Arulhaz S, Ramasubramanian, Sundaralingam, Kannan A, Chandrakumar, Manikandan, Rahman MDF**, (CR), **119(12)**: 76-7.

Cholecystitis, A Paradox in Diagnosis & Treatment Xanthogranulomatous: A Case Series, **Ghosh M, Ghosh Sengupta S**, (OA), **119(10)**: 29-35.

Chronic Lead Poisoning In Adult A Study of Clinical Presentations of, **Sengupta RS, Sengupta U, Ghosh A, Chakraborty S, Sarkar A**,

- Mondal S**, (OA), **119(8)**: 13-7.
- Chronic Liver Diseases Cardiac Complications in, **Barua T, Das AK**, (RA), **119(8)**: 37-40.
- Chronic Obstructive Pulmonary Disease Study of Serum Vitamin D Level in Patients Having, **Deb A, Nath BK, Bhattacharje P Deb A, Nath BK, Bhattacharje P**, (OA), **119(7)**: 32-34.
- Chronotherapeutics – The Need to Listen to Nature's Rhythm, **Chatterjee N**, (Perspective), **119(4)**: 75-6.
- Clinical Practice of Prescribing Proton Pump Inhibitors by Physicians: An Indian Perspective, **Desai A, Anand SS**, (DC), **119(6)**: 91-6.
- Clinics in Surgery, **Deolekar SS**, **119(4)**: 83.
- common infections encountered in clinical practice A review and meta-analysis of its efficacy and tolerance in, **Desai A, Narayanan V, Anand SS**, (DC), **119(8)**: 69-75.
- Comprehensive Medical Toxicology, (Book Review), **Pillay VV**, **119(2)**: 71.
- COPD : A Case Based Approach to the Clinician in Light of GOLD 2021, **Saha SK, Chandra A, Paria TK, Hati A**, (RA), **119(6)**: 50-5.
- Corona Third Wave — Predictions & Preparedness, **Rhaji SA**, (VE), **119(6)**: 68-71.
- COVID Patients Deviations in the Basic Biochemical Parameters In : Our Experience in a COVID Hospital in Eastern India, **Chatterjee S, Ray I, Chakraborty I, Mistri S**, (OA), **119(6)**: 38-40.
- Covid-19 Chemoprophylaxis in — Where Do We Stand Today? **Bagchi C, Majumder B**, (RA), **119(5)**: 31-5.
- COVID-19 : Healthcare Lessons Learned from USA, China and India : Unified by, **Sengupta M, Roy A, Raha SB, Chakrabarti S, Mukhopadhyay I**, (RA), **119(9)**: 39-46.
- COVID-19 among General Population in Hills, West Bengal, India Precautionary Behaviour for : A Pilot Study, **Saha S, Sherpa PL, Ghosh N, Mandal B**, (OA), **119(2)**: 22-5.
- COVID-19 Challenges and Adaptation in Healthcare Delivery during: Perspectives from four different Service
- COVID-19 Infection and Identification of Risk Factors among Asymptomatic Healthcare Workers Prevalence of : A Serosurvey Involving Multiple Hospitals in West Bengal, **Mondal S, Singha A, Das D, Neogi S, Gargari P, Shah M, Arjunan D, Mukhopadhyay P, Ghosh S, Chowdhury J, Chowdhury S**, (OA), **119(5)**: 21-7.
- COVID-19 Infection Update on Immunological aspects of, **Subramanian N**, (RA), **119(11)**: 44-7.
- COVID-19 Pandemic : Lessons Learned from PIPAC Surgery, **Das S, Bose B, Chaudhuri A, Dutta R, Rakshit K, Nag A**, (RA), **119(10)**: 47-9.
- COVID-19 Pandemic among Malaysian Population Psychological Impact of Movement Control Order during: An Online Survey, **Kumar S, Chakraborty S, Vijayabanu U, Devi G, Priya J, Zin KT, Reza S, Jalal D, Das P**, (OA), **119(11)**: 15-8.
- COVID-19 Pandemic on Health Science Educational Institutions in Kerala Impact of, **Unnikrishnan VV, Varghese S**, (OA), **119(10)**: 18-21.
- COVID-19 Pandemic To Evaluate the Efficacy of Microplan for Emergency Department of Medical Colleges laid by the Uttar Pradesh Government of India in Reference to the, **Pandey A, Singh M, Agrawal P, Maheshwari PK, Gautam A, Pursnan N**, (OA), **119(8)**: 18-20.
- COVID-19 Pandemic to FELUDA Test : CRISPR-cas Methods : Culminating in Crescendo of the, **Samashaptak, Das P, Bhattacharyya S, Banerjee A**, (RA), **119(7)**: 51-8.
- COVID-19 Patients Use of Iodomethacin in — Experience from Two Medical Centres, **Ravichandran R, Purna P, Vijayaraghavalu S, Kalavakollu RT, Gaidhane S, Kumar RK**, (OA), **119(7)**: 42-6.
- COVID-19 Positive Patient with Dextrocardia : A Case Report Percutaneous Transluminal Coronary Angioplasty in a, **Roy S, Borse AG, Mitra A, Roy T, Mondal PK, Mitra KK**, (CR), **119(9)**: 70-1.
- COVID-19 Surgeon's Dilemma during, **Bhattacharya K, Bhattacharya N**, (RA), **119(2)**: 31-2.
- COVID-19 Vaccination Fatality with Cerebral Involvement Post, **Arachchi SD, Ruwanpura R, Nanayakkara** (CR), **119(12)**: 69-72.
- COVID-19 Wound Care in, **Rout AK, Chaudhary AH, Mittal AK, Arunprasath A, Kanwate D, Reddy PPM, Seetharam V, Mudgal VK, Petare AU, Kanniah R** (Spl A), **119(5)**: 86-8.
- Cystic Duct Double: Case Report of a Rare Presentation in a Common Operation, **Poddar A, Tantia O, Khanna S**, (RA), **119(10)**: 55-7.
- D**
- Dapsone Therapy in Patients of Persistent and Chronic Immune Thrombocytopenia A Study from Eastern India on the Role of; Where Do We Stand ? **Karthika S, Mandal PK, Baul S, Dolai TK**, (OA), **119(6)**: 16-21.
- Dementia Dealing a Patient with : Some Basic Concepts, **Das G**, (CDN), **119(4)**: 66-70.
- Diabetes & Cardiovascular Disease in Rural India — Point of View: A Hidden Link? **Swaminathan K, Muruganathan A**, (RA), **119(11)**: 42-3.
- Diabetes and Stress, **Pareek KK, Mathur G, Ramchandani GD, Ramchandani R, Mathur D**, (RA), **119(6)**: 41-3.
- Diabetic Foot Ulcer Management of, **Goyal G, Srivastav R, Kapoor S**, (PCME), **119(2)**: 45.
- Digital Contact Tracing – A Hope in Pandemic Era, **Mageshwari M, Rao Boratne AV**, (C), **119(11)**: 77-8.
- Dual Antiplatelet Therapy Emergency Surgery on Patients Receiving — Review of a Challenging Surgical Problem, **Bandyopadhyay SK, Fawzy S, Adil M**, (CR), **119(5)**: 47-9.
- E**
- Effect of Deranged Thyroid Profile on Glycated Hemoglobin : Pre and Post Treatment JIMA, Vol 119, May 2021, **Mahato S**, (C), **119(9)**: 84.
- End TB by 2025 : Tribal Perspective, **Rao VG, Bhat J, Yadav R**, (C), **119(6)**: 99.
- END TB by 2025: Way forward to Achieve this Mission while Recovering from the COVID-19 Pandemic, **Kant S**, (Spl A), **119(4)**: 79-82.
- Enough is enough, **Chaudhuri T**, (Ed), **119(7)**: 14-7.
- Ensure Not Insure, **Chaudhuri T**, (Ed), **119(1)**: 10-2.
- Enteropathica Acrodermatitis in Adolescence — A Rare Presentation of Malabsorption, **Barlaskar S, Nath BK, Bhattacharjee P**, (CR), **119(12)**: 73-5.
- Epistemological Principles of Medicine in India — A Historical Overview, **Sen I**, (MH), **119(3)**: 60-6.
- F**
- Fact & Fun in Surgery, A Companion to Surgical Study, **Rajan CS**, **119(11)**: 76.
- Fetal Hemoglobin in the BioRad D10 Assay Interferences in HbA1c Measurements : Effect of Hemoglobinopathies and Elevated, **Basu S, Chaudhuri S**, (OA), **119(12)**: 15-8.
- Fetal Weight at Term Relevance of Clinical versus Ultrasonographic Estimation of — A Prospective Longitudinal Study, **Chakraborty B, Mondal SK**, (OA), **119(6)**: 34-7.
- Fever : A case based approach for the clinicians, **Chandra A, Chakraborty U**, (CDM), **119(1)**: 70-5.
- Flu Syndrome Safety & Efficacy of the FLUCOLD Uncoated Tablet in the Treatment of Common Cold : Postmarketing Surveillance Study, **Kumar P, Menezes R, Pinto V, Arora D, Tiwari B, Harish S, Vinda Z, Tapas D**, (DC), **119(12)**: 90-4.
- Focal Segmental Glomerulosclerosis Extrapulmonary Tuberculosis Complicated by — A Rare Association, **Bhakat B, Karmakar A, Das S**, (CR), **119(11)**: 51-3.
- Foundation Course Curriculum by the Faculty of Medical Colleges Perception of, **Udgiri R, Patil V**, (OA), **119(12)**: 25-9.
- Future of COVID-19, **Wankhedkar R**, (SA), **119(11)**: 62-5.
- G**
- Gastric Cancer Locally Advanced, **Bhattacharyya S, Gupta A, Ghosh S**, (CDM), **119(7)**: 71-3.
- Gastrointestinal Anastomosis and Perforation Suturing : Early Enteral Feeding In Cases of : A Prospective Study , **Mishra A, Bakhshi GD, Bhandarwar AH**, (OA), **119(10)**: 42-6.
- Gene editing as treatment for inherited haemolytic anemia: Is the future here? **Paul R**, (Perspective), **119(2)**: 60.
- Glaucoma Patients with Insufficient IOP Control with Prostaglandin Analogue Monotherapy Analysis of Efficacy & Safety of Prostaglandin - Timolol Fixed Combination versus Adding Ripasudil to Prostaglandin in Primary Open Angle — An Open Label, Randomised Study, **Roy S, Bhattacharya A, Majumdar NK, Dolui A, Bhattacharya S**, (OA), **119(7)**: 22-6.
- Global Hunger Index, **Bhattacharya A**, (C), **119(3)**: 70..
- Glycemia Potential Health Benefits of Fruits and Vegetables : Epic Inspite, **Gupta L, Lal PR, Suma SV, Goel G, Sharma A, Khandelwal D**, (RA), **119(5)**: 36-40.

Grain awareness and consumption in select Indian cohorts Understanding whole, **Madan J, Hussain N, Joshi S, Mehra J, Marwaha A, Bharti R, Thomas J**, (SA), **119(1)**: 88-94.
Gynecology, **Roy L**, (Mediquiz 04/2021), **119(4)**: 77-8 & 82.

H

Handbook of Pharmacology for the Anesthesiologists, **Chowdhury L**, **119(5)**: 97.
HbA1c Measurements Assay Interferences in : Effect of Hemoglobinopathies and Elevated Fetal Hemoglobin in the BioRad D10, **Basu S, Chaudhuri S**, (OA), **119(12)**: 15-8.
Health and Hamlet, **Chaudhuri T**, (Ed), **119(11)**: 12-4.
Health is a Human Right, **Chaudhuri T**, (Ed), **119(4)**: 10-3.
Healthcare and Tide-less Trends in Leadership Turbulent Time in — Let us Create a Small Ripple, **Ray K, Greenhouse S**, (RA), **119(2)**: 36-8.
Hematological and Biochemical Parameters as Diagnostic Test for Malaria in Patient with Acute Febrile Illness : Analysis of, **Sharma D, Solanki AS, Prajapati M**, (OA), **119(9)**: 32-4.
Hematology , **Roy Chowdhury A**, (Mediquiz), **119(3)**: 67 & 9.
Hemolytic Uremic Syndrome in Snake Bite Atypical : An Often Missed Entity, **Ranjan A, Bagchi AS, Barman TP, Pal SK , Tarenia S**, (CR), **119(7)**: 62-5.
Hepatic Iron Overload in Transfusion Dependent Thalassemia Patients (TDT) from a Tertiary Care Hospital from Eastern India The Utility of Transient Elastography (Fibro-Scan) as an Indicator, **Jain M, Roy P, De R, Mondal MK, Mondal PK, Baul SN, Mitra S, Bhattacharya S, Dolai TK**, (OA), **119(9)**: 35-8.
Hepatic Trauma and Pyogenic Liver Abscess Inferior Vena Cava Syndrome in, **Dalal AK, Dalal UR, Rathi HK, Kaur R**, (PCME), **119(5)**: 54-7.
Hepatitis B Operational Guidelines of NVHCP for management of, **Chakraborty A, Bhattacharya P, Chatterjee N**: (SA), **119(7)**: 83-8.
Hernia A Case Report on A Very Rare : Primary Anterior Perineal Hernia, **Chatterjee S, Kuila S, Agarwal A**, (CR), **119(12)**:78-80.
High-Risk exposure amongst Health Care Workers (HCW) Factors affecting: Audit of COVID-19 Risk Assessment Committee from Tertiary Care Centre in North East India, **Jagtap VK, Ete T, Thangkhiew L, Marbaning E, Marak A, Slong D, Tongper D, Lyngdoh NM, Sarma A, Topn N**, (OA), **119(1)**: 56-9.
Hirschsprung's Disease Presenting in Adulthood : A Difficult Encounter, **Halder P, Ghosh Dastidar A, Halder SK, Ukil S, Goel A, Das S**,(CR), **119(12)**: 67-8.
HIV Patients in a Government Medical College Institutional Guidelines for Safe Surgery in, **Ray R, Chatterjee S**, (RA), **119(11)**: 38-41.
Hormonal Evaluation and Imaging Abnormalities in Patients with Multiple Pituitary Hormone Deficiency; Clinical Presentations, A Single-centre Experience from Rural West Bengal, **Dutta S, Chakraborty PP, Biswas SN, Roy K**, (OA), **119(2)**: 13-8.
How to conduct clinical trial during an Epidemic : Lessons from the WHO Solidarity Trial, (Perspective), **Paul R, Pal J** **119(1)**: 84.
Humanities in Medical Education, **Singh T, Mahajan R**, **119(2)**: 71-2.
Hypertension Clinic and Hypertensionologist The Concept of, **Muruganathan A**, (RA), **119(12)**: 55-6.

I

In Memorium, **Aggarwal KK**,**119(5)**: 4.
In Memorium, **Bhattacharya AK**, **119(2)**: 74.
Incisional Hernia and Minimally Invasive Approach Using Larger Mesh for Repair Clinical Profile of, **Pathania BS, Mahajan D, Abrol S**,(OA), **119(12)**: 30-5.
Infectious waste from a COVID-19 Laboratory, **Jacob SM, Sushi KM, Sivasangeetha K**, (C), **119(10)**: 69.
Innovation for, **Vyas B, Mehta P, Vyas RB, Waghela P, Marathe A**. (OA), **119(4)**: 24-8.
Interstitial Lung Disease MDA5 Positive Juvenile Dermatomyositis with, **Das S, Mandal A, Pal S, Roy H, Das BB**, (CR),**119(8)**:52-5.
Intraductal Carcinoma of the Breast Correlation between Her2Neu Status with Molecular Classification, Cyclin D1 Status and Ki67 Expression in, **Panda SB, Chakraborti S, Chakraborty J, Bhattacharyya R** (OA), **119(4)**: 29-33.
Invasive Mucormycosis in COVID-19 Patients on Steroid Therapy at a Tertiary Care Centre A Computed Tomographic Findings of — A Case Series, **Bhattacharyya S, Saha R, Das P, Basu SP, Mandal S, Mandal T**, (CR), **119(12)**: 81-4.

J

JIMA : Vol 119, No 6, June, 2021, **Prabhu RD**, (C), **119(7)**: 94.
JIMA(Volume XX, No 3, December, 1950, Page 106-9), **Ray S**, (Archive), **119(2)**: 56.
JIMA, February 2021, **Chakraborty S**, (C), **119(4)**: 85. **JIMA, February 2021, Kumar P**, (C), **119(4)**: 84.
JIMA, October 2021, Editorial, **R Churungoo**, (C), **119(11)**: 78.
JIMA, September, 2021, **Udgiri R**, (C), **119(12)**: 98.
Juvenile Idiopathic Arthritis Vitamin D Level in Patients with: A Study From a Tertiary Care Institute of Kolkata, **Mandal PK, Bandyopadhyay A, Mondal S, Pradhan R**, (OA), **119(12)**:36-9.

L

Laparoscopy Diagnostic—A Useful Diagnostic Tool, **Verma S, Chaudhry NK**, (RA), **119(12)**: 62-6.
Low Back Pain for Clinicians : An Evidence Based Approach, **Ghosh S, Ghosh A**, (CDM),**119(10)**: 58-62.
Lower Limb Injuries, **Das S, Arunprasath A, Bal BS, Bhagwan KR, Chaudhary L, Reddy P, Johri RK, Kannaiah R, Rao TB, Rathod R** (Spl A), **119(5)**: 82-5.

M

Malignant Struma-ovarii Literature Review and A Case Report of — Struma-ovarii, **Tantia A, Chatterjee S, Khanna S, Kapoor P, Banerjee MS , Mukherjee U**, (CR), **119(6)**: 65-7.
Management of Anorectal Wounds, **Mittal K, Bora A, Setha A, Patel B, Chavan DD, Pelleti PK, Shararooni SA, Rathod R** (Spl A), **119(5)**: 89-94.
Management of Non-healing Wounds : A Simple Practical Approach, **Pai P, Kundu D, Prakash P, Nimmala S, Pramod G Sivakumar A, Gupta S, AU Petare** , (Spl A), **119(5)**: 77-81.
Management of Oral Contraceptives Induced Cerebral Venous Thrombosis, Hemorrhagic Infarction Presenting with Left Hemiparesis and Isolated Left Upper Limb Simple Focal Seizures, **Pateel GNP, Kumar PS, Manjunath BS, Somayay R**,(C), **119(10)**: 68-9.
Management of Symptoms in General Practice, **Mahajan P**, **119(4)**: 83.
Marching into Metaverse, **Chaudhuri T**, (Ed), **119(12)**:12-4.
Mcmaster Text book of Internal Medicine South Asian Edition, Expert Authors, **119(9)**: 83.
Medical Examination System In India COVID Calls for an Urgent Change in UG & PG, **Abraham G, Tamilselvi A, Shroff S, George TK**, (SA), **119(12)**: 86-9
Mediquiz - 01 / 2021, **Ray K, Halder SK, Das S**, **119(1)**: 86-7.:
Mediquiz (2/2021), (Mediquiz), **Poddar A**, **119(2)**: 61 & 72.
Mefenamic Acid in the Management of COVID-19 Repurposing, **Aggarwal KK, Chong YW, Sharma R, Pillai M, Naidu R, Chan AYS, Urabe MU, Cavalcanti D, Budhathoky P, D'Souza, QSR, Ganabaskaran N, Chowdhary MdJ, Asokan RV, Datta RK, Alapet J, Goel VK, Prakash B, Joshi S, Gupta A, Garg S, Thomas A, Rai DR, Jayalal JA, Arora PN, Kalra K, Aggarwal AK, Chakravarti A, Pandya A, Tripathi S, Mishra B, Jain TS, Pachnekar A, Utture SS, Mehta K, Pareek RP, Nachane AP, Gowda A, Karande S**, (RA), **119(1)**: 16-23.
Memoirs of a Surgeon Beyond Incisions, Blood, & Sweat, **Bose SM**, **119(6)**: 97.
Mental Status of Undergraduate Medical Students During the Pandemic Effect of Counseling on the— A Prospective Quasi-experimental Study at a District Medical College of West Bengal, **Dhar Chowdhury L, Biswas T, Ghosh R, Chaudhuri A**,(OA), **119(4)**: 14-8.
Mirizzi's Syndrome Type I in a Case of Situs Inversus Totalis Laparoscopic Cholecystectomy and Choledocholithotomy and Ttube Drainage In, **Bose B, Sarkar S , Pal B**, (CR), **119(9)**: 72-4.
Mitral Stenosis in Eastern India : Balloon Mitral Valvuloplasty in Patients above 60 years age with : A Prospective Analytic Study from IPGME&R and SSKM Hospital, Kolkata, **Mandal S, Mandal D, Chatterjee S, Banerjee K**, (OA), **119(7)**: 47-50.
Mixopathy, **Jayalal JA**, (VE), **119(4)**: 61-2.
Moya Moya Disease — Stroke in Children A Rare Case of, **Pillai SM, Jayakrishnan MP, Arora T, Jayaraj KM, Sakthivelayutham S, Sowmini PR, Kumar MS, Saravanan RV, Mugundhan K**, (PCME), **119(1)**: 76-7.
My CORONA Diary, **Agrawal R**, (C), **119(11)**: 77.
Myths and Facts : Circumcision, **KumarA, Kumar B, Rashi R, Jeewan R, Sinha AK, Ali MM**, (RA), **119(11)**: 48-50.

N

- NACPFT's Practical Medicolegal Manual, **Pillay VV**, **119(3)**: 68.
 National Tuberculosis Elimination Programme : New Guidelines for Management of Drug Sensitive TB, **Misra S, Mondal P, Deb J, Saha R**, (Spl C), **119(3)**: 54-7.
 Native Medical Institution : The first footprint of British Medical Education in India, **Paul R**, (MH), **119(1)**: 80-3.
 Necrosis of Femur Neck in Young Adult Secondary to Indigenous Medicines Avascular — An Eye Opener for Clinicians, **Panwar P, Kant R, Totaganti M, Raina R**, (CR), **119(7)**: 59-61.
 Neuroleptic Malignant Syndrome Aripiprazole induced : A Case Report, **Ghosh S, Saha I, Mondal A**, (CR), **119(4)**: 59-60.
 Neurologic Manifestations of Hyponatremia with Special Reference to Unusual Rare manifestations Study of, (OA), **Jain N, Sardana V, Maheshwari D, Bhushan B, Sharma SK**, (OA), **119(3)**: 17-20.
 New Modalities and challenges in diabetic foot Management, **Ruke M, Sharma A, Saikia R, Agrawal TC, Maskara RK, Togale MD, Rathod R, Seetharam V**, (Spl A), **119(5)**: 64-9
 Nodding Syndrome Type 1 Diabetes with, **Shah M, Saboo B**, (CR), **119(6)**: 62-4.
 Non-lupus Crescentic Glomerulonephritis Clinical Spectrum and Outcomes of: An Experience from Eastern India, **Karmakar KL, Pandey R**, (OA), **119(9)**: 15-21.
 Non-palpable testes : Our Experience Role of Laparoscopy in Management of, **Mehta KD, Rewari H**, (OA), **119(8)**: 32-6.
 Nutrition and Wound Care, **Kamat M, Bala S, Dutta SK, Mishra S, Nagaprakash BS, Veligandla KC**, (Spl A), **119(5)**: 60-3.

O

- Organ Function Tests, **Lakshmi S, Sowmya TV**, **119(3)**: 69.
 Orthopaedics, **Karmakar A**, (Mediquiz), **119(5)**: 95-6.
 Osteoarthritis Knee by Adipose Derived Stromal Vascular Factor with Platelet Rich Plasma, Research
 Oxygen Therapy, **Banik C**, (Mediquiz), **119(6)**: 86 & 98.

P

- Paediatrics, **Ghosh N**, (Mediquiz), **119(7)**: 78-9 & 83.
Pal J, Joshi SR, Tripathi SK, (RA), **119(4)**: 50-4.
 Pandemic COVID-19: Impacts on General Surgical Practices, **Basu A, Kumar A**, (RA), **119(3)**: 31-5.
 Pandemic Review : A Surgeon Perspective, **Mutreja J**, (C), **119(5)**: 98.
 Pandemic The Re-Emerging — What's Urgently Needed in West Bengal? **Tripathi SK, Samajdar SS**, (C), **119(4)**: 84-5.
 Participation of Private Sector in COVID-19 vaccination, **Wankhedkar R**, (VE), **119(3)**: 44.
 Parvovirus B-19 Infection A Rare Case of Idiopathic Pulmonary Fibrosis with, **Patel AD, Dixit S, Kushwaha RAS, Bajaj DK, Bajpai J, Kant S**, (CR), **119(8)**: 49-51.
 Perception of Education Environment in Clinical Postings : Medical Students', **Jha T, Jha KM**, (RA), **119(2)**: 26-30.
 Periodic Paralysis Hypokalaemic — A Diagnostic and Therapeutic Challenge, **Mukhopadhyay S, Sharan A, Ghosh B**, (RA), **119(3)**: 36-41.
 Physical & Immunological Barrier of COVID 19! Mask for All, **Samajdar SS, Ghosh S, Dasgupta S**,
 Physician's Role — The Challenging Task of Balancing Multiple Responsibilities, **Bandyopadhyay SK**, (SComm), **119(11)**: 60-1.
 Plasma Exchanges in a Tertiary Care Hospital Plasmapheresis; Reasons & Results, An Epidemiological Study on the Indications and Outcome of Therapeutic, **Gupta S, Prasad A, Das P, Roy DS, Saw Mondal RR, Gupta M, Sekhar H**, (OA), **119(5)**: 16-20.
 Platelet Indices in the Diagnosis of Acute Appendicitis Role of Biomarkers, Scoring Systems and — evidence based approach, **Gurushankari B, Sureshkumar S, Basu D, Kate V**, (RA), **119(9)**: 55-62.
 Platelet Rich Fibrin Non-healing Ulcers Role of, **Bhattacharya A, Ghosh A**, (PCME), **119(8)**: 56-: Quiz, **Angirish B, Jankharia B**, (IM), **119(8)**: 58.
 Post Herpetic Abdominal Pseudohermia (PHAP), **Chrungoo RK, Chungoo I, Abrol S, Bhardawaj R, Bali HS**, (RA), **119(9)**: 47-9.
 Post Stroke Epilepsy, **Jeyaraj KM**, (C), **119(1)**: 96.
 Postgraduate Pharmacology, **Sarkar S, Srivastava V, Mohanty M**, **119(1)**: 97.
 Posttraumatic Stress Disorder of COVID-19 Pandemic among Postgraduates Working at Tertiary Care Hospital Assessing Impact Event Scale of— A Cross-sectional Study, **Udgiri RS, Biradar SG,**

Shannawaz M, (OA), **119(4)**: 19-23.

- Principles of Medical Education, **Singh T, Gupta P, Singh D**, **119(8)**: 77.
 Priority Should be Reset, **Ganguly SB**, (C), **119(2)**: 73.
 Prophylaxis among Rural, Hilly and Tribal Population of India COVID Management and, **Kant S**, (RA), **119(9)**: 63-9.
 Providers, **Biswas M, Ghosh J, Giri S, Naskar S**, (RA), **119(4)**: 44-9.
 Proximal Tibia in a 10 Year Old Child Treated by Bone Graft from Mother Large Aneurysmal Bone Cyst of, **Banerjee S**, (PCME), **119(12)**: 85.
 Psychiatry, **Bhattacharya S**, (Mediquiz), **119(8)**: 76-7.
 Psychological Interventions in Academic Performance of UG Medical Students, Institution based Prospective, Cross-sectional Study Impact of Lifestyle Modification and, **Dhar Chowdhury L, Mohite P, Bhattacharyya R, Chaudhuri A**, (OA), **119(12)**: 45-50.
 Pulmonary Atresia with Ventricular Septal Defect (Pseudotruncus arteriosus) Mesangioproliferative Glomerulonephritis in a case of : An Interesting Case Report, **Pal S, Datta PK, Ganguly A, Saha S, Roy**, (CR), **119(1)**: 67-9.
 Pulmonary Masses CT Perfusion Study in, **Mohan S, Sarkar S, Madathil MB, Justin GM**, (OA), **119(6)**: 27-33.
 Pyrexia of Unknown Origin (PUO) Approach to a case of, **Biswas U, Mahato P, Chakraborty M**, (CDM), **119(2)**: 46-9.

Q

- Quiz 1, **Angirish B, Jankharia B**, (IM), **119(1)**: 65; **119(3)**: 58; **119(5)**: 58; **119(6)**: 84; **119(7)**: 76; **119(9)**: 81; **119(10)**: 65; **119(11)**: 74; **119(12)**: 95.

R

- Recent Advances in Wound Management, **Chatterjee S, Parakh A, Babu GM, Lopamudra M, Bera PK, Jenav R, Mallick S, Umesha C, Petare A**, (Spl A), **119(5)**: 70-3.
 Recurrent Seizure A Cause of — A Neuro Cutaneous Syndrome, **Pal P, Chatterjee N**, (PCME), **119(1)**: 78-9.
 Reorienting Medical Education in India — Absolutely Essential. **Sasidharan PK**, (C), **119(1)**: 95-6.
 Research in **Chaudhuri T**, (Ed), **119(10)**: 14-7.
 Residency Programs in India — An Appraisal, **Abraham SJ**, (VE), **119(2)**: 43-4.
 REVIEWS :
 Atlas of Normal Child Development (1 month to 36 months), **Ghosh AK**, **119(1)**: 97.
 Clinics in Surgery, **Deolekar SS**, **119(4)**: 83.
 Fact & Fun in Surgery, A Companion to Surgical Study, **Rajan CS**, **119(11)**: 76.
 Handbook of Pharmacology for the Anesthesiologists, **Chowdhury L**, **119(5)**: 97.
 Humanities in Medical Education, **Singh T, Mahajan R**, **119(2)**: 71-2.
 Management of Symptoms in General Practice, **Mahajan P**, **119(4)**: 83.
 McMaster Text book of Internal Medicine South Asian Edition, Expert Authors, **119(9)**: 83.
 Memoirs of a Surgeon Beyond Incisions, Blood, & Sweat, **Bose SM**, **119(6)**: 97.
 NACPFT's Practical Medicolegal Manual, **Pillay VV**, **119(3)**: 68.
 Organ Function Tests, **Lakshmi S, Sowmya TV**, **119(3)**: 69.
 Postgraduate Pharmacology, **Sarkar S, Srivastava V, Mohanty M**, **119(1)**: 97.
 Principles of Medical Education, **Singh T, Gupta P, Singh D**, **119(8)**: 77.
 Safety in Minimal Access Surgery – Evidence & Recommendations, **Tantia O, Chaudhuri T**, **119(12)**: 97.
 Till We Win, **Lahariya C, Kang G, Guleria R**, **119(7)**: 94.
 Vascular Malformations . **Khanna AK, Tiwary SK**, **119(10)**: 67.
 Revisiting the Efficacy and Safety of Ranitidine, **Shukla A, Kher V**, (DC), **119(11)**: 66-73.
 Rheumatoid Arthritis in a Tertiary Care Hospital A Comparative Assessment of the Diagnostic Value of Anti-cyclic Citrullinated Peptide Antibodies and Rheumatoid Factor in patients with, **Ghosh S, Das Ghosh S, Chandra A, Pal J**, (OA), **119(7)**: 35-7.
 Rhinitis and Nasal Health in India Pollution-induced, **Paramesh H, Mahashur A, Talwar D, Bhargava S, Lele J, Verma S, Vadgama P, Vora A, Jayaraman S, Panicker CJ, Pawar S, Shah M**, (RA), **119(12)**: 57-61.

- Right Colon Cancer The Tunnel Approach versus Medial Approach in Laparoscopic Right Hemicolectomy for : A Retrospective Analysis, **Sahoo MR, Sethi MK, Das Poddar KK**, (RA), **119(10)**: 50-4.
- ROP Screening Program in Two State Government Managed Special Newborn Care Units (SNCUs) of North Bengal Report from a Trained Specialist Dependent, **Chakraborty S, Sharma PK, Choudhury K, Goswami S**, (OA), **119(7)**: 27-31.
- S**
- Safety in Minimal Access Surgery – Evidence & Recommendations, **Tantia O, Chaudhuri T**, **119(12)**: 97.
- SARS-CoV2 New Strain, **Ray PS**, (RA), **119(1)**: 31-6.
- SARS-CoV-2 Classical and Molecular Virology in the Context of, **Pawar SD, Tandale BV, Tare DS, Keng SS, Kode SS, Abraham P**, (RA), **119(1)**: 24-30.
- SARS-CoV2 Pandemic A Primer on Pandemic Preparedness for Health Care Facilities Drawn from the, **Murugesan M, Valson AT, Sathyendra S, Mathews P, Valsan A, Rupali P**, (RA), **119(9)**: 50-4.
- SARS-COV-2 Vaccines : A Systematic Review, **Varshney R, Dutta S, Srivastava A, Aggarwal A, Giri S, Goel A**, (RA), **119(6)**: 56-9.
- Sclerosis Coexistent Morphea and Systemic : An Uncommon Association, **Ghosh T, Mandal K, Pal P, Chatterjee N**, (PCME), **119(6)**: 72.
- Scrub Typhus in a Tertiary Care Hospital in North Eastern India — A Prospective study, **Debnath I, Das D, Difoosa B, Bhuyan S**, (OA), **119(12)**: 19-24.
- Scrub Typhus Meningitis Clinical Vignettes of, **Ganguly S, Das S, Islam R**, (OA), **119(11)**: 19-22.
- Serum Adenosine Deaminase (ADA) in Tuberculous Lymphadenitis Diagnostic Value of, **Adhikari MK, Arafat SM, Ananna MA, Rahman MA, Imam H, Haq SMM**, (OA), **119(3)**: 13-6.
- Serum Gamma Glutamyl Transferase (GGT) level as a Risk Factor in Acute Stroke Presenting in a Tertiary Care Hospital Study on, **Saha S, Singha A, Mitra A**, (OA), **119(2)**: 19-21.
- Serum Uric Acid Levels with the Patients having Impaired Glucose Tolerance A Study to find out the Association and Correlation between the, **Bala B, Chowdhury PK, Roy UK, Ghosh A**, (OA), **119(12)**: 40-44.
- Shining India — Dream of A Monk, **Pal J**, (Insight), **119(1)**: 13-5.
- Skin and Soft Tissue Infections and Upper Respiratory Tract Infections Lincomycin in, **Desai A, Anand SS**, (DC), **119(2)**: 62-6.
- Something beyond, **Chaudhuri T**, (Ed), **119(8)**: 10-2.
- Spondylitis Safety and Efficacy of Rituximab in — A One Year Prospective Clinical Study, **Gantait K, Patra S, Chowdhury R** (OA), **119(7)**: 38-41.
- Staphylococcus aureus Isolates Obtained from Skin and Soft Tissue Infections Antimicrobial Susceptibility Profile of : A Real-World Study Based on a Large Diagnostic Laboratory Data, **Singh M, Immanuel G, Kannan A, Singh M, Immanuel G, Kannan A**, (OA), **119(3)**: 21-6.
- Stroke of Indeterminate Cause Young, **Mugundhan K, Saravanan RV, Malcolm JK, Velayutham SS, Sowmini PR, Sathish KM**, (PCME), **119(3)**: 48-9.
- Study on Loss of Protection Sense in Type 2 Diabetes Mellitus with Special Reference to TSH Value within Normal Range JIMA, Vol 119, March 2021, **Mandal T**, (C), **119(8)**: 77.
- Sturge Weber Disease with Portal Hypertension A Case of, **Biswas D, Saha M, Das**, (CR), **119(7)**: 68-70.
- Surgical Masqueraders Vomiting in Children : How to Identify the? **Kumar B, Kumar M, Sinha AK, Ali M, Anand U, Kumar A**, (RA), **119(6)**: 44-9.
- Surgical Site Infections Challenges in Management of — Lessons Learnt, **Muthuswaraiyah Y, Mallik A, Agarwal A, Kesarkar P, Srivatsan V5, Shah U, Veligandla KC** (SA), **119(7)**: 80-2.
- T**
- Thalassaemia, **Samanta SK**, (SC), **119(6)**: 77-83.
- The 1st Metacarpal Bone Salvaged by Fibular Graft Giant Cell Tumour of, **Banerjee S**, (PCME), **119(4)**: 65.
- The Abdominal Wall Closure - What Do We Know So Far? **Anirudh M, Senthil RS, Chattopadhyay BK**, (RA), **119(5)**: 41-6.
- The Crisis — Concerns And Solutions, **Upadhyay R**, (VE), **119(5)**: 52-3.
- The First Centenary of BCG Vaccination in Human : 2021, **Bhattacharyya S**, (MH), **119(2)**: 59.
- The Technology must be Accessible and Affordable to All, **Palanivelu C**, (VE), **119(7)**: 74-5.
- Theory Question as an Assessment Tool Faculty Perceptions of : A Survey, **Adhikari A, Munshi S, Roy M, Bhattacharya S, Indu R, Das AK**, (OA), **119(1)**: 47-51.
- Thyroid Profile on Glycated Hemoglobin Effect of Deranged: Pre and Post Treatment, **Srivastava A, Rai S**, (OA), **119(5)**: 13-5.
- Till We Win, **Lahariya C, Kang G, Guleria R**, **119(7)**: 94.
- Transient Loss of Consciousness (TLOC) — A Low-risk High Stakes Condition that Every Physician must know How to Manage, **Ray G, Keith I**, (RA), **119(4)**: 34-8.
- Tuberculosis Cases of Eastern Region of Bihar Study of Genetic Mutation Exhibiting Resistance to Rifampicin and Isoniazid in the, **Singh DP, Ghosh SK, Kumar P, Singh AK, Kumar K**, (OA), **119(7)**: 17-21.
- Tumours in the Puerperal Period Lower Abdominal Parietal — A Rare Etiology, **Chatterjee S, Chatterjee A**, (CR), **119(5)**: 50-1.
- Type 1 Diabetes and Their Siblings Thyroid Autoimmunity in Children and Young Adults with, **Ramesh J, Mahato S, Seth A, Debnath E**, (OA), **119(12)**: 51-4.
- Type 2 Diabetes Mellitus Patients with and without Diabetic Nephropathy A Study of Serum Magnesium and Serum Zinc Concentration In, **Paul T, Das P, Bhattacharjee P, Das D**, (OA), **119(1)**: 52-5.
- Type 2 Diabetes Mellitus with Special Reference to TSH Value within Normal Range Study on Loss of Protection Sense in, **Bhakta SK, Datta S, Roy A, Mukherjee PP**, (OA), **119(3)**: 27-30.
- Type-2 Diabetes Mellitus in a Tertiary Care Centre of North Bengal Echocardiographic Evaluation of Diastolic Dysfunction in Patients, **Bala B, Majumdar BB, Roy D, Pal J, Ray AN, Chakrabarti D, Chakraborty S**, (OA), **119(10)**: 36-41.
- U**
- Ulcers Simple Way of Management Pressure, **Sen SK, Mishra B, Reddy GRM, Rai HV, Krishnamurthy G, Tulaskar N, Rajesh S, Veligandla KC**, (Spl A), **119(5)**: 74-6.
- Undergraduate Medical Students about the Current Medical Curriculum in India : Perception of, **Agarwal V, Agarwal T, Ray I, Agarwal P, Agrawal V, Sharma D**, (OA), **119(9)**: 27-31.
- Urate Effectiveness of Regular Monitoring on Adherence to — Lowering Therapy and Its Effect on Serum Uric Acid Levels in Indian Subjects — A Retrospective Analysis, **Dargad R**, (DC), **119(8)**: 63-8.
- Urinary Bladder with Calculi Formation and a Vesico- cutaneous Fistula after Inguinal Hernia repair Mesh Migration into the — A Rare Case Report, **Shrivastava RP, Desai JR, Bagasrawala S**, (CR), **119(3)**: 42-3.
- V**
- Vascular Malformations . **Khanna AK, Tiwary SK**, **119(10)**: 67.
- Ventral Abdominal Wall Hernias Laparoscopic Retro-rectus Onlay Mesh Repair (RROM) for — Is It the New Gold Standard? **Jani K, Contractor S**, (OA), **119(9)**: 22-6.
- Vitamin D Deficiency Study on Perinatal Outcome in Relation to Maternal, **Sarkar D, Saha B, Datta S**, (OA), **119(8)**: 21-4.
- Vulva Hypertrophic Tuberculosis of— An Unusual Case Report, **Sharma JB, Gupta S, Kriplani A, Arava S, Tomar S**, (CR), **119(2)**: 41-2.
- W**
- Waldemar Mordechai Wolff Haffkine, **Paul R. Pal J**, (History) : Remembering the Stalwart, **119(1)**: 85.
- We will not give in..., **Chaudhuri T**, (Ed), **119(5)**: 10-2.
- What Should be the Future of Medical Practice in India? **Sasidharan PK**, (VE), **119(3)**: 45-7.
- Why we should write, **Chaudhuri T**, (Ed), **119(9)**: 12-4.
- World Health Day 2021 : Another Wake-up Call for Health Equity, **Dasgupta R**, (Spl C), **119(4)**: 71-2. Quiz, (IM), **Angirish B, Jankharia B**, **119(4)**: 73.
- World Leprosy Day : Looking Beyond MDT, **Chattopadhyay BP**, (Spl. C), **119(1)**: 60-4.
- World Suicide Prevention Day, September 10 : Creating Hope Through Action, **Bhattacharyya R**, (SpCl), **119(9)**: 78-80.
- Z**
- Zinc Hyper-supplementation on Hospital Stay of COVID-19 Patients — Results of a Prospective Controlled Study A Pilot Study to Assess the Impact of, **Nasta AM, Goel R, Pardiwala B, Toraskar K, Desai A** (OA), **119(11)**: 33-7.

AUTHOR INDEX

A

- Abraham G, Tamilselvi A, Shroff S, George TK:** COVID Calls for an Urgent Change in UG & PG Medical Examination System In India, (SA), **119(12):** 86-9.
- Abraham SJ:** Residency Programs in India — An Appraisal, (VE), **119(2):** 43-4.
- Abrol S:** See **Chrungoo RK.**
- Abrol S:** See **Pathania BS.**
- Adhikari A, Munshi S, Roy M, Bhattacharya S, Indu R, Das AK:** Faculty Perceptions of Theory Question as an Assessment Tool: A Survey, (OA), **119(1):** 47-51.
- Adhikari MK, Arafat SM, Ananna MA, Rahman MA, Imam H, Haq SMM:** Diagnostic Value of Serum Adenosine Deaminase (ADA) in Tuberculous Lymphadenitis, (OA), **119(3):** 13-6.
- Adil M:** See **Bandyopadhyay SK.**
- Agarwal A:** See **Muthuswaraiyah Y.**
- Agarwal A:** See **Chatterjee S.**
- Agarwal P:** See **Agarwal V.**
- Agarwal T:** See **Agarwal V.**
- Agarwal V, Agarwal T, Ray I, Agarwal P, Agrawal V, Sharma D:** Perception of Undergraduate Medical Students about the Current Medical Curriculum in India, (OA), **119(9):** 27-31.
- Aggarwal A:** See **Varshney R.**
- Aggarwal AK:** See **Aggarwal KK**
- Aggarwal KK, Chong YW, Sharma R, Pillai M, Naidu R, Chan AYS, Urabe MU, Cavalcanti D, Budhathoky P, D'Souza, QSR, Ganabaskaran N, Chowdhary MdJ, Asokan RV, Datta RK, Alapet J, Goel VK, Prakash B, Joshi S, Gupta A, Garg S, Thomas A, Rai DR, Jayalal JA, Arora PN, Kalra K, Aggarwal AK, Chakravarti A, Pandya A, Tripathi S, Mishra B, Jain TS, Pachnekar A, Utture SS, Mehta K, Pareek RP, Nachane AP, Gowda A, Karande S:** Repurposing Mefenamic Acid in the Management of COVID-19, (RA), **119(1):** 16-23.
- Aggarwal KK:** In Memorium, **119(5):** 4.
- Agrawal P:** See **Pandey A.**
- Agrawal R:** My CORONA Diary, (C), **119(11):** 77.
- Agrawal TC:** See **Ruke M.**
- Agrawal V:** See **Agarwal V.**
- Ahluwalia J:** See **Gandhi A.**
- Ahmed S:** See **Venkitakrishnan R.**
- Alapet J:** See **Aggarwal KK**
- Ali M:** See **Kumar B.**
- Ali MM:** See **Kumar A.**
- Anand GV:** see **Sharma D**
- Anand SS:** see **Desai A.**
- Anand SS:** See **Desai A.**
- Anand SS:** See **Desai A.**
- Anand U:** See **Kumar B.**
- Ananna MA:** see **Adhikari MK.**
- Angirish B, Jankharia B:** Quiz, (IM), **119(1):** 65; **119(2):** 57; **119(3):** 58; **119(4):** 73; **119(5):** 58; **119(6):** 84; **119(7):** 76; **119(8):** 58; **119(9):** 81; **119(10):** 65; **119(11):** 74; **119(12):** 95.
- Anirudh M, Senthil RS, Chattopadhyay BK:** The Abdominal Wall Closure - What Do We Know So Far? (RA), **119(5):** 41-6.
- Arachchi SD, Ruwanpura R, Nanayakkara R:** Post COVID-19 Vaccination Fatality with Cerebral Involvement, (CR), **119(12):** 69-72.
- Arafat SM:** See **Adhikari MK.**
- Arava S:** See **Sharma JB.**
- Arjunan D:** See **Mondal S.**
- Arora D:** See **Kumar P.**
- Arora PN:** See **Aggarwal KK**
- Arora T:** See **Pillai SM.**
- Arora T:** See **Pillai SM.**
- Arulhaj S, Ramasubramanian, Sundaralingam, Kannan A, Chandrakumar, Manikandan, Rahman MDF:** A Challenging Case of Chest Discomfort and Breathlessness, (CR), **119(12):** 76-7.
- Arunprasath A:** See **Das S.**
- Arunprasath A:** See **Rout AK.**

Asokan RV: See **Aggarwal KK**

B

- Babu GM:** See **Chatterjee S.**
- Bagasrawala S:** see **Shrivastava RP.**
- Bagchi AS:** See **Ranjan A.**
- Bagchi C, Majumder B:** Chemoprophylaxis in Covid-19 — Where Do We Stand Today?(RA), **119(5):** 31-5.
- Bajaj DK:** See **Patel AD.**
- Bajpai J:** See **Patel AD.**
- Bakhshi GD:** See **Mishra A.,**
- Bal BS:** See **Das S.**
- Bala B, Chowdhury PK, Roy UK, Ghosh A:** A Study to find out the Association and Correlation between the Serum Uric Acid Levels with the Patients having Impaired Glucose Tolerance, (OA), **119(12):** 40-4.
- Bala B, Majumdar BB, Roy D, Pal J, Ray AN, Chakrabarti D, Chakraborty S:** Echocardiographic Evaluation of Diastolic Dysfunction in Patients with Type-2 Diabetes Mellitus in a Tertiary Care Centre of North Bengal, (OA), **119(10):** 36-41.
- Bala S:** See **Kamat M.**
- Bali HS:** See **Chrungoo RK.**
- Bandyopadhyay A:** See **Mandal PK.**
- Bandyopadhyay B:** See **Saha PS.**
- Bandyopadhyay SK, Fawzy S, Adil M:** Emergency Surgery on Patients Receiving Dual Antiplatelet Therapy — Review of a Challenging Surgical Problem, (CR), **119(5):** : 47-9.
- Bandyopadhyay SK:** Physician's Role — The Challenging Task of Balancing Multiple Responsibilities, (SComm), **119(11):** 60-1.
- Banerjee A:** See **Samashaptak.**
- Banerjee K:** See **Mandal S.**
- Banerjee MS S :** See **Tantia A.**
- Banerjee S:** Giant Cell Tumour of The 1st Metacarpal Bone Salvaged by Fibular Graft, (PCME), **119(4):** 65.
- Banerjee S:** Large Aneurysmal Bone Cyst of Proximal Tibia in a 10 Year Old Child
- Banik C:** Oxygen Therapy, (Mediquiz), **119(6):** 86 & 98.
- Banthia SK:** See **Jindal SK.**
- Barlaskar S, Nath BK, Bhattacharjee P:** Acrodermatitis Enteropathica in Adolescence — A Rare Presentation of Malabsorption, (CR), **119(12):** 73-5.
- Barman TP:** See **Ranjan A.**
- Barua T, Das AK:** Cardiac Complications in Chronic Liver Diseases, (RA), **119(8):** 37-40.
- Baruah C, Biswas A, Mitra S:** An Observational Study on the Special Characteristics of Cardiovascular Manifestations of Systemic Lupus Erythematosus in North Eastern India, (OA), **119(11):** 23-8.
- Basem M:** See **Gikonyo A.**
- Basu A, Kumar A:** COVID-19 Pandemic : Impacts on General Surgical Practices, (RA), **119(3):** 31-5.
- Basu D:** See **Gurushankari B.**
- Basu S, Chaudhuri S:** Assay Interferences in HbA1c Measurements: Effect of Hemoglobinopathies and Elevated Fetal Hemoglobin in the BioRad D10, (OA), **119(12):** 15-8.
- Basu SP:** See **Bhattacharyya S.**
- Baul S:** See **Karthika S.**
- Baul SN:** See **Jain M.**
- Bera PK:** See **Chatterjee S.**
- Bhagwan KR:** See **Das S.**
- Bhakat B, Karmakar A, Das S:** Extrapulmonary Tuberculosis Complicated by Focal Segmental Glomerulosclerosis — A Rare Association, (CR), **119(11):** 51-3.
- Bhakta SK, Datta S, Roy A, Mukherjee PP:** Study on Loss of Protection Sense in Type 2 Diabetes Mellitus with Special Reference to TSH Value within Normal Range, (OA), **119(3):** 27-30.
- Bhandarwar AH:** **Mishra A.**
- Bhardawaj R:** See **Chrungoo RK.**
- Bhargava S:** See **Paramesh H.**

- Bharti R:** see **Madan J**
Bhat J: See **Rao VG**
Bhattacharje P: See **Deb A**
Bhattacharjee P: See **Barlaskar S**
Bhattacharjee P: see **Paul T**
Bhattacharya A, Ghosh A: Role of Platelet Rich Fibrin Non-healing Ulcers, (PCME), **119(8):56-7**.
Bhattacharya A: Global Hunger Index, (C), **119(3): 70**.
Bhattacharya A: See **Roy S**.
Bhattacharya AK: In Memorium, **119(2): 74**.
Bhattacharya K, Bhattacharya N: Surgeon's Dilemma during COVID-19, (RA), **119(2): 31-2**
Bhattacharya N: see **Bhattacharya K**.
Bhattacharya P: See **Chakraborty A**.
Bhattacharya S: Psychiatry, (Mediquiz), **119(8): 76-7**.
Bhattacharya S: See **Adhikari A**.
Bhattacharya S: See **Jain M**.
Bhattacharya S: See **Roy S**.
Bhattacharyya R, See **Dhar Chowdhury L**.
Bhattacharyya R: See **Panda SB**.
Bhattacharyya R: World Suicide Prevention Day, September 10 : Creating Hope Through Action, (Spl C), **119(9): 78-80**.
Bhattacharyya S, Gupta A, Ghosh S: Locally Advanced Gastric Cancer, (CDM), **119(7): 71-3**.
Bhattacharyya S, Saha R, Das P, Basu SP, Mandal S, Mandal T: A Computed Tomographic Findings of Invasive Mucormycosis in COVID-19 Patients on Steroid Therapy at a Tertiary Care Centre — A Case Series, (CR), **119(12): 81-4**.
Bhattacharyya S: 2021 : The First Centenary of BCG Vaccination in Human, (MH), **119(2): 59**.
Bhattacharyya S: See **Samashaptak**.
Bhowmick S: See **Kar M**.
Bhushan B: see **Jain N**.
Bhuvan V: see **Mohanty SK**.
Bhuyan S: See **Debnath I**.
Biradar SG: see **Udgiri RS**.
Biswas A: See **Baruah C**.
Biswas D , Saha M, Das: A Case of Sturge Weber Disease with Portal Hypertension, (CR), **119(7): 68-70**.
Biswas M, Ghosh J, Giri S, Naskar S:Challenges and Adaptation in Healthcare Delivery during COVID-19: Perspectives from four different Service Providers, (RA), **119(4): 44-9**.
Biswas S, Chetri A, Biswas SC: Approach to A Case Presented with Bleeding per Vagina, (CDOB), **119(6):73-6**.
Biswas SC: See **Biswas S**.
Biswas SN: See **Dutta S**.
Biswas T: See **Dhar Chowdhury L**.
Biswas U, Mahato P, Chakraborty M: Approach to a case of Pyrexia of Unknown Origin (PUO), (CDM), **119(2): 46-9**.
Bora A: See **Mittal K**.
Borse AG: See **Roy S**.
Bose B, Sarkar S, Pal B: Laparoscopic Cholecystectomy and Cholelithotomy and Ttube Drainage In Mirizzi's Syndrome Type I in a Case of Situs Inversus Totalis, (CR), **119(9): 72-4**.
Bose B: See **Das S**.
Budhathoky P: See **Aggarwal KK**.
Burli A: See **Dave M**.
C
C Rex: See **Uikey S**.
Cavalcanti D: See **Aggarwal KK**
Chakrabarti D: See **Bala B**.
Chakrabarti S: see **Panda SB**.
Chakrabarti S: See **Sengupta M**.
Chakraborti R: See **Saha PS**.
Chakraborty A, Bhattacharya P, Chatterjee N: Operational Guidelines of NVHCP for management of Hepatitis B, (SA), **119(7): 83-8**.
Chakraborty B, Mondal SK: Relevance of Clinical versus Ultrasonographic Estimation of Fetal Weight at Term — A Prospective Longitudinal Study, (OA), **119(6): 34-7**.
Chakraborty I: See **Chatterjee S**.
Chakraborty J: See **Panda SB**.
Chakraborty M: See **Biswas U**.
Chakraborty PP: See **Dutta S**.
Chakraborty S, Sharma PK, Choudhury K , Goswami S: Report from a Trained Specialist Dependent ROP Screening Program in Two State Government Managed Special Newborn Care Units (SNCUs) of North Bengal, (OA), **119(7): 27-31**.
Chakraborty S: JIMA, February 2021, (C), **119(4): 85**.
Chakraborty S: See **Bala B**.
Chakraborty S: See **Kumar S**.
Chakraborty S: See **Sengupta RS**.
Chakraborty U: See **Chandra A**.
Chakravarti A: See **Aggarwal KK**
Chan AYS: See **Aggarwal KK**
Chandra A, Chakraborty U: Fever : A case based approach for the clinicians, (CDM), **119(1): 70-5**.
Chandra A: See **Ghosh S**.
Chandra A: See **Mondal HS**.
Chandra A: See **Saha SK**.
Chandrakumar: See **Arulhaj S**.
Chatterjee A: See **Chatterjee S**.
Chatterjee N: Chronotherapeutics – The Need to Listen to Nature's Rhythm, (PERSPECTIVE), **119(4): 75-6**.
Chatterjee N: See **Chakraborty A**.
Chatterjee N: See **Pal P**.
Chatterjee N: See **Ghosh T**.
Chatterjee S, Parakh A, Babu GM, Lopamudra M, Bera PK, Jenav R, Mallick S, Umesha C, Petare A: Recent Advances in Wound Management, (Spl A), **119(5): 70-3**.
Chatterjee S, Chatterjee A: Lower Abdominal Parietal Tumours in the Puerperal Period — A Rare Etiology, (CR), **119(5): 50-1**.
Chatterjee S, Kuila S, Agarwal A: A Case Report on A Very Rare Hernia : Primary Anterior Perineal Hernia, (CR), **119(12):78-80**.
Chatterjee S, Ray I, Chakraborty I, Mistri S: Deviations in the Basic Biochemical Parameters In COVID Patients : Our Experience in a COVID Hospital in Eastern India, (OA), **119(6): 38-40**.
Chatterjee S: See **Mandal S**.
Chatterjee S: See **Ray R**.
Chatterjee S: See **Tantia A**.
Chattopadhyay BK: See **Anirudh M**.
Chattopadhyay BP: World Leprosy Day : Looking Beyond MDT, (Spl C), **119(1): 60-4**.
Chattopadhyay S: See **Saha PS**.
Chaudhari O: See **Uikey S**.
Chaudhary AH: See **Rout AK**.
Chaudhary L: See **Das S**.
Chaudhry NK: See **Verma S**.
Chaudhuri A See **Dhar Chowdhury L**.
Chaudhuri A: See **Das S**.
Chaudhuri A: See **Dhar Chowdhury L**.
Chaudhuri S: See **Basu S**.
Chaudhuri T: All kudos to the brave hearts (Ed), **119(6): 12-5**.
Chaudhuri T: Are we Marching away from Safety? (Ed), **119(1):11-2**.
Chaudhuri T: Artificial Intelligence and Medicine, (Ed), **119(3): 10-2**.
Chaudhuri T: Enough is enough,(Ed), **119(7): 14-7**.
Chaudhuri T: Ensure Not Insure (Ed), **119(2): 10-2**.
Chaudhuri T: Health and Hamlet, (Ed), **119(11): 12-4**.
Chaudhuri T: Health is a Human Right, (Ed), **119(4): 10-3**.
Chaudhuri T: Marching into Metaverse,, (Ed), **119(12):12-4**.
Chaudhuri T: Research in, (Ed), **119(10): 14-7**.
Chaudhuri T: Something beyond,(Ed), **119(8): 10-2**.
Chaudhuri T: We will not give in, (Ed), **119(5): 10-2**.
Chaudhuri T: Why we should write, (Ed), **119(9): 12-4**.
Chavan DD: See **Mittal K**.
Chenniappan M: Become a Sherlock Holmes in ECG- Series, (SC), **119(1): 66; 119(2): 58; 119(3): 59; 119(4): 74; 119(5): 59; 119(6): 85; 119(7): 77; 119(9): 82; 119(10): 66; 119(11): 75; 119(12): 96**.
Chetri A: See **Biswas S**.
Chinda M: See **Venkitakrishnan R**.
Chong YW: See **Aggarwal KK**

Choudhury K: See **Chakraborty S**.
Chowdhary Md J: See **Aggarwal KK**.
Chowdhury A: See **Saha PS**.
Chowdhury J: See **Mondal S**.
Chowdhury PK: See **Bala B**.
Chowdhury R: See **Gantait K**.
Chowdhury S: See **Mondal S**.
Chrungoo I: See **Chrungoo RK**.
Chrungoo RK, Chrungoo I, Abrol S, Bhardawaj R, Bali HS: Post Herpetic Abdominal Pseudohermia (PHAP), (RA), **119(9):** 47-9.
Cimpaye E: See **Gikonyo A**.
Contractor S: See **Jani K**.

D

D'Souza, QSR: See **Aggarwal KK**.
Dalal AK, Dalal UR, Rath HK, Kaur R: Inferior Vena Cava syndrome in Hepatic Trauma and Pyogenic Liver Abscess, (PCME), **119(5):** 54-7.
Dalal UR: See **Dalal AK**.
Dargad R: Effectiveness of Regular Monitoring on Adherence to Urate – Lowering Therapy and Its Effect on Serum Uric Acid Levels in Indian Subjects — A Retrospective Analysis, (DC), **119(8):** 63-8.
Das A: See **Biswas D**.
Das AK: See **Adhikari A**.
Das AK: See **Barua T**.
Das AK: See **Patir RP**.
Das BB: See **Das S**.
Das D: See **Debnath I**.
Das D: See **Mondal S**.
Das D: See **Paul T**.
Das G: Dealing a Patient with Dementia : Some Basic Concepts, (CDN), **119(4):** 66-70.
Das Ghosh S: See **Ghosh S**.
Das P: See **Bhattacharyya S**.
Das P: See **Gupta S**.
Das P: See **Kumar S**.
Das P: See **Paul T**.
Das P: See **Samashaptak**.
Das Poddar KK: See **Sahoo MR**.
Das S, Arunprasath A, Bal BS, Bhagwan KR, Chaudhary L, Reddy P, Johri RK, Kannaiah R, Rao TB, Rathod R: Lower Limb Injuries, (Spl A), **119(5):** 82-5.
Das S, Bose B, Chaudhuri A, Dutta R, Rakshit K, Nag A: Laparoscopy in the Era of COVID-19 Pandemic : Lessons Learned from PIPAC Surgery, (RA), **119(10):** 47-9.
Das S, Mandal A, Pal S, Roy H, Das BB: MDA5 Positive Juvenile Dermatomyositis with Interstitial Lung Disease, (CR), **119(8):** 52-5.
Das S: See **Bhakat B**.
Das S: See **Ganguly S**.
Das S: See **Halder P**.
Das S: See **Ray K**.
Dasgupta R: World Health Day 2021 : Another Wake-up Call for Health Equity, (Spl C), **119(4):** 71-2.
Dasgupta S: See **Samajdar SS**.
Datta PK: See **Pal S**.
Datta RK: See **Aggarwal KK**.
Datta S: see **Bhakta SK**.
Datta S: See **Sarkar D**.
Dave M, Patel P, Jain S, Burli A: Situs Inversus Totalis with Atrial Septal Defect : A Rare Association, (CR), **119(6):** 60-1.
Dayal N: See **Gandhi A**.
De R : See **Jain M**.
Deb A, Nath BK , Bhattacharje P: Study of Serum Vitamin D Level in Patients Having Chronic Obstructive Pulmonary Disease, (OA), **119(7):** 32-34.
Deb J: See **Misra S**.
Debnath E: See **Ramesh J**.
Debnath I, Das D, Difoosa B, Bhuyan S: Myriad of Presentation of Scrub Typhus in a Tertiary Care Hospital in North Eastern India — A Prospective study, (OA), **119(12):** 19-24.
Desai A, Anand SS: Clinical Practice of Prescribing Proton Pump

Inhibitors by Physicians : An Indian Perspective, (DC), **119(6):** 91-6.
Desai A, Anand SS: Lincomycin in Skin and Soft Tissue Infections and Upper Respiratory Tract Infections, (DC), **119(2):** 62-6.
Desai A, Narayanan V, Anand SS: Lincomycin : A review and meta-analysis of its efficacy and tolerance in common infections encountered in clinical practice, (DC), **119(8):** 69-75.
Desai A: See **Nasta AM**.
Desai JR: See **Shrivastava RP**.
Devi G: See **Kumar S**.
Dey D: See **Mondal HS**.
Dhar Chowdhury L, Mohite P, Bhattacharyya R, Chaudhuri A: Impact of Lifestyle Modification and Psychological Interventions in Academic Performance of UG Medical Students, Institution based Prospective, Cross-sectional Study, (OA), **119(12):** 45-50.
Dhar Chowdhury L, Biswas T, Ghosh R, Chaudhuri A: Effect of Counseling on the Mental Status of Undergraduate Medical Students During the Pandemic — A Prospective Quasi-experimental Study at a District Medical College of West Bengal, (OA), **119(4):** 14-8.
Difoosa B: See **Debnath I**.
Dixit HN, Kant S, Dubey P, Vajpayee VMG , Gupta G: Allopathy (Modern Medicine), Ayurveda and AYUSH : Needs to be In Harmony, (SA), **119(6):** 87-90.
Dixit HN: See **Dixit HN**.
Dixit S: See **Patel AD**.
Dolai TK: See **Jain M**.
Dolai TK: See **Karthika S**.
Doley R: See **Patir RP**.
Dolui A: See **Roy S**.
Dubey P: See **Dixit HN**.
Dutta R: See **Das S**.
Dutta S, Chakraborty PP, Biswas SN, Roy K: Clinical Presentations, Hormonal Evaluation and Imaging Abnormalities in Patients with Multiple Pituitary Hormone Deficiency : A Single-centre Experience from Rural West Bengal, (OA), **119(2):** 13-8.
Dutta S: See **Varshney R**.
Dutta SK: See **Kamat M**.

E

Ete T: See **Jagtap VK**

F

Fawzy S: See **Bandyopadhyay SK**.

G

Gaidhane S: See **Ravichandran R.**,
Ganabaskaran N: See **Aggarwal KK**.
Gandhi A, Ahluwalia J, Dayal N, Naithani R, Phatale R, Saxena R, Nair SC: Best Practices In D-Dimer Testing; In COVID-19 and Beyond : Expert Group Recommendations, (C), **119(9):** 84-5.
Ganguly A: See **Pal S**.
Ganguly S, Das S, Islam R: Clinical Vignettes of Scrub Typhus Meningitis, (OA), **119(11):** 19-22.
Ganguly SB: Priority Should be Reset, (C), **119(2):** 73.
Gantait K , Patra S, Chowdhury R: Safety and Efficacy of Rituximab in Ankylosing Spondylitis — A One Year Prospective Clinical Study, (OA), **119(7):** 38-41.
Garg S: See **Aggarwal KK**.
Gargari P: See **Mondal S**.
Gautam A: See **Pandey A**.
George TK: See **Abraham G**.
Ghosh A: See **Bala B**.
Ghosh A: See **Bhattacharya A**.
Ghosh A: See **Ghosh S**.
Ghosh A: See **Sengupta RS**.
Ghosh B: See **Mukhopadhyay S**.
Ghosh Dastidar A: See **Halder P**.
Ghosh J: see **Biswas M**.
Ghosh M, Ghosh Sengupta S: Xanthogranulomatous Cholecystitis, A Paradox in Diagnosis & Treatment : A Case Series, (OA), **119(10):** 29-35.
Ghosh N: Paediatrics, (Mediquiz), **119(7):** 78-9 & 83.

Ghosh N: See **Saha S**.

Ghosh R: See **Dhar Chowdhury L**.

Ghosh S, Das Ghosh S, Chandra A, Pal J: A Comparative Assessment of the Diagnostic Value of Anti-cyclic Citrullinated Peptide Antibodies and Rheumatoid Factor in patients with Rheumatoid Arthritis in a Tertiary Care Hospital, (OA), **119(7):** 35-7.

Ghosh S, Ghosh A: Low Back Pain for Clinicians : An Evidence Based Approach, (CDM), **119(10):** 58-62.

Ghosh S, Saha I, Mondal A: Aripiprazole induced Neuroleptic Malignant Syndrome : A Case Report, (CR), **119(4):** 59-60.

Ghosh S: See **Bhattacharyya S**.

Ghosh S: See **Mondal S**.

Ghosh S: See **Samajdar SS**.

Ghosh Sengupta S: See **Ghosh M**.

Ghosh SK, Singh DP, Tiwari AK, Singh AK: The Glitch with the web of Anti Tubercular Drugs — A Prospective Study on Adverse Drug Reactions, (OA), **119(1):** 43-6.

Ghosh SK: See **Singh DP**.

Ghosh T, Mandal K, Pal P, Chatterjee N: Morphea and Systemic Sclerosis Coexistent : An Uncommon Association, (PCME), **119(6):** 72.

Ghoshal AG: See **Jindal SK**.

Gikonyo A, Irungu C, Kanyeki D, Omondi S, Teny R, Basem M, Musila B, Cimpaye E, Jeitah L, Ponoth P, Gikonyo D: Ambulatory Blood Pressure Monitoring for Ideal Blood Pressure Control : A Kenyan Retrospective Review , (OA), **119(10):** 26-8.

Gikonyo D: See **Gikonyo A**.

Giri S: see **Biswas M**.

Giri S: See **Varshney R**.

Goel A: See **Halder P**.

Goel A: See **Varshney R**.

Goel G: See **Gupta L**.

Goel R: See **Nasta AM**.

Goel VK: See **Aggarwal KK**.

Goswami S: See **Chakraborty S**.

Gowda A: See **Aggarwal KK**.

Goyal G, Srivastav R, Kapoor S: Management of Diabetic Foot Ulcer, (PCME), **119(2):** 45.

Greenhouse S: See **Ray K**.

Gupta A: Cancer Awareness — The Basics, (Spl C), **119(2):** 50-5.

Gupta A: See **Aggarwal KK**.

Gupta A: See **Bhattacharyya S**.

Gupta B: See **Saha PS**.

Gupta G: See **Dixit HN**.

Gupta L, Lal PR, Suma SV, Goel G, Sharma A, Khandelwal D: Potential Health Benefits of Fruits and Vegetables : Epic Inspite Glycemia, (RA), **119(5):** 36-40.

Gupta M: See **Gupta S**.

Gupta S, Prasad A, Das P, Roy DS, Saw Mondal RR, Gupta M, Sekhar H: Plasmapheresis; Reasons & Results, An Epidemiological Study on the Indications and Outcome of Therapeutic Plasma Exchanges in a Tertiary Care Hospital — One Year Single Center Experience, (OA), **119(5):** 16-20.

Gupta S: Case Based Discussion on Benign Prostatic Hyperplasia (BPH), (CDU), **119(9):** 75-7.

Gupta S: See **Pai P**.

Gupta S: See **Sharma JB**.

Gurushankari B, Sureshkumar S, Basu D, Kate V: Role of Biomarkers, Scoring Systems and Platelet Indices in the Diagnosis of Acute Appendicitis — evidence based approach, (RA), **119(9):** 55-62.

H

Halder I: see **Mukhopadhyay K**.

Halder P, Ghosh Dastidar A, Halder SK, Ukil S, Goel A, Das S: A Neglected Case of Hirschsprung's Disease Presenting in Adulthood : A Difficult Encounter, (CR), **119(12):** 67-8.

Halder SK: See **Halder P**.

Halder SK: See **Ray K**.

Haq SMM: See **Adhikari MK**.

Harish S: See **Kumar P**.

Hassan Y: See **Rather AA**.

Hati A: See **Saha SK**.

Hussain AP J: See **Mohanty SK**.

Hussain N: See **Madan J**

I

Ikbal SKA: See **Kar M**.

Imam H: See **Adhikari MK**.

Immanuel G: See **Singh M**.

Indu R: See **Adhikari A**.

Irungu C: See **Gikonyo A**.

Islam R: See **Ganguly S**.

J

Jacob SM, Sushu KM, Sivasangeetha K: Infectious waste from a COVID-19 Laboratory, (C), **119(10):** 69.

Jadhav M: See **Patel DD**.

Jagtap VK, Ete T, Thangkhiew L, Marbaniang E, Marak A, Slong D, Tongper D, Lyngdoh NM, Sarma A, Topn N: Factors affecting High-Risk exposure amongst Health Care Workers (HCW): Audit of COVID-19 Risk Assessment Committee from Tertiary Care Centre in North East India, (OA), **119(1):** 56-9.

Jagtap VK: See **Jagtap VK**

Jain M, Roy P, De R, Mondal MK, Mondal PK, Baul SN, Mitra S, Bhattacharya S, Dolai TK: The Utility of Transient Elastography (Fibro-Scan) as an Indicator of Hepatic Iron Overload in Transfusion Dependent Thalassemia Patients (TDT) from a Tertiary Care Hospital from Eastern India, (OA), **119(9):** 35-8.

Jain N, Sardana V, Maheshwari D, Bhushan B, Sharma SK: Study of Neurologic Manifestations of Hyponatremia with Special Reference to Unusual Rare Manifestations, (OA), **119(3):** 17-20.

Jain R: See **Uikey S**.

Jain S: See **Dave M**.

Jain TS: See **Aggarwal KK**

Jalal D: See **Kumar S**.

Jani K, Contractor S: Laparoscopic Retro-rectus Onlay Mesh Repair (RROM) for Ventral Abdominal Wall Hernias – Is it the New Gold Standard ? (OA), **119(9):** 22-6.

Jankharia B: See **Angirish B**.

Jayakrishnan MP: See **Pillai SM**.

Jayakrishnan MP: See **Pillai SM**.

Jayalal JA: Mixopathy, (VE), **119(4):** 61-2.

Jayalal JA: See **Aggarwal KK**

Jayaraj KM: See **Pillai SM**.

Jayaraman S: See **Paramesh H**.

Jeewan R: See **Kumar A**.

Jeitah L: See **Gikonyo A**.

Jenav R: See **Chatterjee S**.

Jeyaraj KM: Post Stroke Epilepsy, (C), **119(1):** 96.

Jha KM: See **Jha T**.

Jha T, Jha KM: Medical Students' Perception of Education Environment in Clinical Postings, (RA), **119(2):** 26-30.

Jindal SK, Lele J, Ghoshal AG, Nair S, Kant S, Parakh A, Banthia SK, Nagda VD, Joshi P, Masurkar T, Joshi SK: Executive Summary of the Recommendations on Management of Asthma in Primary Care (2020), (Spl A), **119(2):** 67-70.

Johri RK: See **Das S**.

Joshi P: See **Jindal SK**.

Joshi S: See **Aggarwal KK**

Joshi S: See **Madan J**

Joshi SK: See **Jindal SK**.

Joshi SR: See **Samajdar SS**.

Joshi SR: See **SS Samajdar**.

Justin GM: See **Mohan S**.

K

Kalavakollu RT: See **Ravichandran R**.

Kalra K: See **Aggarwal KK**

Kamat M, Bala S, Dutta SK, Mishra S, Nagaprakash BS, Veligandla KC: Wound Care and Nutrition, (Spl A), **119(5):** 60-3.

Kannaiah R: See **Das S**.

Kannaiah R: See **Rout AK**.

Kannan A: See **Arulhaj S**.

Kannan A: See **Singh M**.

Kant R: See **Panwar P.**

Kant S: COVID Management and Prophylaxis among Rural, Hilly and Tribal Population of India, (RA), **119(9):** 63-9.

Kant S: END TB by 2025: Way forward to Achieve this Mission while Recovering from the COVID-19 Pandemic, (Spl A), **119(4):** 79-82.

Kant S: See **Dixit HN.**

Kant S: See **Jindal SK.**

Kant S: See **Patel AD.**

Kanwate D: See **Rout AK.,**

Kanyeki D: See **Gikonyo A.**

Kapoor S: See **Tantia A.**

Kapoor S: See **Goyal G.**

Kar M, Bhowmick S, Ikbāl SKA: Drug Safety Issues in Cardio-oncology Practice, (RA), **119(8):** 41-8.

Karande S: See **Aggarwal KK**

Karmakar A: Orthopaedics, (Mediquiz (5/2021), **119(5):** -95-6.

Karmakar A: See **Bhakat B.**

Karmakar KL, Pandey R: Clinical Spectrum and Outcomes of Non-lupus Crescentic Glomerulonephritis : An Experience from Eastern India, (OA), **119(9):** 15-21.

Karthika S, Mandal PK, Baul S, Dolai TK: A Study from Eastern India on the Role of Dapsone Therapy in Patients of Persistent and Chronic Immune Thrombocytopenia; Where Do We Stand? (OA), **119(6):** 16-21.

Kate V: See **Gurushankari B.**

Kaur R: See **Dalal AK.**

Keith I: See **Ray G.**

Kesarkar P: See **Muthuswaraiyah Y.**

Khandelwal D: See **Gupta L.**

Khanna S S: See **Tantia A.**

Khanna S: See **Poddar A.**

Kher V: See **Shukla A.**

Kriplani A : See **Sharma JB.**

Krishnamurthy G: See **Sen SK.**

Kuila S: See **Chatterjee S.**

Kumar A: See **Basu A.**

Kumar A: See **Kumar B.**

Kumar B, Kumar M, Sinha AK, Ali M, Anand U, Kumar A: Vomiting in Children : How to Identify the Surgical Masqueraders? (RA), **119(6):** 44-9.

Kumar B: See **Kumar A.**

Kumar K: See **Singh DP.**

Kumar M: See **Kumar B.**

Kumar MS: See **Pillai SM.**

Kumar MS: See **Pillai SM.**

Kumar MS: See **Ramya N.**

Kumar P, Menezes R, Pinto V, Arora D, Tiwari B, Harish S, Vinda Z, Tapas D: Safety & Efficacy of the FLUCOLD Uncoated Tablet in the Treatment of Common Cold and Flu Syndrome : Postmarketing Surveillance Study, (DC), **119(12):** 90-4.

Kumar P: JIMA, February 2021, (C), **119(4):** 84.

Kumar P: See **Singh DP.**

Kumar PS: See **Pateel GNP.**

Kumar RK: See **Ravichandran R.**

Kumar S, Chakraborty S, Vijayabanu U, Devi G, Priya J, Zin KT, Reza S, Jalal D, Das P: Psychological Impact of Movement Control Order during COVID-19 Pandemic among Malaysian Population : An Online Survey, (OA), **119(11):** 15-8.

Kumar S: A Drug Utilization Study of Antidepressants in the Psychiatry Unit of a Tertiary Care Hospital, (OA), **119(8):** 25-31.

Kumar V: See **Mohanty SK.**

Kumar A, Kumar B, Rashmi R, Jeewan R, Sinha AK, Ali MM: Circumcision : Myths and Facts, (RA), **119(11):** 48-50.

Kundu D: See **Pai P.**

Kundu PK: See **Mondal HS.**

Kunoor A: See **Venkitakrishnan R.**

Kushwaha RAS: See **Patel AD.**

L

L, Biswas T, Ghosh R, Chaudhuri A,(OA), **119(4):** 14-8.

Lal PR: See **Gupta L.**

Lele J: See **Jindal SK.**

Lele J: See **Paramesh H.**

Lopamudra M: See **Chatterjee S.**

Lyngdoh NM: See **Jagtap VK**

M

Madan J, Hussain N, Joshi S, Mehra J, Marwaha A, Bharti R, Thomas J: Understanding whole grain awareness and consumption in select Indian cohorts, (SA), **119(1):** 88-94.

Madathil MB: See **Mohan S.**

Mageshwari M, Rao Boratne AV: Digital Contact Tracing – A Hope in Pandemic Era, (C), **119(11):** 77-8.

Mahajan D: See **Pathania BS.**

Mahashur A: See **Paramesh H.**

Mahato P: See **Biswas U.**

Mahato S : Effect of Deranged Thyroid Profile on Glycated Hemoglobin : Pre and Post Treatment JIMA, Vol 119, May 2021, (C), **119(9):** 84.

Mahato S: See **Ramesh J.**

Maheshwari D: See **Jain N.**

Maheshwari PK: See **Pandey A.**

Majumdar BB: See **Bala B.**

Majumdar NK: See **Roy S.**

Majumder B: See **Bagchi C.**

Malcolm JK: See **Mugundhan K.**

Malcolm JK: See **Pillai SM.**

Malcolm JK: See **Ramya N.**

Mallick S: See **Chatterjee S.**

Mallik A: See **Muthuswaraiyah Y.**

Mandal A: See **Das S.**

Mandal B: See **Saha S.**

Mandal D: See **Mandal S.**

Mandal K: See **Ghosh T.**

Mandal PK : See **Karthika S.**

Mandal PK, Bandyopadhyay A, Mondal S, Pradhan R: Vitamin D Level in Patients with Juvenile Idiopathic Arthritis: A Study From a Tertiary Care Institute of Kolkata, (OA), **119(12):** 36-9.

Mandal S, Mandal D, Chatterjee S, Banerjee K: Balloon Mitral Valvuloplasty in Patients above 60 years age with Mitral Stenosis in Eastern India : A Prospective Analytic Study from IPGME&R and SSKM Hospital, Kolkata, (OA), **119(7):** 47-50.

Mandal S: See **Bhattacharyya S.**

Mandal T: See **Bhattacharyya S.**

Mandal T: Study on Loss of Protection Sense in Type 2 Diabetes Mellitus with Special Reference to TSH Value within Normal Range JIMA, Vol 119, March 2021, (C), **119(8):** 77.

Manikandan: See **Arulhaj S.**

Manjunath : See **Pateel GNP.**

Marak A: See **Jagtap VK**

Marathe A: See **Vyas B.**

Marbaniang E: See **Jagtap VK**

Marwaha A: See **Madan J**

Maskara RK: See **Ruke M.**

Masurkar T: See **Jindal SK.**

Mathews P: See **Murugesan M.**

Mathur D: See **Pareek KK.**

Mathur G: See **Pareek KK.**

Medda A, Misra AK: A Man with Progressive Swelling of Abdomen: Uncommon Presentation of a Common Disease, (CR), **119(11):** 54-6.

Meena SV: See **Sharma D**

Mehra J: See **Madan J**

Mehta K: See **Aggarwal KK**

Mehta KD, Rewari H: Role of Laparoscopy in Management of Non-palpable testes : Our Experience, (OA), **119(8):** 32-6.

Mehta P: See **Vyas B.**

Menezes R: See **Kumar P.**

Mishra A, Bakhshi GD, Bhandarwar AH: Early Enteral Feeding In Cases of Gastrointestinal Anastomosis and Perforation Suturing : A Prospective Study, (OA), **119(10):** 42-6.

Mishra B: See **Aggarwal KK**

- Mishra B:** See **Sen SK**.
Mishra S: See **Kamat M**.
Misra AK: See **Medda A**.
Misra S, Mondal P, Deb J, Saha R: National Tuberculosis Elimination Programme : New Guidelines for Management of Drug Sensitive TB, (Spl C), **119(3):** 54-7.
Mistri S: See **Chatterjee S**.
Mitra A: See **Roy S**.
Mitra A: See **Saha S**.
Mitra K: See **Roy SK**.
Mitra S: See **Baruah C**.
Mitra S: See **Jain M**.
Mittal AK: See **Rout AK**.
Mittal K, Bora A, Setha A, Patel B, Chavan DD, Pelleti PK, Shararooni SA, Rathod R: Management of Anorectal Wounds, (Spl A), **119(5):** 89-94.
Mohan S, Sarkar S, Madathil MB, Justin GM: CT Perfusion Study in Pulmonary Masses (OA), **119(6):** 27-33.
Mohanty SK, Kumar V, Hussain AP J, Bhuvan V: Non-traumatic Cardiac Tamponade : Two Autopsy Case Reports, (CR), **119(2):** 39-40.
Mohite P: See **Dhar Chowdhury L**.
Moitra S: See **SS Samajdar**.
Mondal A: See **Ghosh S**.
Mondal HS, Kundu PK, Nag A, Dey D, Chandra A, Mukherjee AK: A Study of Correlation Between Anthropometric Measurements and Carotid Intima Media Thickness in Newly Diagnosed Type 2 Diabetes Mellitus Patients in a Tertiary Care Hospital in Eastern India, (OA), **119(11):** 29-32.
Mondal MK: See **Jain M**.
Mondal P: See **Misra S**.
Mondal PK: See **Jain M**.
Mondal PK: See **Roy S**.
Mondal S, Singha A, Das D, Neogi S, Gargari P, Shah M, Arjunan D, Mukhopadhyay P, Ghosh S, Chowdhury J, Chowdhury S: Prevalence of COVID-19 Infection and Identification of Risk Factors among Asymptomatic Healthcare Workers : A Serosurvey Involving Multiple Hospitals in West Bengal, (OA), **119(5):** 21-7.
Mondal S: See **Mandal PK**.
Mondal S: See **Sengupta RS**.
Mondal S: See **Saha PS**.
Mondal SK: See **Chakraborty B**.
Mudgal VK: See **Rout AK**.
Mugundhan K, Saravanan RV, Malcolm JK, Velayutham SS, Sowmini PR, Sathish KM: Young Stroke of Indeterminate Cause, (PCME), **119(3):** 48-9.
Mugundhan K: See **Pillai SM**.
Mugundhan K: See **Pillai SM**.
Mugundhan K: See **Ramya N**.
Mukherjee AK: See **Mondal HS**.
Mukherjee PP: See **Bhakta SK**.
Mukherjee U S: See **Tantia A**.
Mukhopadhyay I: See **Sengupta M**.
Mukhopadhyay K, Halder I, Singh R: Managing Asthma : Must Know Areas for General Physicians, (RA), **119(4):** 39-43.
Mukhopadhyay P: See **Mondal S**.
Mukhopadhyay S, Sharan A, Ghosh B: Hypokalaemic Periodic Paralysis — A Diagnostic and Therapeutic Challenge, (RA), **119(3):** 36-41.
Munshi S: see **Adhikari A**.
Muruganathan A: Adult Vaccination : Some Frequently asked Questions & Answers, (VE), **119(1):** 37-40.
Muruganathan A: See **Swaminathan K**.
Muruganathan A: The Concept of Hypertension Clinic and Hypertensionologist, (RA), **119(12):**55-6.
Murugesan M, Valsan AT, Sathyendra S, Mathews P, Valsan A, Rupali P: A Primer on Pandemic Preparedness for Health Care Facilities Drawn from the SARS-CoV2 Pandemic, (RA), **119(9):** 50-4.
Musila B: See **Gikonyo A**.
Muthuswaraiyah Y, Mallik A, Agarwal A, Kesarkar P, Srivatsan V5, Shah U, Veligandla KC: Challenges in Management of Surgical Site Infections — Lessons Learnt, (SA), **119(7):** 80-2.
Mutreja J: Pandemic Review : A Surgeon Perspective, (C), **119(5):** 98.
N
Nachane AP: See **Aggarwal KK**.
Nag A: See **Das S**.
Nag A: See **Mondal HS**.
Nagaprakash BS: See **Kamat M**.
Nagda VD: See **Jindal SK**.
Nahar A: See **Uikey S**.
Naidu R: See **Aggarwal KK**.
Nair S: See **Jindal SK**.
Nair SC: See **Gandhi A**.
Naithani R: See **Gandhi A**.
Nanayakkara: See **Arachchi SD**.
Narayanan V: See **Desai A**.
Naskar S: See **Biswas M**.
Nasta AM, Goel R, Pardiwala B, Toraskar K, Desai A: A Pilot Study to Assess the Impact of Zinc Hyper-supplementation on Hospital Stay of COVID-19 Patients — Results of a Prospective Controlled Study, (OA), **119(11):** 33-7.
Nath BK: See **Barlaskar S**.
Nath BK: See **Deb A**.
Neogi S: See **Mondal S**.
Nimmala S: See **Pai P**.
O
Om P: Are We Marching away from Safety, (C), **119(3):** 70.
Omondi S: See **Gikonyo A**.
P
Pachnekar A: See **Aggarwal KK**.
Pai P, Kundu D, Prakash P, Nimmala S, Pramod G, Sivakumar A, Gupta S, Petare AU: Management of Non-healing Wounds: A Simple Practical Approach, (Spl A), **119(5):** 77-81.
Pal B: See **Bose B**.
Pal J: See **Bala B**.
Pal J: See **Ghosh S**.
Pal J: See **Paul R**.
Pal J: See **Paul R**.
Pal J: See **Samajdar SS**.
Pal J: Shining India — Dream of A Monk, (Insight), **119(1):** 13-5.
Pal P, Chatterjee N: A Cause of Recurrent Seizure — A Neuro Cutaneous Syndrome,
Pal P: See **Ghosh T**.
Pal S, Datta PK, Ganguly A, Saha S, Roy H: Mesangioproliferative Glomerulonephritis in a case of Pulmonary Atresia with Ventricular Septal Defect (Pseudotruncus arteriosus) : An Interesting Case Report, (CR), **119(1):** 67-9.
Pal S: See **Das S**.
Pal SK: See **Ranjan A**.
Palanivelu C: The Technology must be Accessible and Affordable to All, (VE), **119(7):** 74-5.
Panda SB, Chakrabarti S, Chakraborty J, Bhattacharyya R: Correlation between Her2Neu Status with Molecular Classification, Cyclin D1 Status and Ki67 Expression in Intraductal Carcinoma of the Breast, (OA), **119(4):** 29-33.
Pandey A, Singh M, Agrawal P, Maheshwari PK, Gautam A, Pursnan N: To Evaluate the Efficacy of Microplan for Emergency Department of Medical Colleges laid by the Uttar Pradesh Government of India in Reference to the COVID-19 Pandemic, (OA), **119(8):** 18-20.
Pandey R: See **Karmakar K**.
Pandya A: See **Aggarwal KK**.
Panicker CJ: See **Paramesh H**.
Panwar P, Kant R, Totaganti M, Raina R: Avascular Necrosis of Femur Neck in Young Adult Secondary to Indigenous Medicines — An Eye Opener for Clinicians, (CR), **119(7):** 59-61.
Parakh A: See **Jindal SK**.
Parakh A: See **Chatterjee S**.
Paramesh H, Mahashur A, Talwar D, Bhargava S, Lele J, Verma S,

- Vadgama P, Vora A, Jayaraman S, Panicker CJ, Pawar S, Shah M:** Pollution-induced Rhinitis and Nasal Health in India, (RA), **119(12):**57-61.
- Paramez AR:** See **Venkitakrishnan R.**
- Pardiwala B:** See **Nasta AM.**
- Pareek KK, Mathur G, Ramchandani GD, Ramchandani R, Mathur D:** Diabetes and Stress, (RA), **119(6):** 41-3.
- Pareek RP:** See **Aggarwal KK**
- Paria TK:** See **Saha SK.**
- Pateel GNP, Kumar PS, Manjunath BS, Somayay R:** Management of Oral Contraceptives Induced Cerebral Venous Thrombosis, Hemorrhagic Infarction Presenting with Left Hemiparesis and Isolated Left Upper Limb Simple Focal Seizures, (C), **119(10):** 68-9.
- Patel AD, Dixit S, Kushwaha RAS, Bajaj DK, Bajpai J, Kant S:** A Rare Case of Idiopathic Pulmonary Fibrosis with Parvovirus B-19 Infection, (CR), **119(8):**49-51.
- Patel B:** See **Mittal K.**
- Patel DD, Sangade VV, Jadhav M, Saraf V, Vasa DS, Rege SA:** Middle Colic Artery Pseudoaneurysms in Acute Necrotising Pancreatitis, (CR), **119(7):** 66-7.
- Patel P:** See **Dave M.**
- Pathania BS, Mahajan D, Abrol S:** Clinical Profile of Incisional Hernia and Minimally Invasive Approach Using Larger Mesh for Repair, (OA), **119(12):**30-5.
- Patil V:** See **Ud giri R.**
- Patir RP, Doley R, Das AK:** A Correlation Study between Red Cell Distribution Width and Ranson Score in Predicting Severity and Outcome of Acute Pancreatitis, (OA), **119(10):** 22-5.
- Patolia H, Patolia S:** The Resumption and Management of Bariatric surgical Procedures and Postoperative Care during COVID-19 — A Single Surgeon Experience from India, (RA), **119(5):** 28-30.
- Patolia S:** See **Patolia H.**
- Patra S:** See **Gantait K.**
- Paul R, Pal J:** How to conduct clinical trial during an Epidemic : Lessons from the WHO Solidarity Trial, (Perspective), **119(1):** 84.
- Paul R, Pal J:** Waldemar Mordechai Wolff Haffkine, (History : Remembering the Stalwart), **119(1):** 85.
- Paul R:** Gene editing as treatment for inherited haemolytic anemia: Is the future here? (Perspective), **119(2):** 60.
- Paul R:** Native Medical Institution : The first footprint of British Medical Education in India, (MH), **119(1):** 80-3.
- Paul T, Das P, Bhattacharjee P, Das D:** A Study of Serum Magnesium and Serum Zinc Concentration In Type 2 Diabetes Mellitus Patients with and without Diabetic Nephropathy, (OA), **119(1):** 52-5.
- Pawar S:** See **Paramesh H.**
- Pawar SD, Tandale BV, Tare DS, Keng SS, Kode SS, Abraham P:** Classical and Molecular Virology in the Context of SARS-CoV-2, (RA), **119(1):** 24-30.
- Pelleti PK:** See **Mittal K.**
- Petare A:** See **Chatterjee S.**
- Petare AU:** See **Pai P.**
- Petare AU:** See **Rout AK.**
- Phatale R:** See **Gandhi A.**
- Phillip S:** See **Venkitakrishnan R.**
- Pillai M:** See **Aggarwal KK**
- Pillai SM, Jayakrishnan MP, Arora T, Jayaraj KM, Sakthivelayutham S, Sowmini PR, Kumar MS, Saravanan RV, Mugundhan K:** Moya Moya Disease — A Rare Case of Stroke in Children, (PCME), **119(1):** 76-7.
- Pillai SM, Jayakrishnan MP, Arora T, Malcolm JK, Kumar MS, Velayutham SS, Sowmini PR, Saravanan VR, Mugundhan K:** Foot Drop as the Initial Presentation of Amyotrophic Lateral Sclerosis, (PCME), **119(4):** 63-4.
- Pinto V:** See **Kumar P.**
- Poddar A, Tantia O, Khanna S:** Double Cystic Duct : Case Report of a Rare Presentation in a Common Operation, (RA), **119(10):** 55-7.
- Poddar A:** Mediquiz (2/2021), (Mediquiz), **119(2):** 61 & 72.
- Ponoth P:** See **Gikonyo A.**
- Prabhu RD:** JIMA : Vol 119, No 6, June, 2021, (C), **119(7):** 94.
- Pradhan R:** See **Mandal PK.**
- Prajapati M:** See **Sharma D.**
- Prakash B:** See **Aggarwal KK**
- Prakash P:** See **Pai P.**
- Pramod G:** See **Pai P.**
- Prasad A:** See **Gupta S.**
- Priya J:** See **Kumar S.**
- Priyadarsani G:** See **Ramya N.**
- Purna P:** See **Ravichandran R.**
- Purnan N:** See **Pandey A.**
- R**
- R Chungoo :** JIMA, October 2021, Editorial, (C), **119(11):** 78.
- Raha SB:** See **Sengupta M.**
- Rahman MA:** See **Adhikari MK.**
- Rahman MDF:** See **Arulhaj S.**
- Rai DR:** See **Aggarwal KK**
- Rai HV:** See **Sen SK.**
- Rai S:** See **Srivastava A**
- Raina R:** See **Panwar P.**
- Rajan CS:** Calling the Shots : A CS note on Covid Specific Vaccination, (C), **119(2):** 73.
- Rajesh S:** See **Sen SK.**
- Rakshit K:** See **Das S.**
- Ramasubramanian:** See **Arulhaj S.**
- Ramchandani GD:** See **Pareek KK.**
- Ramchandani R:** See **Pareek KK.**
- Ramesh J, Mahato S, Seth A, Debnath E:** Thyroid Autoimmunity in Children and Young Adults with Type 1 Diabetes and Their Siblings, (OA), **119(12):**51-4.
- Ramya N, Priyadarsani G, Sowmini PR, Kumar MS, Malcolm JK, Sakthivelayutham S, Viveka SR, Mugundhan K:** Autoimmune Encephalitis (Anti NMDA Receptor Antibody Encephalitis) — Our Experience, (CR), **119(11):** 57-9.
- Ranjan A, Bagchi AS, Barman TP, Pal SK, Tarenia S:** Atypical Hemolytic Uremic Syndrome in Snake Bite : An Often Missed Entity, (CR), **119(7):** 62-5.
- Rao Boratne AV:** See **Mageshwari M.**
- Rao TB:** See **Das S.**
- Rao VG, Bhat J, Yadav R:** End TB by 2025 : Tribal Perspective,(C), **119(6):** 99.
- Rashi R:** See **KumarA.**
- Rather AA, Hassan Y, Rather SA:**Laparoscopic Management of Acquired Diaphragmatic Hernia, (CR), **119(4):** 55-8.
- Rather SA:** See **Rather AA.**
- Rathi HK:** See **Dalal AK.**
- Rathod R:** See **Das S.**
- Rathod R:** See **Mittal K.**
- Rathod R:** See **Ruke M.**
- Ravichandran R, Purna P, Vijayaraghavalu S, Kalavakollu RT, Gaidhane S, Kumar RK:** Use of Indomethacin in COVID-19 Patients — Experience from Two Medical Centres, (OA), **119(7):** 42-6.
- Ray AN:** See **Bala B.**
- Ray G, Keith I:** Transient Loss of Consciousness (TLOC) — A Low-risk High Stakes Condition that Every Physician must know How to Manage, (RA), **119(4):** 34-8.
- Ray I:** See **Agarwal V.**
- Ray I:** See **Chatterjee S.**
- Ray K, Greenhouse S:** Turbulent Time in Healthcare and Tide-less Trends in Leadership — Let us Create a Small Ripple, (RA), **119(2):** 36-8.
- Ray K, Halder SK, Das S:** Mediquiz - 01 / 2021, **119(1):** 86-7.:
- Ray PS:** New Strain SARS CoV2, (RA), **119(1):** 31-6.
- Ray R, Chatterjee S:** Institutional Guidelines for Safe Surgery in HIV Patients in a Government Medical College, (RA), **119(11):** 38-41.
- Ray S:** JIMA(Volume XX, No 3, December, 1950, Page 106-9), (Archive), **119(2):** 56.
- Reddy GRM:** See **Sen SK.**
- Reddy P:** See **Das S.**
- Reddy PPM:** See **Rout AK.**

- Rege SA:** See **Patel DD**.
Rewari H: See **Mehta DD**,
Reza S: See **Kumar S**.
Rhaji SA: Corona Third Wave — Predictions & Preparedness, (VE), 119(6): 68-71.
Rout AK, Chaudhary AH, Mittal AK, Arunprasath A, Kanwate D, Reddy PPM, Seetharam V, Mudgal VK, Petare AU, Kannaiah R: Wound Care in COVID-19, (Spl A), 119(5): 86-8.
Roy A: See **Bhakta SK**.
Roy A: See **Sengupta M**.
Roy Chowdhury A: Hematology, (Mediquiz), 119(3): 67 & 9.
Roy D: See **Bala B**.
Roy DS: See **Gupta S**.
Roy H: See **Das S**.
Roy H: See **Pal S**.
Roy K: See **Dutta S**.
Roy L: Gynecology, (Mediquiz 04/2021), 119(4): 77-8 & 82.
Roy M: See **Adhikari A**
Roy P: See **Jain M**.
Roy S, Bhattacharya A, Majumdar NK, Dolui A, Bhattacharya S: Comparative Analysis of Efficacy & Safety of Prostaglandin - Timolol Fixed Combination versus Adding Ripasudil to Prostaglandin in Primary Open Angle Glaucoma Patients with Insufficient IOP Control with Prostaglandin Analogue Monotherapy — An Open Label, Randomised Study, (OA), 119(7): 22-6.
Roy S, Borse AG, Mitra A, Roy T, Mondal PK, Mitra KK: Percutaneous Transluminal Coronary Angioplasty in a COVID-19 Positive Patient with Dextrocardia : A Case Report, (CR), 119(9): 70-1.
Roy T: See **Roy S**.
Roy UK: See **Bala B**.
Ruke M, Sharma A, Saikia R, Agrawal TC, Maskara RK, Togale MD, Rathod R, Seetharam V: New Modalities and challenges in diabetic foot management, (Spl A), 119(5): 64-9.
Rupali P: See **Murugesan M**.
Ruwanpura R: See **Arachchi SD**.
S
Saboo B: See **Shah M**.
Saha B: See **Sarkar D**.
Saha B: See **Saha PS**.
Saha I: See **Ghosh S**.
Saha M: See **Biswas D**.
Saha PS, Chakraborti R, Chowdhury A, Chattopadhyay S, Mondal S, Gupta B, Saha B, Bandyopadhyay B: Orientia tsutsugamushi — A Leading Cause of AES in West Bengal, India, (OA), 119(6): 22-6.
Saha R: See **Misra S**.
Saha R: See **Bhattacharyya S**.
Saha S, Sherpa PL, Ghosh N, Mandal B: Precautionary Behaviour for COVID-19 among General Population in Hills, West Bengal, India : A Pilot Study, (OA), 119(2): 22-5.
Saha S, Singha A, Mitra A: Study on Serum Gamma Glutamyl Transferase (GGT) level as a Risk Factor in Acute Stroke Presenting in a Tertiary Care Hospital, (OA), 119(2): 19-21.
Saha S: See **Pal S**.
Saha SK, Chandra A, Paria TK, Hati A: COPD : A Case Based Approach to the Clinician in Light of GOLD 2021, (RA), 119(6): 50-5.
Sahoo MR, Sethi MK, Das Poddar KK: The Tunnel Approach versus Medial Approach in Laparoscopic Right Hemicolectomy for Right Colon Cancer : A Retrospective Analysis, (RA), 119(10): 50-4.
Saikia R: See **Ruke M**.
Sakthivelayutham S: See **Pillai SM**.
Sakthivelayutham S: See **Ramya N**.
Samajdar SS, Ghosh S, Dasgupta S, Pal J, Joshi SR, Tripathi SK: Mask for All — Physical & Immunological Barrier of COVID 19! (RA), 119(4): 50-4.
Samanta SK: Thalassaemia, (SplC), 119(6): 77-83.
Samashaptak, Das P, Bhattacharyya S, Banerjee A: CRISPR-cas Methods : Culminating in Crescendo of the COVID-19 Pandemic to FELUDA Test, (RA), 119(7): 51-8.
Sangade VV: See **Patel DD**.
Saraf V: See **Patel DD**.
Saraiya UB, Shah N: Folic Acid Therapy Completes 9 Decades — Originated in India, (RA), 119(2): 33-5.
Saravanan RV: See **Mugundhan K**.
Saravanan RV: See **Pillai SM**.
Saravanan VR: See **Pillai SM**.
Sardana V: See **Jain N**.
Sarkar A: See **Sengupta RS**.
Sarkar D, Saha B, Datta S: Study on Perinatal Outcome in Relation to Maternal Vitamin D Deficiency, (OA), 119(8):21-4.
Sarkar S: See **Bose B**.
Sarkar S: See **Mohan S**.
Sarma A: See **Jagtap VK**
Sasidharan PK: Reorienting Medical Education in India — Absolutely Essential. (C), 119(1): 95-6.
Sasidharan PK: What Should be the Future of Medical Practice in India? (VE), 119(3): 45-7.
Sathaye CB: See **Uikey S**.
Sathyendra S: See **Murugesan M**,
Saw Mondal RR: See **Gupta S**.
Saxena R: See **Gandhi A**.
Seetharam V: See **Rout AK**.
Seetharam V: See **Ruke M**.
Sekhar H: See **Gupta S**.
Sen I: Epistemological Principles of Medicine in India — A Historical Overview, (MH), 119(3): 60-6.
Sen SK, Mishra B, Reddy GRM, Rai HV, Krishnamurthy G, Tulaskar N, Rajesh S, Veligandla KC: Pressure Ulcers Simple Way of Management (Spl A), 119(5): 74-6.
Sengupta M, Roy A, Raha SB, Chakraborti S, Mukhopadhyay I: Unified by COVID-19 : Healthcare Lessons Learned from USA, China and India, (RA), 119(9): 39-46.
Sengupta RS, Sengupta U, Ghosh A, Chakraborty S, Sarkar A, Mondal S: A Study of Clinical Presentations of Chronic Lead Poisoning In Adult, (OA), 119(8): 13-7.
Sengupta U: See **Sengupta RS**.
Senthil RS: See **Anirudh**.
Seth A: See **Ramesh J**.
Setha A: See **Mittal K**.
Sethi MK: See **Sahoo MR**.
Shah K: See **Uikey S**.
Shah M, Saboo B: Type 1 Diabetes with Nodding Syndrome, (CR), 119(6): 62-4
Shah M: See **Mondal S**.
Shah M: See **Paramesh H**.
Shah N: See **Saraiya UB**.
Shah U: See **Muthuswaraiyah Y**.
Shannawaz M: See **Udgiri RS**.
Sharan A: See **Mukhopadhyay S**.
Shararooni SA: See **Mittal K**.
Sharma A: See **Gupta L**.
Sharma A: See **Ruke M**.
Sharma D, Meena S, Anand G: Acute Abdomen — Case Based Approach For Clinicians, (CDS), 119(3): 50-3.
Sharma D, Solanki AS, Prajapati M: Analysis of Hematological and Biochemical Parameters as Diagnostic Test for Malaria in Patient with Acute Febrile Illness, (OA), 119(9): 32-4.
Sharma D: See **Agarwal V**.
Sharma JB, Gupta S, Kriplani A, Arava S, Tomar S: Hypertrophic Tuberculosis of Vulva — An Unusual Case Report, (CR), 119(2): 41-2.
Sharma PK: See **Chakraborty S**.
Sharma R: See **Aggarwal KK**
Sharma SK: See **Jain N**.
Sherpa PL: See **Saha S**.
Shrivastava RP, Desai JR, Bagasrawala S: Mesh Migration into the Urinary Bladder with Calculi Formation and a Vesico-cutaneous Fistula after Inguinal Hernia repair — A Rare Case Report, (CR), 119(3): 42-3.
Shroff S: See **Abraham G**.

Shukla A, Kher V: Revisiting the Efficacy and Safety of Ranitidine, (DC), **119(11):** 66-73.

Singh A: see **Ghosh SK**

Singh AK: See **Singh DP.**

Singh DP, Ghosh SK, Kumar P, Singh AK, Kumar K: Study of Genetic Mutation Exhibiting Resistance to Rifampicin and Isoniazid in the Tuberculosis Cases of Eastern Region of Bihar, (OA), **119(7):** 17-21.

Singh DP: See **Ghosh SK**

Singh M, Immanuel G, Kannan A: Antimicrobial Susceptibility Profile of Staphylococcus aureus Isolates Obtained from Skin and Soft Tissue Infections : A Real-World Study Based on a Large Diagnostic Laboratory Data, (OA), **119(3):** 21-6.

Singh M: See **Pandey A.**

Singh R: See **Mukhopadhyay K.**

Singha A: See **Mondal S.**

Singha A: see **Saha S.**

Sinha AK: See **Kumar B.**

Sinha AK: See **Kumar A.**

Sivakumar A: See **Pai P.**

Sivasangeetha K: See **Jacob SM.**

Slong D: See **Jagtap VK**

Solanki AS: See **Sharma D.**

Somayay R: See **Pateel GNP.**

Sowmini PR: See **Mugundhan K.**

Sowmini PR: see **Pillai SM.**

Sowmini PR: See **Pillai SM.**

Sowmini PR: See **Ramya N.**

Srivastav R: See **Goyal G.**

Srivastava A, Rai S: Effect of Deranged Thyroid Profile on Glycated Hemoglobin : Pre and Post Treatment, (OA), **119(5):** 13-5.

Srivastava A: See **Varshney R.**

Srivatsan V: See **Muthuswaraiyah Y.**

SS Samajdar, Moitra S, Joshi SR, Tripathi SK: Are COVID-19 Survivors Likely to be Better Poised to Prevent Cancer or to Cope with it ? — A Contesting Viewpoint, (SC), **119(10):** 63-4.

Subramanian N: Update on Immunological aspects of COVID-19 Infection, (RA), **119(11):** 44-7.

Suma SV: See **Gupta L.**

Sundaralingam: See **Arulhaj S.**

Sureshkumar S: See **Gurushankari B.**

Sushi KM: See **Jacob SM.**

Swaminathan K, Muruganathan A: Point of View — Diabetes & Cardiovascular Disease in Rural India : A Hidden Link? (RA), **119(11):** 42-3.

T

Talwar D: See **Paramesh H.**

Tamilselvi A: See **Abraham G.**

Tantia A, Chatterjee S, Khanna S, Kapoor P, Banerjee MS, Mukherjee U: Struma-ovarii — Literature Review and A Case Report of Malignant Struma-ovarii , (CR), **119(6):** 65-7.

Tantia O: See **Poddar A.**

Tapas D: See **Kumar P.**

Tarenia S: See **Ranjan A.**

Teny R: See **Gikonyo A.**

Tewary K: Artificial Intelligence, (C), **119(4):** 84.

Thangkhiew L: See **Jagtap VK**

Thomas A: See **Aggarwal KK**

Thomas J: See **Madan J**

Tiwari AK: See **Ghosh SK**

Tiwari B: See **Kumar P.**

Togale MD: See **Ruke M.**

Tomar S: See **Sharma JB.**

Tongper D: See **Jagtap VK**

Topn N: See **Jagtap VK**

Toraskar K: See **Nasta AM.**

Totaganti M: See **Panwar P.**

Tripathi S: See **Aggarwal KK**

Tripathi SK, Samajdar SS: The Re-Emerging Pandemic — What's Urgently Needed in West Bengal? (C), **119(4):** 84-5.

Tripathi SK: See **Samajdar SS.**

Tripathi SK: See **SS Samajdar.**

Tulaskar N: See **Sen SK.**

U

Udgiri R, Patil V: Perception of Foundation Course Curriculum by the Faculty of Medical Colleges, (OA), **119(12):**25-9.

Udgiri R: JIMA, September, 2021, (C), **119(12):** 98.

Udgiri RS, Biradar SG, Shannawaz M: Assessing Impact Event Scale of Posttraumatic Stress Disorder of COVID-19 Pandemic among Postgraduates Working at Tertiary Care Hospital — A Cross-sectional Study, (OA), **119(4):** 19-23.

Uikey S, C Rex, Sathaye CB, Shah K, Chaudhari O, Nahar A, Jain R: Effectiveness and Safety of Nefopam in Indian Patients with Acute Traumatic Pain, (DC), **119(8):** 59-62.

Ukil S: See **Halder P.**

Umesha C: See **Chatterjee S.**

Unnikrishnan VV, Varghese S: Impact of COVID-19 Pandemic on Health Science Educational Institutions in Kerala, (OA), **119(10):** 18-21.

Upadhyay R: The Crisis — Concerns And Solutions, (VE), **119(5):** 52-3.

Urabe MU: See **Aggarwal KK.**

Utture SS: See **Aggarwal KK.**

V

Vadgama P: See **Paramesh H.**

Vajpayee VMG: See **Dixit HN.**

Valsalan P: See **Venkitakrishnan R.**

Valsan A: See **Murugesan M.**

Valson AT: See **Murugesan M.**

Varghese S: See **Unnikrishnan VV.**

Varshney R, Dutta S, Srivastava A, Aggarwal A, Giri S, Goel A: SARS-COV-2 Vaccines : A Systematic Review, (RA), **119(6):** 56-9.

Vasa DS: See **Patel DD.**

Velayutham SS: See **Mugundhan K.**

Velayutham SS: See **Pillai SM.**

Veligandla KC: See **Kamat M.**

Veligandla KC: See **Muthuswaraiyah Y.**

Veligandla KC: See **Sen SK.**

Venkitakrishnan R, Valsalan P, Paramez AR, Ahmed S, Kunoor A, Philip S, Chinda M: Baricitinib : Delineating a New Treatment Option in COVID-19, (DC), **119(7):** 89-93.

Verma S, Chaudhry NK: Diagnostic Laparoscopy — A Useful Diagnostic Tool, (RA), **119(12):** 62-6.

Verma S: See **Paramesh H.**

Vijayabanu U: See **Kumar S.**

Vijayaraghavalu S: See **Ravichandran R.**

Vinda Z: See **Kumar P.**

Viveka SR: See **Ramya N.**

Vora A: See **Paramesh H.**

Vyas B, Mehta P, Vyas RB, Waghela P, Marathe A: Research Innovation for Osteoarthritis Knee by Adipose Derived Stromal Vascular Factor with Platelet Rich Plasma, (OA), **119(4):** 24-8.

Vyas RB: See **Vyas B.**

W

Waghela P : See **Vyas B.**

Wander GS: "Challenges in Medical Education in India" (JIMA, Vol 118, No 12, December, 2020), (C), **119(1):** 96.

Wankhedkar R: Future of COVID-19, , (SA), **119(11):** 62-5.

Wankhedkar R: Participation of Private Sector in COVID-19 vaccination, (VE), **119(3):** 44.

Y

Yadav R: See **Rao VG.**

Z

Zin KT: See **Kumar S.**

We thank all the Hon'ble Referees who contributed a lot during the year 2021



Dr Abhimanyu Basu
Surgery, Bengal



Dr Alakendu Ghosh
Rheumatology, Bengal



Dr Aniruddha Sengupta
Orthopaedics, Bengal



Dr Anita Babasaheb Tandale
Dentistry & Endodontics, MS



Dr Anjan Adhikari
Pharmacology, Bengal



Dr Anshuman Poddar
Surgery, Bengal



Dr Anup Kr Sadhu
Radiology, Kolkata



Dr Anurag Srivastava
Surgery, Delhi



Dr Arnab Gupta
Surgical Oncology, Bengal



Dr Arunabha Sen
General Physician, WB



Dr Arup Das Biswas
Cardiology, Bengal



Dr Ashish Kr Basu
Endocrinology, Kolkata



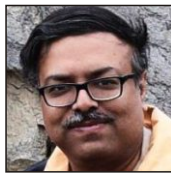
Dr Ashish Saha
Medicine, Bengal



Dr Asoke Ghoshal
Dermatology, Kolkata



Dr Alanu Chandra
General Medicine, WB



Dr Avijit Hazra
Pharmacology, Bengal



Dr Biswarup Bose
Surgery, Bengal



Dr Bitan K Chattopadhyay
Surgery, Kolkata



Dr Bibhuti Saha
Tropical Medicine, Kolkata



Dr Biswajit Sukul
FMT, WB



Dr Chandan Chatterjee
Pharmacology, Bengal



Dr Chanchal Kr Jana
Medicine, Kolkata



Dr Chandika Banik
Anaesthesiology, Bengal



Dr Dilip Karmakar
Urology, WB



Dr Dilip Kumar Das
Community Medicine, WB



Dr Diptendra Sarkar
Surgery, Kolkata



Dr Dolanchampa Modak
Tropical Medicine, WB



Dr Gautamananda Roy
Stroke Medicine, UK



Dr Girish Mathur
Gen.Physician, Rajasthan



Dr Golokbihari Maji
Orthopaedics, WB



Dr Indranil Chakraborty
Biochemistry, WB



Dr J B Sharma
Obs.& Gynae, Delhi



Dr Joydeep Deb
Chest Medicine, WB



Dr K Mugundhan
Neurology, Chennai



Dr Kaushik Saha
Paediatric Surgery, WB



Dr KK Mukherjee
Orthopaedics, Kolkata



Dr Kingshuk K Dhar
Gastroenterology, Kolkata



Dr Krishna Sen
Medicine, WB



Dr Kanai Lal Karmakar
Nephrology, WB



Dr Kumkum Bhattacharya
Microbiology, WB



Dr Lopamudra (Dhar)
Chaudhuri, Pharmacology, WB



Dr M Abdullah Al Mamun
Surgery, Dhaka



Dr Minnal Kanti Roy
Neurology, WB



Dr M L Saha
Surgery, WB



DrMadhumita Mukhopadhyay
Surgery, WB



Dr Maitreyee Bhattacharya
Haematology, WB



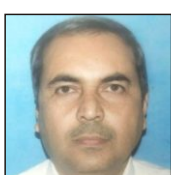
Dr Meenakshi Girish
Pediatrics, Maharashtra



Dr Malay Kumar Ghosal
Psychiatry, WB



Dr Malay Mundle
Community Medicine, WB



Dr Manas Banerjee
Internal Medicine, WB



Dr Manab Nandy
Pharmacology, Kolkata



Dr Mriganka Ghosh
General Surgery, Kolkata



Dr Manas Kr Gumta
Surgery, WB



Dr Milan Chakraborty
Medicine, WB



Dr N Subramanian
Rheumatology, TN



Dr Nema C Nath
Surgery, Kolkata

We thank all the Hon'ble Referees who contributed a lot during the year 2021



Dr Nur Hossain B Sahin
Surgery, Bangladesh



Dr O P Singh
Psychiatry, Kolkata



Dr Om Tantia
MA & B Surgery, WB



Dr Prosenjit Mondal
Vitreoretinal Surgeon, WB



Dr Pratip Kr. Kundu
Microbiology, Kolkata



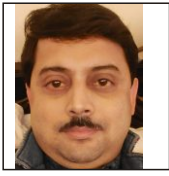
Dr Partha S Karmakar
Medicine, Kolkata



Dr Partha Ray
Neurology, UK



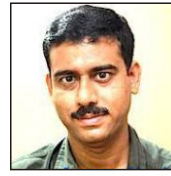
Dr Rajdeep Singh
Surgery, Delhi



Dr Ranjan Bhattacharyya
Psychiatry, Bengal



Dr R.N.Sarkar
Medicine, Bengal



Dr Rana Bhattacharya
Endocr. & Metabolism, WB



Dr Rita Pal
Anaesthesiology, WB



Dr Rudrajit Paul
Medicine, Kolkata



Dr Santanu Kr Tripathi
Pharmacology, WB



Dr Sajal Datta
Obstetrics & Gynae, WB



Dr Samarendra K Basu
Obs. & Gynaecology, WB



Dr Sanjay Kalra
Endocrinology, Karnal, Hr



Dr Samit Samanta
Haematology, WB



Dr S B Ganguly
Medicine, WB



Dr S P Dey Sarkar
Gastroenterology, WB



Dr S K Jindal
Pulmonology, Chandigarh



Dr Sandip Gosh
Medicine, Bengal



Dr Sanjoy Banerjee
Gastroenterology, WB



Dr Sarbajit Roy
Medicine, WB



Dr Sattik Siddanta
Endocrinology, WB



Dr Shambo S Samajdar
Clinical Pharmacology, WB



Dr Shashank R Joshi
Endocrinology, Mumbai



Dr Shiva K. Misra
Surgery, UP



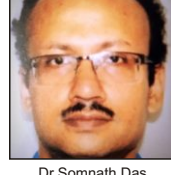
Dr Shohael Md Arafat
Medicine, Dhaka



Dr Shobha Sehgal
Immunopathology, Chandigarh



Dr Soma Saha
Medicine, Agartala



Dr Somnath Das
FMT, WB



Dr Soma Gupta
Biochemistry, WB



Dr Somnath Mukherjee
Ophthalmology, Bengal



Dr Soumitra K Ghosh
Medicine, Kolkata



Dr Soumitra Roy
Cardiology, Kolkata



Dr Soumen Das
Surgical Oncology, WB



Dr Subhankar Bhattacharya
Cardiothoracic Surgery, WB



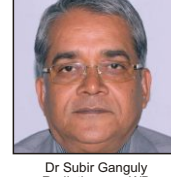
Dr Subhas Ch Biswas
Obs. and Gynae, WB



Dr Subhasish K Guha
Tropical Medicine, WB



Dr Sukanta Chatterji
Paediatrics, Kolkata



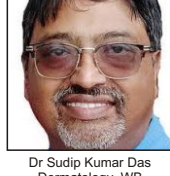
Dr Subir Ganguly
Radiotherapy, WB



Dr Sudhir Mehta
Medicine, Rajasthan



Dr Sudip Kumar Das
ENT, WB



Dr Sudip Kumar Das
Dermatology, WB



Dr Sujay Maitra
Paediatric Surgery, WB



Dr Supriyo Sarkar
Respiratory Medicine, WB



Dr Sutapa Roy
Ophthalmology, WB



Dr Subhankar Home
Ophthalmology, Kolkata



Dr Subhash C Biswas
Obs. & Gynae, Kolkata



Dr Surya Kant
Respiratory Medicine, UP



Dr Tapan K Naskar
Obs. & Gynae, WB



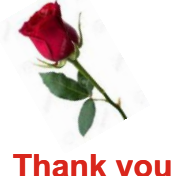
Dr Tuphan K Dolai
Haematology, Kolkata



Dr Udas Ch, Ghosh
Medicine, Kolkata



Dr V G Pradeep Kumar
Neurology, Kerala



Thank you

Allergy Test From Blood Sample Only

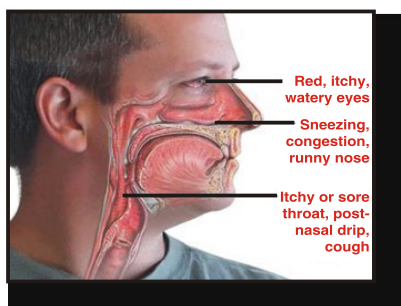
INDIA'S LEADING INVITRO ALLERGY TESTING LABORATORY

For all allergies such as: Asthma, Rhinitis, Skin Allergies, Itchy-watery eyes, Gastrointestinal problems, Mouth ulcer. Veg-Nonveg Food, Dust Mite, Indian Pollens, Aspergillus, Contact and Drug Allergens tested by CAPTURED ELISA Method.

Simple, Safe and Convenient blood test in all ages of patients.

Over 6,75,000 Samples processed.

Customized Immuno therapy available (Injectable).



**Endocrine and Allergy
Laboratory Pvt. Ltd.**



MC-4440

- 📍 108, West Face, Opp. Indian Overseas Bank, Near Baghban Party Plot, Thaltej-Hebatpur Road, Thaltej, Ahmedabad - 380059. ✉ endoallergy@yahoo.com 🌐 www.ealabs.co.in
 ☎ 9099045241 / 9099045247 / 07043064003 / 07043064004 / 8488997165 / 8488997186

PLEASE CONSULT YOUR DOCTOR & YOU MAY GIVE BLOOD SAMPLE TO YOUR NEAREST LABORATORY.

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION :

Sir Nilratan Sircar IMA House, 53, Sir Nilratan Sarkar Sarani (Creek Row), Kolkata - 700 014
Phone : (033) 2237- 8092, Mobile : +919477493027; E-mail : jima1930@rediffmail.com
Website : <https://onlinejima.com> ; www.ima-india.org/ejima
Head office : Indian Medical Association, IMA House, Indraprastha Marg, New Delhi - 110 002
Telephones : +91-11-2337 0009, 2337 8680, Email : hsg@ima-india.org ; Website : www.ima-india.org

Registration No. KOL RMS / 476 / 2020 - 2022

RNI Regd. No. 2557/1957
Vol. 65, No. 12, December 2021, Kolkata

Date of Publication : 20th December, 2021

In medical practice, common cold is the most prevalent sickness¹

In treatment of common cold & flu

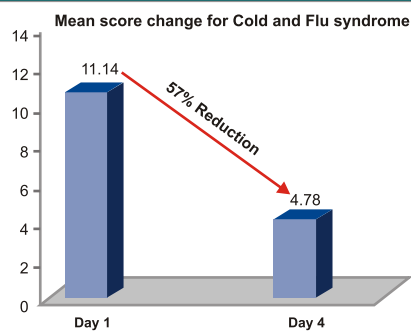


Rx **Flucold**
Tablets

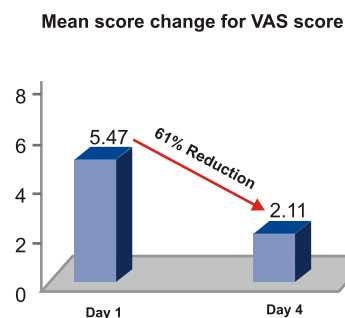
Paracetamol 500 mg + Phenylephrine HCL 10 mg + Chlopheniramine Maleate 2 mg

Knocks Flu ... Knocks Cold

57% Reduction in Symptomatic Relief of Cold & Flu*



61% Reduction in Severity of Cold & Flu on Visual Analog Score (VAS)*



1. Mossad SB. Treatment of the common cold. *BMJ*. 1998;317:33-36

* JIMA Dec' 2021



Mktg. Off: A-303, Floral Deck Plaza, Off Central M.I.D.C. Road, Andheri (East), Mumbai - 400093, India.
Ph: +91 22 - 68311100; Fax: +91 22 - 2839 0733; www.wallace.com

If not delivered please return to
Journal of the IMA (JIMA)
53, Sir Nilratan Sarkar Sarani,
(Creek Row), Kolkata - 700014

Printed and Published by **Dr Sanjoy Banerjee** on behalf of Indian Medical Association and printed at Prabaha, 45, Raja Rammohan Sarani, Kolkata - 700009 and Published from Sir Nilratan Sircar IMA House, 53, Sir Nilratan Sarkar Sarani (Creek Row), Kolkata 700014, Editor : **Dr Jyotirmoy Pal**