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CONTENTS

Editorial

End TB by 2025 : Difficult Mission, but Not Impossible

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Whether we ourselves have escaped from the scourge of tuberculosis or not, there is probably hardly a family which has not had to do something with this dreaded disease.

— Pt. Jawahar Lal Nehru , *1st Prime Minister of India*

Tuberculosis (TB), known since Vedic era in India as 'Kshaya Roga' or 'Raj Yakshma', finds similar description by Hippocrates as 'Pthisis' meaning to decay. On 24th March, 1882 that causative organism of TB was discovered by Robert Koch's,hence the disease is also known as 'Koch's disease' and 24thMarch is celebrated as 'World TB Day'[1].

The basics of TB treatment are Nursing Care, Fresh Air and Good Nutrition, first described in Ayurveda and later on adopted by modern medicine as "Sanatoria Treatment". Chemotherapy era started in 1944, when Wakesmann discovered Streptomycin and since then few more drugs came into light, last being Rifampicin in 1980's. Then after a long gap of nearly 40 years Bedaquiline and Delamanid in recent years[2-4].

Resurgence of TB occurred in late 80's, mainly due to Human Immunodeficiency Virus (HIV) and in 1993 World Health Organization (WHO) declared TB as 'GLOBAL EMERGENCY' due to rising problem globally, it's association with HIV and increasing drug resistance. Now it showed the incidences of TB as 140 per lakh population globally, whereas, it is 211 per lakh population in India. Deaths due to TB are 22 per lakh globally and 33 per lakh in India., HIV TB cases are 14 per lakh globally and 6.6 per lakh in India. The estimated Multiple Drug Resistance (MDR) or Rifampicin Resistant TB cases rested at 8.1 per lakh globally and in India it is 11 per lakh population[5,6].

Approximately, half of the population is infected and one- fourth of the global annual new cases occur in India. Prevalence of TB is 3.2 million in India and incidences is 2.7 million new cases annually ie, more than 6000 people develop TB every day in India which amounts to more than 4 people developing TB every minute! About 4 lakh 23 thousands patients die due to TB every year which amounts to more than thousands deaths per day and one child everyday. There are about one lakh forty seven thousand patients of MDR-TB in India. Incidence of Multi Drug Resistant (MDR)-TB is 6.19% in all patients (2.84% in new and 11.6% in among previously treated)[7,8].

If we look at the evolution of TB control in India, we find that National TB programme was first instituted in 1962. The programme was next reviewed in 1992 which saw that only 30% of patients were diagnosed and of these only 30% were treated successfully and hence the programme was declared as failed programme. These alarming figures gave birth to NTEP (Erstwhile RNTCP) pilot project in 1993. After the initial success, the NTEP project was scaled up in 1997 and finally on 24thMarch 2006, the entire country was covered under NTEP. The first National Strategic Plan for TB control was initiated for 2012-2017 to achieve universal access to quality TB diagnostics and treatment having guided activities and creating accountability against results. The Government of India, in May 2012, passed a mandate for all healthcare providers to notify every TB case diagnosed and/or treated, to local authorities. The national programme also rolled out an innovative and visionary electronic recording and reporting system (Nikshay) across the country in 2012. The need for mass-communication was addressed by the launch of Amitabh Bachchan's campaign, "TB Harega Desh Jeetega" on 24thMarch 2015. With this nationwide campaign of India Vs TB, our country has come a long way towards TB elimination[9].

The real way forward has been shown to us by our Hon'ble Prime minister Shri Narendra Modi ji by organising the 'END TB SUMMIT' in Delhi on 13th March 2018 along with Dr Tedros Adhanom Ghebreyesus, Director-General of WHO.[10]

The Ministry of Health and Family welfare (MOHFW) in consultation with over 150 national and international experts working in the field of public health as well as private sectors finalized the new National Strategic Plan for TB 2017-2025 (NSP)[11].

WHO definition of TB elimination implies reducing cases of TB to less than 1 per 10 Lacs population. Keeping this in mind, a vision of TB-Free India with zero deaths, disease and poverty due to TB is seen. The goal of this NSP is to achieve a rapid decline in burden of TB, morbidity and mortality while working towards elimination of TB in India by 2025. The requirements for moving towards TB elimination have been integrated into the four strategic pillars of "Detect – Treat – Prevent – Build" (DTPB).

Active case finding activity (ACF) among vulnerable groups is a focus over the next 5 years and considerable efforts are being made to reach these populations. The prioritization of vulnerable groups for screening and ACF has been formulated for urban, rural and tribal areas[12-14].

Different choices for information and communication technologies (ICT) based treatment adherence support mechanisms like introduction of Real Time Medication Event Reminder Monitor (RT-MERM) and automatic pill counter have been introduced. The 'Nikhshay Poshan Yojana' launched by Government of India in March, 2018, aims to provide incentive of 500 rupees per month for the entire duration of treatment for nutritional support to TB patients. It has been implemented via a smart card linked to Aadhar which provides for a tamper proof storage of patient account and identity. To increase private sector involvement in TB control, every private doctor is being given incentive of Rs 1000 at the completion of treatment which he has notified.

Government of India declared TB a notifiable disease on 7th May 2012. Sticking to its earlier policy GOI took a harsher step towards TB control by issuing the gazette notification of MOHFW on 16th March, 2018 (published on 19th March). As per the gazette notification of MOHFW, clinical establishment – doctors, laboratories, pharmacists, chemists and druggists, that fails to notify TB patients will be booked under Sections 269 and 270 of the Indian Penal Code that carries a jail from six months to two years or a fine or both along with financial penalty. Government of India has taken all the steps after change of END TB by 2025 by our Honorable Prime Minister. However, malnutrition, Diabetes, Mellitus and Drug Resistance are the big challenges for this END TB mission[15-17].

We, as a country have already eradicated polio. In the process we have learnt that having brand ambassador at state level, involvement of social, religious and local leaders in the awareness campaign, involvement of print and electronic media in spreading awareness, nukkadnataks, distribution of pamphlets, wall writings, folk dance etc to spread awareness in villages and remote places like tribal areas have brought us closer to our goal of eradication in much less time. We need to implement these learnings in our mission to eliminate TBalso.

The name of Revised National Tuberculosis Control Program (RNTCP) has been changed to National Tuberculosis Elimination Program (NTEP)on 30th December 2019. This Gesture is also in accordance with the Mission END TB 2025[18].

We all should join hands to make India TB Free and get rid of our country from this dreaded disease.

"END TB by 2025".

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Original Article

A Retrospective descriptive study of snake bites in the medicine wards of Alipurduar hospital, West Bengal, India, from April 2013 to March 2014

Hari Shankar Pathak[1], Tanuka Mandal[2], Tanushree Mondal[3], Partha Pratim Das[4], Uddalak Chakraborty[5], Tarun Kumar Paria[5], Purbasha Biswas[5]

Snake bite is an important cause of accidental death in modern India and its public health importance has been underestimated. West Bengal is one of the high snake bite prevalence states of India. Alipurduar district, a heavily riverine forested district with huge areas of agricultural land, large number of tea gardens reports a considerable number of snake bites annually and 13 species of venomous snakes have been reported from here. No data on snakebite epidemiology, clinical profile and mortality in Alipurduar district is available yet. We conducted a hospital based retrospective descriptive study of 160 patients admitted with history of snake bite in the medical wards of the Alipurduar District Hospital over a period of 12 months. Details of the history including time and place of bite, clinical findings including local and systemic features of envenomation, tests performed, provision of Anti-Snake Venom and supportive medications and outcomes were obtained from the hospital records. 75% of the patients were from rural areas including tea gardens. 71.2% were males and 70% of the persons in the 30-49 years age group were affected. Seasonal variation in snake bite was seen with a peak in June-July. 70% of the snakebites had no features of envenomation and 60% of the bites occurred during the day time the lower limbs being bitten the most (83%). 70% of the snake bite cases were hospitalized within 6 hours of the bite and 88% of them attended government hospital without visiting any traditional healer. 80% of the envenomed cases had neurotoxic features. More than 70% cases had panic attacks and 80% had tight ligature with complications. Community education on prevention of snake bites, appropriate first aid following snake bites and appropriate cum adequate training of medical personnel in syndromic management of snakebites could reduce snake bite morbidity.

[*J Indian Med Assoc* 2020; **118(1):** 11-6]

Key words **: Snake bite, Types of envenomation, Clinical findings of snake bite.**

Snake bite was included in the list of neglected tropical diseases by the World Health Organisation in the year 2009, removed in 2013 and then again reincluded in 2017[1,2]. 'Million Death Study' conducted by the Registrar General of India (RGI) estimates around 50,000 snakebite deaths per year in India based on "routine, representative re-sampled household interview of mortality with medical evaluation (RHIME)"[3]. Snake bite is an important cause of accidental death in modern India and its public health importance has been underestimated with the morbidity estimated to be more than 30 – fold higher than the number declared from official hospital returns[3,4]. West Bengal is one of the high snake bite prevalence states of India besides Andhra Pradesh, Kerala, Tamilnadu and Maharashtra[5]. Incidence of snake bite depends on the frequency of contact between snakes and humans; snake bite occurs when humans move to the habitat of snakes like paddy fields, tea and coffee plantations or when snakes frequent domestic and peri-domestic areas in search of preys like rodents, fowls, etc or during flooding[6]. Alipurduar district which encounters large number of snake bites averaging 600-700 annually, is a heavily riverine forested district with famous wild life sanctuaries and has huge areas of agricultural land and a large number of tea gardens, all of

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which are home to many species of snakes[7,8]. 25 species of snakes are reported to be common in undivided Jalpaiguri district, including Alipurduar (a separate district since June 2014) of which 13 are venomous and 12 non venomous, including Pythons[7]. The common venomous found during an ophiofaunal survey are Naja (Spectacled cobra), Bungarus caruleus (Krait), Naja Hannah (King cobra) and Trimeresurus species (Pit viper)[7]. No hospital based or community based surveys on snake bite epidemiology, clinical profile and mortality in Alipurduar District in the Northern Part of West Bengal, India is available yet. Deaths due to snake bite in India are mainly due to lack of awareness in the community on proper first aid, delay in reaching the hospital, where AVS is available, killing valuable time at the traditional healer's (Ojha) place, lack of confidence of doctors in using AVS infusion, improper protocol for its management, less stress on syndromic approach by doctors and sometimes lack of infrastructure for critically ill patients[9,10].

Aims and Objectives

We aimed to study the epidemiology and clinical aspects of snake bites in and around Alipurduar, West Bengal to identify frequency at the district hospital, which is best equipped to manage snake bites; types of envenomation; sites of bites; signs and symptoms of envenomation; first aid provided at the community level and responses to provision of treatment as per the National and State Snake Bite Management Protocol at the district hospital and suggest measures to strengthen snake bite management in the district.

Methods and Materials

We conducted a hospital based retrospective descriptive study of 160 patients admitted with history of snake bite in the medical wards of the Alipurduar District Hospital over a period of 12 months (April 2013 to March 2014). We recorded the history of snake bite including time and place of bite, species of snake involved, clinical findings including local and systemic features of envenomation, tests performed including the 20 minutes Whole Blood Clotting Test (20 WBCT), provision of Central Research Institute Polyvalent Anti-Snake Venom based on syndromic approach and Injection Atropine, Injection Neostigmine and Injection Adrenaline as outlined in the National and State Snake Bite Management Protocol as well as outcomes from the hospital records of Alipurduar District Hospital with the consent of the Superintendent of the hospital.

Results

Of the total 160 cases admitted with history of snake bite in the medical wards of the Alipurduar District, 114 (71.2%) were males, 36 (28.8%) were females, 112 (70%) were in the age group of 30-49 years , 31 (19.4%) in between 50 to70 years of age and 17 (10.6%) between11 to 29 years of age (Fig 2). 120 (75%) of the patients were from the rural areas, mostly from tea gardens, agricultural and forest villages.

30 (18.8%), 24 (15% and 10 (6.3%) were homemakers, farmers and forest workers respectively while the remaining 96 (60%) included people of various occupations, including 8 (5%) snake charmers and non-working persons.

90 (56%), 41 (25.6%), 19 (11.9%) and 10 (6.3%) of the cases occurred in the months of February-April, May-July, August-October and November respectively (Fig 3).

32 (20%) of the cases were brought within 3 hours of the snake bite, 80 (50%) brought between 3 and 6 hours of the bite and 48 (30%) cases brought after 6 hours of the snake (Fig 4).

96 (60%) of the snake bites took place during the daytime while on outdoor activities, including farming, playing, working in the forest and handling snakes while 32 (20%) snake bites took place at night, mostly on stepping on snakes unknowingly. 32 (20%) of the bites took place when the patients were asleep (Table 1).

134 (83.8%), 16 (10%) and 10 (6.3%) of the bites were in the lower limbs, upper limbs and other parts of the body respectively. 132 (82.5%) of the snake bite victims, including the snake charmers, could not identify the snakes (Fig 4). In 8 (5%) of the cases snakes were brought for identification and 3 cases were identified to be python bites.

128 (80% of the snake bites cases were given tight ligature jeopardizing blood circulation, as well as, improper first aid 140 (88%) of the snakebite victims were brought straight to Alipurduar District Hospital or to other government hospitals and then referred to the Alipurduar District Hospital without contacting any traditional healer.

112 (70%) of the snakebite cases had no features of envenomation. Bite marks with or without fang (two puncture marks) marks were present in 112 (70%) of the cases. 83 (51.9%), 89 (55.6), 96 (60%) and 54 (33.8%) had local oedema, bleeding (generalized or from bite wound), pain and numbness respectively. 32 (20%) of the cases had cellulitis/compartmental syndrome/necrosis at site of bite due to tight ligature and injury and required referral for surgical intervention (Figs 1&5).

128 (80%) cases had panic attacks, including palpitation, chest pain, psychogenic dyspnoea, tremor, etc. 24 (15%) had neurological signs and symptoms, including ptosis, weakness of the limbs, aphasia, aphonia, etc. 5 (3.12%) had haematological signs and symptoms, including bleeding, ecchymosis. In 10 (6.3%) cases, 20 minute WBCT was positive. 1 (One) patient had renal complications with hematuria, hemoglobinuria, etc.

On an average 10 to 30 vials of AVS were used in 96

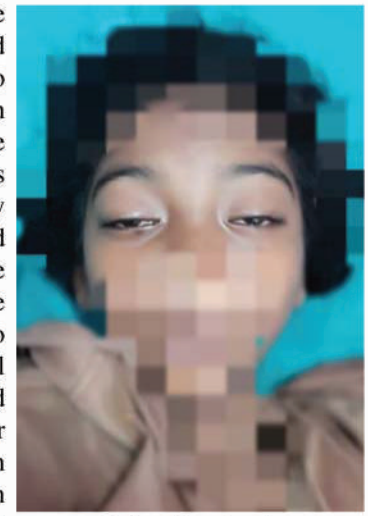
(60%) snake bite cases (without skin test) based on the syndromic management as per the government guidelines. 48 (30%) cases were administered Injections Atropine (0.6mg to 6mg) and Neostigmine (1.5mg to 9mg) at 30mins to 60mins interval. Patients were kept and observed for a minimum 48 hours in hospital. Anaphylactic shock was noted in 12 (7.5%) cases, all of whom responded to Injection Adrenaline. Minor reactions, including itching, rash, nausea, pain abdomen, vomiting were seen in 64 (40%) of the cases who received Injection AVS. No death occurred due to AVS reaction. 144 (90%) of the snakebite cases were discharged as cured and healthy. 12 (7.5%) were referred to a higher center while 2.5%) patients died at Alipurduar District Hospital. The discharged patients were all counselled regarding snake bite prevention, proper first aid and encouraged for early access to health care intervention at government hospitals, including Rural Hospitals & Primary Health Centres.

Discussion

There was high number (70%) of dry bites or bite by non-poisonous snakes. Various studies suggest that envenomed bites constitute between 12% and 50% of the total number of bites and bites by non-poisonous snakes might be as high as 70% of all snake bites[9-11].

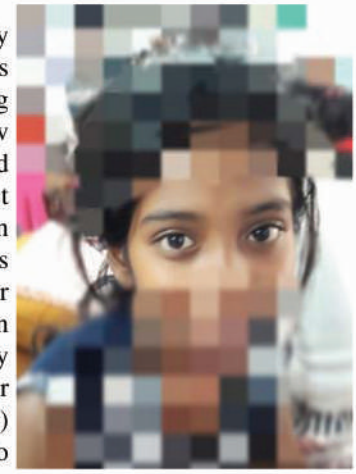
Males were found to be more affected (above 70%) and that more than 70% of middle aged persons with age ranging from 30 to 49 years were affected. In Bankura District of West Bengal more than 50% of the snake bite victims were in the 30 – 50 years aged group[12]. In Paschim Midnapore District of West Bengal too the majority age group (>42%) affected was the 31 -50 age group[13]. Similarly, males accounted for more than 56% in Paschim Midnapore[13]. This may be explained by the fact that males and people in the 30-49 age group commonly remain engaged in outdoor activities in farms, tea gardens and forests[6].

There was obvious seasonal variation with rising number of snake bites in the rainy season from May and with highest incidence in July-August and decrease in December to pre-monsoon level[3,6,10,12]. Snake bite and death rate is always high during the rainy season[12,14]. Increased snake bites during the rainy season are probably due to flooding of the natural habitats of the rats and the snakes and their increased presence in and around human residences[6,10,14]. This probably explains the high number of snakebites among homemakers in Alipurduar. Bites during agricultural/tea plucking activities, which increase during the rainy season is probably another reason for high number of snake bites and deaths during this season[10].



Before Treatment

Bites occurred mostly during outdoor activities (60%) but bites during sleep were remarkably low at 20%. In a hospital based study at Bankura District of West Bengal more than 71% of the snake bites occurred during outdoor activities[6,12]. Common Krait bite is not very common in Alipurduar District though 4 (four) cases were suspected to be Krait bites based on the history of bite during sleep and mysterious clinical features of abdominal pain, sore throat and fever in the absence of bite marks and administered AVS to which they responded favorably.



After Treatment

Bites affected lower limbs (83.75%) predominantly. In tropical countries lower limb is affected more because of occupation, lack of use of protective footwear or less visibility in rural area due to lack of light[6,12-14].

Fig 1 — Necrosis at the site of snake bite

Table 1 — *Time and Site of Snakebites, 2013-14, Alipurduar District Hospital, Alipurduar, West Bengal, India*

Time of Bite	Number of bites
Day time	96
Night time	32
During sleep	32
Area of bite	Number of bites
Lower limb	134
Upper limb	16
Other areas	10

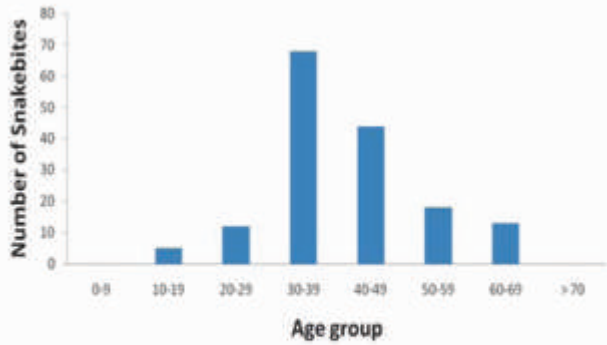


Fig 2 —Age distribution of Snakebites, Alipurdurar District Hospital, Alipurduar, West Bengal

Fig 3 — Monthly distribution of Snakebites in 2013-2014, Alipurduar District Hospital, West Bengal

More than 80% of the cases presented with panic attacks/early psychiatric features. Similar hospital based study of 121 snake bite victims in Bangladesh found that more than 80% of the patients had early psychiatric features, including severe anxiety, hallucination, irritability, psychogenic convulsion, difficulty in concentration, aggressive behavior, etc[15,16]. As per cognitive behavior is concerned, the snake bite could be a critical incident acting on existing psychological conditions including myths, misconceptions and ophidiophobia, triggering negative automatic thoughts leading to anxiety and depression[17]. Anxious people may over-breathe so that they develop pins and pin and needles of extremities, stiffness or tetany of their hands and feet and dizziness, vasovagal shock and high blood pressure and pulse with consequent adverse effects[17]. Reassurance that death is not imminent and that medical care is available is a very important first aid intervention. This will drive away their fear and excitement, slow the patient's heart rate and reduce the spread

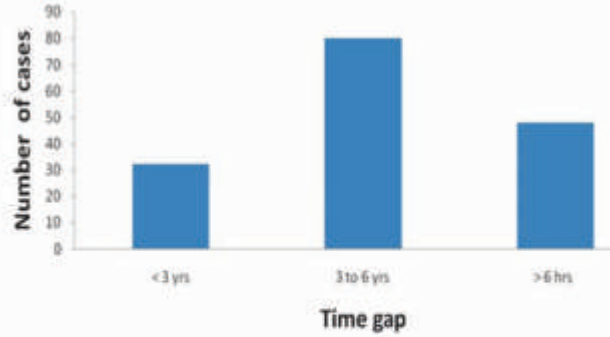


Fig 4 — Time gap between Snakebite and Hospitalisation, 2013-2014, Alipurduar District Hospital, West Bengal

of venom[15].

Improper first aid especially tight ligatures (20%) resulted in complications including cellulitis and compartmental syndrome. Tourniquets and compression bandages are potentially dangerous as they can cause gangrene, increased fibrinolysis and bleeding in the occluded limb, peripheral nerve palsies and intensification of local envenomation[18]. Traditional tight (arterial) tourniquets if applied tightly around the upper part of the limb are extremely painful as the limb becomes ischaemic and are very dangerous if left in place for long periods resulting in gangrenous limbs. [15] This practice is also strongly discouraged and only immobilization is recommended[15,18].

70% of the snakebite victims reached the hospital within 6 hours of the bite. In a hospital based study in Malaysia, less than 50% snakebite victims reached the hospital in 24 hours since snakebite[19]. In Purulia District in West Bengal, less than 30% snakebite victims reached the hospital within 6 hours of bite[20]. This reflects that the awareness level and service access in Alipurduar District is relatively better.

Only 12.5% of the patients sought interventions from

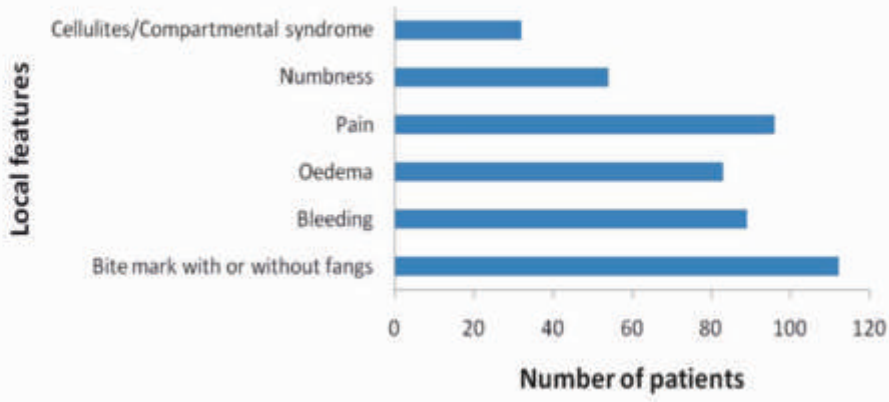


Fig 5 — Local features in Snakebite cases, 2013-2014, Alipurduar District Hospital, West Bengal

traditional healers. A retrospective analysis of snakebite data from a community based epidemiological survey in South 24 Parganas in West Bengal, India, showed that 62% of snakebite deaths were due to intervention of traditional healers[14]. Among the snake bite patients in Burdwan District in West Bengal State, India 65.47% went to the traditional healers (ojhas) and 8.46% persons went to hospital only after consulting the ojhas. [5] This reflects that the people in Alipurduar are conscious about early hospitalization.

Local features were more common than systemic manifestations and in many were progressive suggestive of poisonous snake bites. Neurotoxic snake bites (15%) were more compared to vasculotoxic snake bites (3.12%), which is very much identical with the findings in Purulia district of West Bengal[19]. In Bankura district of West Bengal around 50% of snakebite deaths were due to neurotoxic envenomation[12]. However, in Paschim Midnapore district of West Bengal vasculotoxic bites were more than 82%[12]. The very low % of vasculotoxic bites is corroborated by the fact that snakes of the viperidae family are rare in Jalpaiguri District, including Alipurduar[7].

Though more than 70% of the cases admitted with a history of snakebite were found to have dry bites or had unknown bites, 60% had been administered Injection AVS. This was likely to be primarily due to combination of various factors including predominance of history of snakebite by the victims or their relatives, local symptoms simulating venomous snakebites and lack of confidence on the part of the medical officers in ascertaining the signs of envenomation, high proportion cases having panic attacks, as well as, the apprehension of public backlash just in case the condition of the patient worsened reflecting lack of proper training in snake bite management. Low level of recognition of signs of envenomation and undue importance to local symptoms leads to administration of AVS to non-envenomed victims[9].

The average use of 10 to 30 vials of AVS was as per the existing snakebite management protocols and corroborated with studies in other parts of the state, country and the world[21-23]. Though there were some cases of anaphylactic shock which was managed satisfactorily with Injection Adrenaline, no complications or death occurred due to administration of Injection AVS.

Syndromic approach based on state snake bite management protocol was helpful in treating more than 90% of the cases successfully even in the absence of identification of kind of snake involved. A syndromic approach is very useful when snakes have not been identified and clinical features causes by venoms of different species may overlap. [15] A module on management of snake bite cases for Medical Officers, 2015 published by the Government of West Bengal is in practice in Alipurduar and Medical Officers have been trained on snake bite management based on it with re-orientations every year[6].

Referral rate is low given the fact that neither CCU nor facility for dialysis was available during the period under reference. The death rate due to snakebite is low compared other parts of the state[14]. Now, with the provision of a Critical Care Unit (CCU) and a Dialysis unit at the Alipurduar District Hospital, Snake bite management has been strengthened.

Our study covers only the Alipurduar District Hospital and not any other government hospital in the district where snakebite management is provided and hence does not reflect the true load of snake bite cases in government hospitals in Alipurduar. Further, as this study was hospital based, it does not encompass the significantly large group of patients who did not report to the district hospital for various reasons. However, it does give a trend of the epidemiological and clinical profile of snake bite cases in the district. A community-based approach would have overcome this limitation and provided a true picture of the magnitude of snake bites in the district along with the detailed epidemiological and clinical profile of the snake bite cases in the district. Further, a prospective hospital based study with a written protocol would have provided better epidemiological and clinical profile of snake bite cases, factors associated with adverse outcomes and provided information on strengthening snake bite management in the district.

Conclusion

Snake bite, a neglected tropical disease with high fatality, can be treated effectively based on syndromic approach as per the state snake bite management protocol. AVS without skin test dose is life saving and is very safe and effective with Injection Adrenalin at hand. Medical Officers need to trained and regular re-orientation on usage of the snake bite management protocol done to ensure better detection of signs of envenomation and judicious use of AVS. Timely hospitalization, avoidance of traditional or faith healers and increased awareness among the masses with regards to prevention of snake bites, including use of personal protection during outdoor activities, deterrence to attraction of snakes to households by improving storage of food and fodder at home and avoiding keeping or rearing of fowls at homes or in the vicinity, clearing garbage and vegetations from peri-domestic areas, sleeping on charpoys and using mosquito nets while sleeping. Apart from community awareness on prevention of snake bites paramedical staff and the community at large needs to be sensitized on proper and appropriate first aid in cases of snake bites, including avoidance of ligatures, need for

psychological assurance to the snake bite victim and rapid transportation to the nearest hospital where AVS is available. Lastly, a community based survey to assess the magnitude and epidemiological profile of snake bites in the district, as well as, a prospective hospital based study to study the clinical profile of snake bite cases along with study of factors associated with adverse outcomes with a view of improve clinical management of snake bites in the district is recommended.

Patients' consent : No direct consent was taken from the patients as this is a retrospective study. Details of history, clinical findings, admissions and outcomes were obtained from the hospital records. Consent, instead was taken from the Superintendent of the hospital to use information contained in the patient records without disclosing the identity of the patients and solely for educational and research purposes with the view to decreasing snake bite morbidity and mortality.

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Original Article

A comparative study of Internal Jugular Vein Cannulation : Ultrasound Guided Technique *versus* Conventional Blind technique

Vaibhavi B Patel[1], Smita R Engineer[2], Kiran B Patel[3], Vikram P Mehta[4], Mona Bilandani[5]

Central line cannulation is usually done in right Internal Jugular Vein (IJV) for long term administration of fluid, antibiotic, hemodialysis, chemotherapy. IJV cannulation is routinely done by Conventional Blind Technique (CT) using landmarks. Nowadays Ultrasound Guided Technique (UT) is used to cannulate IJV. The aim of this study was to compare outcome of the Ultrasound guided technique with conventional technique in terms of success rate, number of attempts for IJV location and cannulation, time required for procedure and complications. This study was conducted on 120 patients who were randomly divided into 2 groups. For both the group of patients seldinger technique was used to cannulate IJV. In Ultrasound guided technique, IJV was cannulated with real time linear transducer probe with high frequency. IJV was cannulated in first attempt in 90% of patients with Ultrasound guided technique and 61.66% of patients with conventional technique (P=0.03). Second attempt was required in 10% of patients with Ultrasound guided technique and 30% of patients with conventional technique (P=0.01). Third attempt was required in 8.33% of patients with conventional technique while it was nil in Ultrasound guided technique. Mean time for procedure was 7.78+2.75 minutes in Ultrasound guided technique and 19.4+5.68 minutes in conventional technique (p=0.025 is significant). In Ultrasound guided technique, rate of complications like, carotid puncture was none, hematoma 8%, difficulty in cannulation 1.66% which are less as compared to conventional technique (8%, 21.66%, 10% respectively). Thus, use of real time Ultrasound for IJV cannulation is beneficial than conventional technique in terms of decreased number of attempts for IJV location and cannulation, less access time and deceased incidence of complications.

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Key words **: IJV cannulation, Ultrasound Guided Technique, Conventional Technique.**

Central line cannulation is usually done in Internal Jugular Vein (IJV) because of its anatomical position, larger diameter and minimal obstruction in its route to right atrium. IJV cannulation is commonly performed to obtain access to central venous line for long term administration of fluid, antibiotic, total parenteral nutrition, hemodynamic monitoring (CVP-central venous pressure monitoring), hemodialysis, chemotherapy[1]. Cannulation of right IJV has been the preferred method for central venous cannulation[2] because right IJV is in a straight line to right atrium and shorter route, while on the left side the dome of the pleura is higher and chances of damage to thoracic duct. IJV cannulation is done routinely by conventional blind technique using landmarks. Nowadays, Ultrasound Guided Technique is used to cannulate IJV. Ultrasound is a non-invasive, non-ionising form of imaging that is safe for all age group patients. It has been suggested that Usg Guided Technique has higher success rate, less number of attempts for IJV location and cannulation, less time required for IJV cannulation and less procedure related complications[3]. Failure to successfully cannulate IJV occurs in the range of 2% to 9% in conventional technique[4]. The aim of this study was to compare outcome of the Ultrasound Guided Technique for IJV cannulation with Conventional Technique in terms of number of attempts for IJV location and cannulation, total access time (time from skin puncture to aspiration of venous blood) and complications related to the procedure.

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Material and Method

This study was conducted in Civil Hospital, Ahmedabad on randomly selected 120 patients who required IJV cannulation. It is a prospective, randomized, interventional, controlled type of study. CTRI registration of the study was not done. All the patients were evaluated before the procedure and written informed consent was taken. Patients of age group 18-75 years, with normal coagulation profile and platelets count >80,000 were included in our study. Patients with abnormal coagulation profile, known

vascular abnormality were excluded from the study. IJV cannulation was done in various patients undergoing for major prolonged surgery (pheochromocytoma, whipple's surgery, large thyroid mass, neurosurgery), intraoperative CVP monitoring, patients requiring long term antibiotics/ fluid, patients requiring TPN (total parenteral nutrition), patients undergoing for hemodialysis, in patient with difficult peripheral venous access. Procedure was carried out in operation theatre in full aseptic precaution with necessary monitors applied and equipments available. No intravenous medication was given before or during procedure. Patients were randomly devided into 2 groups of 60 each, group conventional technique (CT) and Ultrasound Guided Technique (UT) using computer generated random list. In conventional technique group, IJV was cannulated by landmark guided seldinger technique. In Ultrasound Guided Technique group, IJV cannulation was done by using Ultrasound imaging system (SONOSITE) with a 7.5-MHz transducer probe connected to a two-dimensional ultrasound device. The patient was kept in supine position with head turned to opposite side for complete exposure of procedure side and a shoulder pack was placed to extend the neck (except in patient of cervical spine injury in whom the neck was kept in supine position only). After applying monitors (SPO_2 and ECG), painting and drapping was done and Inj. Lignocaine 2% was injected on the site of needle entry.

In conventional technique surface landmarks are apex of the triangle made by 2 heads (sternal and clavicular) of sternocleidomastoid muscle and medial third of clavicle just lateral to carotid pulsations. 20 Gauze needle was advanced at 45 degree angle to skin directed towards ipsilateral nipple. After aspiration of free flow of venous blood in saline filled syringe, a guide wire was passed through the needle into IJV and needle was removed. Finally 18 G radio-opaque catheter was cannulated over guide wire into IJV and guide wire was removed. Catheter was secured with proper stitches.

In Ultrasound Guided Technique, we used real time (Dynamic) method which allows needle observation as the needle approaches the target vessel. The linear transducer probe with high frequency was used, since the vascular structures are typically shallow. Transducer probe was kept in sterile plastic bag with ultrasonic gel applied on it. We kept the probe perpendicular to the floor which is parallel and approximately 1.5 cm above the clavicle (Outplane technique), so only tip of advancing needle can be seen on monitor. Position of IJV in relation to carotid artery was accessed first and 2% lignocaine was injected with 24 g hypodermic needle 0.5 cm above the site of probe. The wheel in subcutaneous tissue was visualized on monitor as enlarging hypoechoic area. 20 G needle was advanced through this skin wheel towards IJV keeping vein in centre of the monitor. Tip of needle (visualized as hyperechoic dot) was advanced towards anterior wall of IJV. The vein was pierced by a short stabbing motion of needle which leads to puncture in anterior wall of IJV without causing double wall puncture. When the tip of the needle was located in vein, confirmation was done by aspiration of venous blood. We also confirmed IJV location by keeping the probe in plane of IJV so we were able to visualize anterior and posterior walls of vein with tip of needle inside. Then insertion of 18 G catheter was done by seldinger's technique same as mentioned in conventional technique. Successful placement of catheter was confirmed by Chest X-ray and post-procedure arterial blood gas analysis.

In our study, data recorded were patients' demographic data, number of attempts for IJV location, total access time (time from skin puncture to aspiration of venous blood) and complications related to procedure (such as hematoma, arterial puncture, difficulty in IJV cannulation, hemothorax, pneumothorax, brachial plexus irritation, failure of procedure). Primary outcome of this study is successful cannulation in first attempt and secondary outcome is duration of procedure and complications related to procedure.

We have calculated sample size by using power analysis and sample size version 8(2008) software. According to this, sample size was calculated to be 58 in each group at 80% power of study and 0.05 level of significance (a) using two-tailed chi-square test. It was done to detect absolute difference of 20% for successful cannulation of IJV in first attempt by Ultrasound Guided Technique and conventional technique. To be on safer side, we decided to keep 60 patients in each group.

Statistical package for social science version 23 (23, IBM, Chicago, USA) was used for analysing the data. All data are presented as mean and % of patients. A chi-square test was used to compare categorical variables and a student's t-test was used to compare independent means. P value <0.05 was considered significant.

Observation

Our study was a single blinded observational type of study carried out on 120 patients who required IJV cannulation. Our 2 study groups were similar in regards to patients' demographic data (age, sex, weight) and site of IJV insertion (Tables 1 & 2).

IJV was cannulated in first attempt in 90% of patients with Ultrasound Guided Technique and 61.66% of patients with conventional technique (p=0.03). Second attempt was required in 10% of patients with Ultrasound Guided Technique and 30% of patients with conventional technique (p=0.01). Third attempt was required in 8.33% of patients with conventional technique while it was nil in Ultrasound Guided Technique (Table 3).

Table 1 — *Demographic Data*

Group	Usg guided technique (n=60)	Conventional technique (n=60)
Age (Years)	40.31+14.84	43.95+17.97
Sex (M/F)	36/24	23/37
Site of IJV (Right/Left)	59/1	57/3

Table 2 — *Number of attempts for successful vein localization*

No of patients cannulated in	UTN (%)	CTN (%)	P Value
First Attempt	54(90%)	38(61.66%)	0.03
Second Attempt	6(10%)	18(30%)	0.01
Third Attempt	0(0)	5(8.33%)	

Table 3 — *Total Time Required For IJV Cannulation*

Mean time for IJV Cannulation (minutes)	Usg guided technique	Conventional technique	P value
	7.78+2.75	19.4+5.68	0.025

Total access time is considered from skin puncture to aspiration of venous blood. Mean time for procedure was 7.78+2.75 minutes in Usg Guided Technique and 19.4+5.68 minutes in Conventional Technique having P=0.025 which is significant (Table 4).

In Ultrasound Guided Technique there were no cases of carotid artery puncture while it occurred in 8% of patients in Conventional Technique. Hematoma occurred in only 8% of patients with Ultrasound Guided Technique as compared to 21.6% of patients in Conventional Technique. Difficulty in threading guidewire after successful IJV cannulation occurred only in 1.6% of patients with Usg guided technique as compared to 10% of patients in Conventional Technique. There were no cases of haemothorax, pneumothorax, and brachial plexus injury in any of techniques during the study.

***Ultrasound Guided Images* — Outplane technique :** The probe is kept perpendicular to the floor which is parallel and approximately 1.5 cm above the clavicle. In this technique tip of advancing needle and adjacent vascular structure is seen on monitor (Figs 1 & 2).

Inplane technique : Probe is kept perpendicular to clavicle and in line with anatomical location of IJV. Whole course of advancing needle towards vein can be seen on monitor (Figs 3 & 4).

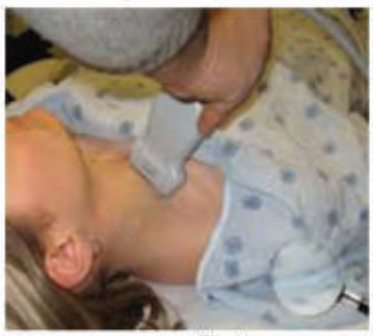

Fig 1

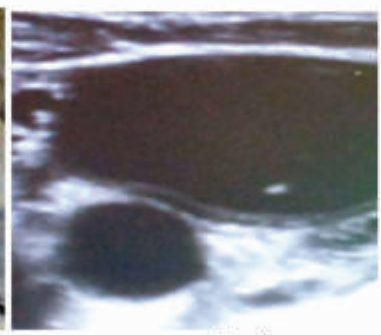

Fig 2

Table 4 — *Showing Complications*

Complications	Usg guided technique	Conventional technique
Carotid puncture	0(0)	5(8%)
Hematoma	5(8%)	13(21.66%)
Difficulty in cannulation	1(1.66%)	6(10%)

Fig 3

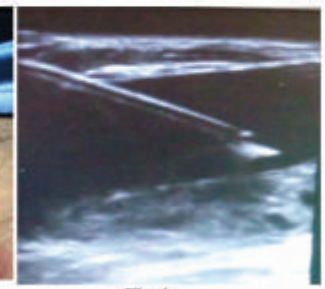

Fig 4

Discussion

As per our study, in Ultrasound Guided IJV cannulation procedure time (7.78+2.75 minutes in UT) is less compared to Conventional Technique (19.4+5.68 minutes in CT), procedure related complications are negligible with use of Ultrasound, number of attempts for IJV cannulation are less with Ultrasound Guided Technique. (IJV was cannulated in first attempt in 90% of patients with Ultrasound Guided Technique and 61.66% of patients with Conventional Technique)

Considerable amount of time and efforts are spent on insertion of central venous catheter for various purposes, but IJV cannulation is not without risk and may lead to adverse effects that are both hazardous to patients and expensive to treat. Nowadays Ultrasonography is most widely used imaging technique in medical practice. USG is portable, nonradiating, and inexpensive as compared to other imaging modalities such as MRI, CT scan. In modern Ultrasound, a small pulse of echo is transmitted from transducer to body which penetrates body tissue along the path of transmission. Some waves are reflected back to transducer and some continue to penetrate deeper depending upon different acoustic impedances of tissues. The wavelength and frequency of Ultrasound are inversely related. Superficial structures are visualized with high frequency waves and low frequency waves are used to visualize deeper structures[5]. Ultrasonography has specific advantages in cannulating a vessel over conventional blind technique like visualization of a vascular structure, optimal needle placement, avoids puncture of posterior wall of IJV, accurate placement of catheter inside IJV, confirmation of guidewire inside IJV, less number of attempts and lower rate of complications.

As the IJV is a superficial vascular structure, the linear transducer probe with high frequency was used. Most of the patients in our study showed lateral and anterolateral lying IJV relative to carotid artery. We measured depth of IJV from skin which was approximately 0.8+-0.4 cm (Fig 5).

On radiological visualization artery is circular in shape, pulsatile, thick walled and non-compressible when pressure is given by probe. While vein is elliptical in shape, non-pulsatile, thin walled and compressible by pressure.

Ultrasonography is useful for central line cannulation as either dynamic technique or static technique. In dynamic technique (also known as real time), the whole procedure is accompanied by the use of USG[6]. While in static technique, USG is used pre-procedure for marking the puncture site, visualization of anatomy and post-procedure to detect possible complications. We used dynamic approach for our study as it allows real-time visualization of the needle tip placement and has been shown to be superior to the static approach in most situations. There are 3 different approaches for Ultrasound Guided Technique for IJV cannulation like outplane, inplane and oblique[7,8]. Outplane (transverse axis) approach has advantage of visualization of adjacent structures and short learning curve but disadvantage of higher risk of injury to the posterior wall of the vessel. Inplane (longitudinal axis) approach has advantage of visualization of vessel, guide wire, catheter during whole procedure but disadvantage is inability to visualize adjacent structures. Third approach is, the oblique, is an intermediate to the previous two[9]. In our study, we kept the probe perpendicular to the floor and parallel to the clavicle (Outplane technique), so only tip of advancing needle and adjacent structures can be seen on monitor. Later on, after aspiration of venous blood, we confirmed IJV location by keeping the probe perpendicular to clavicle (inplane of IJV), so we were able to visualize anterior and posterior walls of vein with tip of needle inside.

All datas are normally distributed in both the Ultrasound Guided Technique and Conventional Technique groups in terms of age, gender (m/f) and site of IJV insersion (rt/lt).

A Study on 200 patients done by Azmat Riaz et al described that vein was localised on 1st attempt in 99% of ultrasound-group patients and in 89% of land-mark-group patients. 2nd attempt was required in 1% of patients of ultrasound-group and 7% of patients of land-mark-group[10]. In our study, IJV was cannulated in first attempt in 90% of patients with Ultrasound Guided Technique and 61.66% of patients with Conventional Technique (P=0.03). Second attempt was required in 10% of patients with Ultrasound Guided Technique and 30% of patients with Conventional Technique (P=0.01). Third attempt was required in 8.33% of patients with Conventional Technique while it was nil in Ultrasound Guided Technique (Table 2). Thus study results are comparable with our study.

Fig 5

Carotid arterial puncture is the most common and frequent complication of IJV cannulation due to its anatomical proximity of 2 vessels. According to our study, in Ultrasound Guided Technique there were no cases of carotid artery puncture while it occurred in 8% of patients with Conventional Technique. Hematoma occurred in only 8% of patients with Ultrasound Guided Technique as compared to 21.6% of patients with Conventional Technique (Table 4). As per study by Darko Sazdov, Marija Srceva *et el* carotid artery puncture occurred in 1% of patients of ultrasound group, while in 8% of patients in land-mark technique (p=0.0007). Hematoma occurred in 4% of patients with Ultrasound as compared to 10% of patients with landmark technique (p=0.01)[10]. This data are comparable with our study results. Similar results were found by Gurkan Turker *et al* which shows carotid puncture and hematoma are less with Usg (0.5% and 1% respectively) as compared to conventional technique (4.73% and 3.68% respectively)[11]. The rate of complications such as accidental puncture of the carotid artery, hemothorax, pneumothorax, and hematoma, as well as the total procedure duration and the occurrence of bloodstream infection associated with catheter, was significantly lower in the group that underwent Ultrasound Guided catheterization[12]. Superiority of Ultrasound Guided Technique over Conventional Technique is seen in patients with obesity, oedema, coagulation disorders, difficult anatomical landmarks, chest deformity, previous surgery, burns, cervical spine injury where neck movements are restricted, hypovolemic patients. Due to proven benefits of Ultrasound Guided IJV cannulation, it will be difficult to justify not using Usg for this procedure. The National Institute for Clinical Excellence (NHS 2002) guidelines issued in 2002 recommend the use of ultrasound for IJV cannulation in both adults and children in most circumstances in both elective and emergency situations[13]. In February 2012, International Committee of Ultrasound

Vascular Access published its recommendations and concluded that, the vascular catheterization must be guided by Ultrasound due to its efficacy and safety provided by the procedure. The National Institute of Clinical Excellence (NICE) issued guidelines recommending that Ultrasound Guidance be used for all elective and emergency central venous cannulations in the National Health Service (England and Wales)[14].

However there are limiting factors like unavailability of Ultrasound machine due to high cost and need for an experienced operator who has an understanding of probe orientation, image display, the physics of ultrasound, and mechanisms of image generation and artefacts. In our study, Out of total 120 patients, in 2 patients of burns contracture involving neck and in 2 patients with cervical spine injury in whom neck movements were restricted, Ultrasound Guided Technique was used because conventional technique guided IJV cannulation was not possible at all. There were 3 cases in which IJV cannulation was failed by blind technique and later on succeeded by Ultrasound Guided Technique. So success rate of IJV cannulation was 100% with Ultrasound Guided Technique and 95% with conventional technique. Similar results were observed in study done by Shah H, Bhavsar M[15]. Thus use of USG for IJV cannulation reduces mechanical and infectious complications[16], reduces chances of thrombosis, increases success rate and decreases patient discomfort.

Conclusion

Use of real time Ultrasound for Internal Jugular Vein cannulation is beneficial than conventional landmark guided technique in terms of decreased number of attempts for IJV location and cannulation, decreased access time, deceased incidence of complications, increased success rate and substantially decreased patient discomfort. Patient discomfort was not measured using any scoring system, but patients in whom IJV cannulation was done with Ultrasound were more comfortable in terms of short procedure time, less number of attempts and less complications.

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Original Article

Prevalence of Autoantibodies in patient complaining of multiple joint pain in a tertiary care hospital

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Autoimmune phenomenon is attributed to a number of diseases which were once considered idiopathic. In humans, production of auto antibodies (a-Abs) against self-antigens is quite frequent but earlier their presence was associated with autoimmune diseases, however a-Abs have been documented in non-autoimmune disorders i.e. complicated pregnancy, cancer, stroke etc. This study was designed to determine serum level of antinuclear antibody (ANA), Rheumatoid Factor (RF) and anti dsDNA antibodies in apparently healthy population with multiple joint pain. After written informed consent, blood sample of 294 subjects was obtained by random sampling. Participantsof established autoimmune diseases were excluded. Enzyme linked immune sorbent assay (ELISA) was used to determine ANA, RF and anti-dsDNA antibody. Categorical variables were compared by using $\chi 2$ test. A p value <0.05 was considered statistically significant. Rheumatoid factor was the most frequent a-Ab (19.05%), followed by anti dsDNA (7.14%), while ANA was the lowest (3.4%) antibody detected. Only RF had a statistically significant association with gender (p=0.047). No association of these antibodies with age was detected. Rheumatoid factor auto antibody was more prevalent as compared to ANA and dsDNA antibody in healthy adults.

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Key words **: ANAs, Anti dsDNA, Anti RF, Autoantibodies, Autoimmune disease.**

Anti-nuclear antibodies (ANA) are immunoglobulin directed against autologous cell nuclear and cytoplasmic components[1-3]. The occurrence of different ANA is associated with autoimmune disease and with differences in disease severity including extent of skin involvement, internal organ manifestation and prognosis[2]. Researchers have been performing steady efforts to develop tests for detecting ANA and disease-specific auto antibodies to nuclear antigens for the diagnosis, prognostic assessment, and monitoring of patients with systemic autoimmune diseases[4]. Nowadays, measurement of ANA has been widely used to provide supporting evidence of a diagnosis of autoimmune disease such as Systemic Lupus Erythematosus (SLE), Sjögren etc[5]. SLE is a multisystem disorder that is considered as a prototype Immune Complex (IC)-mediated disease[6]. This autoimmune disease related to central or peripheral nervous system; about 17% to 75% of patients respectively[7]. Additionally, levels of antibodies against dsDNA were shown covary with SLE disease activity[8]. The aim of this study was to investigate the prevalence of ANA and anti-dsDNA in patient with suspected autoimmune disease.

Rheumatoid Factor (RF) is heterogeneous antibody of IgM class; directed against Fc fragment of IgG. It is used as a disease marker of Rheumatoid Arthritis (RA)[9] but it can be detected in other connective tissue and inflammatory disorders. About 1-5% of healthy individuals may have this antibody and they are at increased risk to develop RA[10].

Materials and Methods

Serum samples were obtained from different Department of Calcutta National Medical College and Hospital. Each of these serum samples was tested for the presence of ANA, RA factor and anti-dsDNA (Aeskulisa dsDNA check, Aesku Diagnostics, Germany) by ELISA method. These tests were performed by commercial kits according to the manufacturer's instructions. First of all, results were classified as ANA positive or negative according to the definitions contained within the packages for each kit. Subsequently, anti-dsDNA results were classified as positive or negative for each patient. Borderline results were arbitrarily classified as positive.

For statistical analyses, manufacturer suggested cut-off were applied to create positive and negative values from the continuous original observations. Positivity rates,

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specificities and Spearman correlation coefficient between assays were calculated as indicated using SAS software, Version 9.2 of the SAS system for Windows. In statistical analyzes, p-value <0.05 was considered as significant.

Results

In this study, there were more female (214) as compared to male (80). Mean ±SD of age of males and females was 42.20 (3.52) and 24.54 (0.76) ranging from 13-66 and 3-65 (years) respectively. ANA was detected in 4.67% females and 0% males and RF was detected in 10% males and 22.43% females while anti-dsDNA was detected in 5% males and 7.94% females and on comparison there was no significant difference in these parameters. Frequency of ANA, RF and anti-dsDNA was 3.4%,19.04% and 7.14% respectively (Tables 1 & 2).

More females (86%) compared to males (14 %) had a-Abs. Mean age of males was 35.28 years and of females it was 22.14 years. Among the subject 36.74% were more than 35 years (55.1% males and 44.9% females), 50% were between 26-35 years (70.4%males and 29.6% females) and only 13.26% were less than 25 years of age (30.7% males and 69.3% females).

Among the subjects 10 (3.4%) had ANA, 56 (19.05%) had RF and 21 (7.14%) had dsDNA. On comparison of gender, out of 80 males, 8 % had RF, 5% had dsDNA and none of the male had ANA whereas out of 214 females, 22.42% had RF, 7.94% had dsDNA and 4.67% female had ANA. RF was significantly associated with gender (Odds ratio 1.948, 95% confidence interval, (1.004-3.785) while ANA and dsDNA were not associated with gender. It was observed that more females than males (22.42% *versus* 8%) had RF. Further, none of the a-Abs was associated with age (Figs 1 & 2).

Discussion

In the present study, ANA was detected in 3.4% of healthy individuals with multiple joint pain which is lower than already documented ie, 4% to 13%[11-14]. In the current study, there was high prevalence of RF in females (22.43%) than males (10%)[15]. It should be noted that RF a-Abs are frequently present in healthy subjects and can be detected in chronic infections. ANA positivity rate found in our female patients is a consistent result with the knowledge of the autoimmune diseases are more frequent in women[16,17]. This predominancy was researched by Leo and et al. According to their study, the hormone profile, fetal microchimerism and some strategic genes which are on the sex chromosomes are playing role on this relationship[18]. Our three years' experience of testing autoantibodies was shared in this study. Reliable test results are very important for the health of the patients with autoimmune disorders. For being a dependable laboratory, having enough knowledge and experience about the chosen methods of autoantibody tests is mandatory. A good relationship with the clinicians is also an indispensable component of confidential analysis and reporting.

Table 1 — *Comparison of autoantibodies based on gender*

Variable	Male (n=80)	Female (n=214)	Total (n=294)	p- values
ANA Positive	0	10	10	0.068
RF Positive	8	48	56	0.044
Ani-dsDNA Positive	4	17	21	0.6097

Table 2 — *Comparison of autoantibodies based on age*

Vaiable	Age group		p value
	<25 (n=39) Positivity (n)%	>25 (n=255) Positivity (n)%	
ANA Positive	1	9	1
RF Positive	12	44	0.1456
Anti-dsDNA Positive	5	16	0.1906

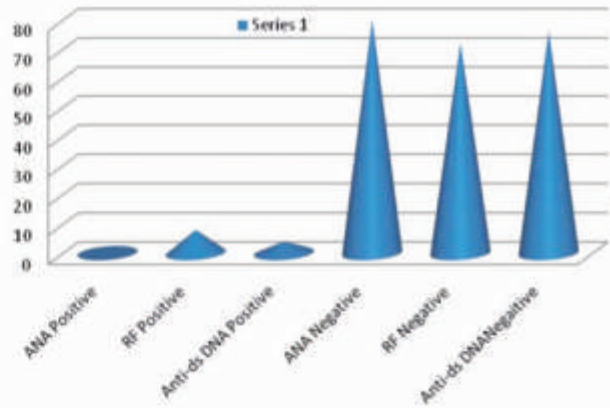

Fig 1 — Male ANA, RF and Anti-dsDNA test result Comparison Chart

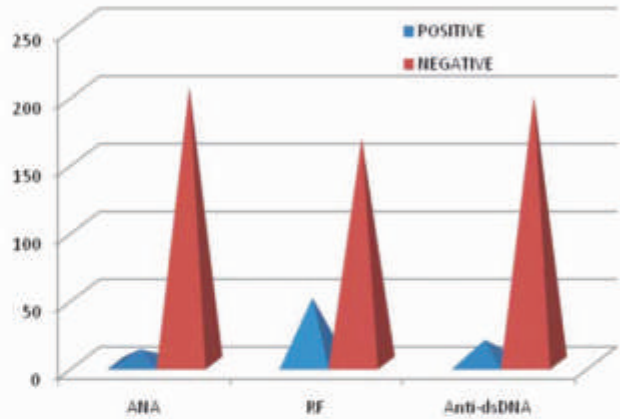

Fig 2 — Female ANA, RF and Anti-ds DNA test result Comparison Chart

Conclusion

Rheumatoid factor auto antibodies were more prevalent as compared to dsDNA and ANA in healthy adults. Further, RF was associated with gender as it was prevalent more in males compared to females. ANA and anti dsDNA were not associated with age and gender.

Conflict of interest :

None of the researchers has any financial or other interest in the products that were used for this study.

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Original Article

Cross sectional analysis of suicidal behavior in adolescents — comparison with adult attempters

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Indian studies have suggested that the suicides and suicidal behaviours are higher in younger age groups. Studies comparing the socio-demographical and clinical variables between various age groups in relation to suicidal behavours are required to tailor specific interventions for the early age groups. Hence this study was conducted to analyse socio-demographic and clinical variables of adolescent suicide attempters and to compare certain potential risk factors between adolescent and adult suicide attempters. Socio-demographic and clinical variables of 199 adolescents versus 960 adult attempters were compared using a specially designed questionnaire to find out the potential risk factors in adolescents.Significant number of adolescent attempters were females, from nuclear family, had higher frequency of medical illnesses and specific life stressors related to their developmental period. Majority had medical contact within one week of attempt and attempted suicide within one week after the stressor. Current psychiatric diagnosis was more frequent in adults than adolescents. In adolescents the most frequent psychiatric diagnosis was adjustment disorder. This study concludes that Adjustment disorders related to life stressors preceded adolescent suicidal attempts more frequently than adults. Helping adolescents to cope with life events should be a focus of suicide prevention strategies in this population.

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Key words **: Adolescents, suicide, attempts, life events, self-harm.**

Worldwide, suicide is the second leading cause of death in young people, representing a major public health problem especially in the 15-19 year age group[1]. Youth is a period of heightened risk of suicide and suicide is a leading cause of death among young people in India[2].A cross sectional study of adolescent suicidal behavours (age 12-19) in two schools in Delhi found the life time prevalence of suicidal attempts to be as high as 8%[3]. Adolescents suicide attempters are a heterogeneous group and their characteristics are different and the pattern of suicidal behaviour is not similar to that of adult population[4]. Potential risk factors for suicide attempts in adolescents include female gender, psychopathology especially a major depressive disorder, previous suicide attempts, hopelessness, recent stressful life events, suicide attempts by family members or friends, chronic physical illness, family violence and dysfunction and lower academic achievement[5]. Suicidal attempt is the strongest risk factor for suicide, psychiatric disorders which tend to onset in adolescence being the second[6]. Other contributors include genetic vulnerability, psychological, familial, social, and cultural factors[7].

The precipitating events, which have led to a suicide attempt, are most often stressful interpersonal problems between the adolescent and his parents or peers[8]. Some types of stress such as exit events, or interpersonal losses, and other major negative events often precede suicide attempts[9]. The relationship between chronic stress and adolescent suicide attempts is clinically important because treatment for disharmony among parents may reduce the risk of suicide among adolescents living in a stressful home environment[10]. Given the potentially tragic nature of adolescent suicide attempts and the elevated risk of suicide clustering among adolescents, the identification of adolescents at risk for suicide attempts before their behaviour escalates and becomes more serious would be of obvious value.

There is a lack of systematic research on suicide in adolescence. Due to paucity of data and to increase our understanding of adolescent suicide attempt and improve the management present study was conducted with the following aims:

(1) To study the socio-demographic and clinical variables of adolescent suicide attempters.

(2) To compare certain potential risk factors between adolescent and adult suicide attempters (Tables 1-3).

Material and Methods

A non-experimental descriptive approach was used for

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Table 1 — *Socio-Demographic Details*

	Age below 19 years (199)	Age above 19 years (960)	p
Sex :			
Male	76 (38.2)	501 (52.2)	0.00*
Female	123 (61.8)	459 (47.8)	
Marital Status :			
Unmarried	174 (87.4)	272 (28.3)	0.00
Married	24 (12.1)	641 (66.8)	
Separated/widow	1 (0.5)	47 (4.9)	
Religion :			
Hindu	136 (68.4)	762 (79.4)	0.00
Muslim	59 (29.6)	156 (16.3)	
Christian	4 (2.0)	40 (4.2)	
Tribal	0 (0.0)	2 (0.2)	
Domicile :			
Rural	161 (80.9)	833 (86.8)	0.02*
Urban	38 (19.1)	127 (13.2)	
Mean Education (Years)	9.41±2.31	7.65±3.65	0.00
Occupation-Unemployed	155 (77.9)	441 (45.9)	0.00
Family :			
Joint	62 (31.2)	413 (43.1)	0.007
Nuclear	137 (68.2)	547 (56.9)	
Consanguinity- yes	16 (8.0)	63 (6.6)	0.45*
Medical Illnesses	39 (19.6)	29 (3.0)	0.001*
F/H/O Psch Illness	59 (29.6)	332 (34.6)	0.19*
F/H/O suicide	5 (2.5)	69 (7.2)	0.01*
Past Psych Illness	22 (11.1)	249 (25.9)	0.00*
Past Suicide attempt	23 (11.6)	194 (20.2)	0.002*
Mean Number of past attempts	0.13±0.5	0.24±0.7	0.004

*Fisher's exact test

Table 2 — *Special Causes for the Attempt*

	Age Below 19 years (199)	Age Above 19 years (960)	p
Special cause for attempt	171 (85.9)	827 (86.1)	0.51
Friction with family members	74 (37.2)	130 (13.6)	0.00
Love failure	19 (9.5)	40 (4.2)	0.00
Death of dear ones	14 (7.0)	28 (2.9)	0.01
Friction with girl/boy friends	11 (5.5)	15 (1.6)	0.00
Failure in Exam	11 (5.5)	0 (0.0)	0.00
Physical problems	7 (3.5)	66 (6.9)	0.05

*Fisher's exact test

this study. The study was conducted at KMCT Medical College Hospital with an inpatient capacity of 60 beds. Psychiatry Department receives referrals from various Departments for management of approximately 10-20 suicide attempters in any given month. The institution has a written rule that any patient admitted for a suicide attempt has to be evaluated by the Psychiatry Department before his or her discharge from the hospital. Consecutive suicide attempters of all age groups referred for detailed psychiatric evaluation from various Departments from the period 2012 January to 2015 December formed the study sample for the two comparison arms. Information was obtained from patient, care giver and other reliable sources. The assessments were completed within one day of receiving

Table 3 — *Details about Suicide Attempt*

	Age below 19 years (199)	Age above 19 years (960)	p
H/O Medical Contact :			
Within 1 week	162 (81.4)	685 (71.2)	0.04
Within 1 week to 1 month	13 (6.5)	78 (8.1)	
Within 1 month to 3 months	13 (6.5)	105 (10.9)	
Hours of Sleep :			
0-2	5 (2.5)	52 (5.4)	0.00
3-5	46 (23.1)	502 (52.3)	
6 or more	142 (71.3)	378 (39.3)	
Change in Weight :			
Nil	185 (93.0)	759 (79.0)	0.00
10% or Weight Loss	14 (7.0)	200 (20.8)	
10% or more Weight gain	0 (0.0)	1 (0.0)	
Time Difference between stress and Attempt :			
24 Hours	89 (44.7)	188 (19.6)	0.00
24 Hours – 1 week	27 (13.6)	111 (11.6)	
1 week – 1 month	20 (10.1)	98 (10.2)	
More than 1 month	40 (20.2)	483 (50.3)	
Suicide Treats	84(42.2)	438(45.6)	0.21*
Suicide Notes	21 (10.6)	85 (8.9)	0.42*
Time of Suicide Attempt :			
12 Midnight- 6am	8 (4.0)	46 (4.8)	0.97
6am – 6 pm	108 (54.3)	519 (54.1)	
6pm – 12 Midnight	80 (40.2)	382 (39.8)	
Place of Attempt :			
House	156 (78.4)	745 (77.6)	0.95
Outside	40 (20.1)	202 (21.0)	
Consumption of Alcohol at the Time of Attempt	11 (5.5)	211 (22.0)	0.00
Mode of Attempt :			
Poisoning	147 (73.9)	757 (78.9)	0.21
Drowning	0 (0.0)	9 (0.9)	
Hanging	24 (12.1)	97 (10.1)	
Cutting	28 (14.1)	97 (10.1)	
Mean Time of Discovery (Minutes)	77.4+140.6	73.5+152.8	0.74
Mean time of Reaching Hospital (Minutes)	198.0+485.0	167.0+304.9	0.39

*Fisher's exact test

referral. World Health Organisation (WHO) definition of child and adolescent such as any person between ages 10 and 19 was adopted for the selection of adolescents[11]. The total sample was divided into two groups, Group 1, 10-19 years age and group 2, above 19 years age (Table 4).

Inclusion and Exclusion Criteria

Suicide attempters who are willing to participate in this study after signing the written informed consent were included in the study. The subjects had to be inpatients during the assessment and should be able to respond to the tools appropriately. Subjects who had no accompanying family member for corroboration of information were excluded.

Tools

A self-designed socio-demographic questionnaire was used to document the psycho-socio-demographic details and life events. It consists of a total of 104 items covering various aspects like socio-demographic data, details of

Table 4 — *Psychiatric Diagnosis*

	Age below 19 years (199)	Age above 19 years (960)	p
Psychiatric Diagnosis - Present	120 (60.3)	764 (79.6)	0.00
Depression	22 (11.1)	261 (27.2)	0.00
Mania/Bipolar	2 (1.2)	29 (3.0)	0.78
Schizophrenia/Psychoses	2 (1.2)	53 (5.5)	0.00
Alcohol/Drug abuse	7 (3.5)	117 (12.2)	0.00
Adjustment Disorder	81 (40.7)	324 (33.8)	0.04
Neuroses	21 (10.6)	65 (6.8)	0.05

Fisher's exact test

the suicide attempt, past medical and psychiatric history, current psychiatric diagnosis and psychosocial events. Initially a pilot assessment was conducted on 10 subjects and some modifications were done in the questionnaire like removing the ambiguity of some items. Test retest reliability of the prepared tool was established by Cronbach's alpha (0.714). Psychiatric diagnosis was based on DSM IV Criteria[12].

Detailed explanations were given to subjects and parents about the purpose of the study. Confidentiality of the information was assured and informed consent was taken from parents prior to enrolling subjects. Rapport was established and explanation was given about the study tool. Total time taken for data collection was one hour for each subject.

Analysis of Data

Data was analyzed by SPSS-10 PC software system. Socio-demographic data and Psychological factors were analyzed by percentage of frequencies. Association between socio-demographic and selected psychological factors between two groups was analyzed using "t" test, "Chi-square" test and "Fisher's exact test".

Results

Table 1 shows the comparison of socio-demographic variables of adolescent versus adults suicide attempters. Significant number of adolescent attempters were females, from nuclear family and had history of medical illnesses. Adult attempters had higher frequency of family history of suicide, past psychiatric illnesses, past suicide attempts and mean number of attempts.

Table 2 shows the comparison of causes for the attempt. Adolescents had significantly higher frequency of events such as friction with family members, love failure, death of loved ones, friction with girl/boyfriends, failure in exam, physical problems etc.

Table 3 shows that significantly more adolescents had medical contact within 1 week of attempt and attempted suicide within 1 week after the stressor. Table 4 shows that current psychiatric diagnosis was more frequent in adults than adolescents. The most frequent psychiatric diagnosis in adolescents was adjustment disorder.

Discussion

Suicidal behavior in adolescent age group is an important public health issue because of the large proportion (21.8%) that 10-19 year olds constitute in the population of India[13]. In a study which evaluated the cause of death among those aged 10-19 years, in a rural population of 108,000 in South India, suicide accounted for about a quarter of all deaths in males and between 50% and 75% of all deaths in females aged 10-19 years. The average suicide rate for girls was 148 per 100,000, and for boys, 58 per 100,000[14]. In the adolescent age group, the associated developmental and social challenges are quite different from that of an adolescent population. Understanding the characteristics and variables associated with adolescent suicide in contrast to adult suicidal behaviours is important in designing interventions specifically tailored to this population.

In most of the earlier studies, girls outnumbered boys in suicide attempt and ideation[15,16]. Present study also there was an over representation of female attempters though it was not clinically significant. An earlier study on adolescent suicides from India has shown equal representation of male and female attempters[17]. This gender paradox is explained by recent studies[18]. Adolescent females feel shy in discussing their views and problems with peers or families resulting in feeling of being isolated and attempt suicide as a cry for help. Furthermore, although adolescent boys have less suicidal thoughts, their ideas translate into more completed suicides. Other possibility for this difference could be due to a cohort effect (ie, more recent female generations are engaging in more suicidal behavior). Additionally, boys may not remember or may minimize the clinical significance of this type of behavior during their adolescence (ie, retrospective reporting grossly underestimates the rates of adolescent suicidal behavior).

Though both the groups had predominance from rural areas (reflecting the catchment area of the hospital), there was a significant difference between the groups with a larger proportion of adolescents from urban areas. Majority of adolescents were found to be hailing from nuclear families. This could be related to fact that most of these adolescents are from urban settings where joint family fragmentation is more likely. Further studies are required to explore the psychiatric morbidity and suicide ideation among the adolescents living in different social settings like rural joint families and urban nuclear families. It also needs to be explored whether there is an underreporting of adolescent suicides in rural settings due to cultural factors.

Majority of adolescent subjects attempted suicide within 24 hours after the stressor whereas the adult subjects attempted more than a week after the stressor. This may suggest that the adolescent attempts were more

unplanned and impulsive. This again ties up with the fact that adolescent suicides appear to be related more with situational problems and associated concerns about social support and coping abilities.

Studies have found that suicidal people frequently consult medical services, usually a primary care physician, shortly before the act, sometime in the last few days or hours prior to the suicidal act[19]. In the present study 94% of the adolescents had contact with medical personnel at least three months before the attempt. Among them, 81% had medical contact within one week of their attempt. Even though the information is not exactly available from the subjects whether they had suicidal ideation during these consultations, considering the predominance of physical and Psychological problems in them, it is a strong possibility having grave implications. One investigation found that 41% of adult persons who committed suicide had contact with a health care professional within 28 days of death, 47 percent within 1 week, and 18 percent on the day of death. However, suicidal intent was discussed in only 22% of this cases[20]. Unfortunately similar data is not available from adolescent group. Educational measures for primary care physicians aimed at identifying the flag signs of suicidality will be useful adolescent suicide prevention.

Many physicians miss or dismiss the telltale signs of suicidality presuming that it is quite unlikely to occur in adolescents. They also have the feeling that asking suicidal ideation may provoke suicidality in certain situations. This lack of recognition and misbelief is compounded by the fact that suicidal intent often presents differently in adolescents and can be confused with changes in personality, sleep problems, drug abuse, fatigue, concentration deficits, diminished memory, lack of initiative etc. They are also less likely to report suicidal ideation and intent compared to adults. This makes difficulty in establishing the diagnosis and initiating treatment. The problem is further compounded by the lack of sensitization among primary care givers regarding adolescent mental health problems.Hawton et al reported that only 20% of their adolescent study sample had Psychiatric disorders[21]. In the present study 60% had psychiatric disorders but with a predominant diagnosis of adjustment disorder. Their attempts were mostly impulsive occurring within a week after the stressor. This again underlines the fact that adolescent suicides appear to be related more with poor social support and maladaptive coping techniques.

In the adult suicidology, one avenue to understand the psychological condition immediately prior to the self-destructive act has been the study of suicide notes. In a study by Posener et al in Montreal, seventeen adolescents who left notes were identified, comprising 10% of the population of suicides[22]. Victims who left notes did not differ from the total group in age and sex distribution. In the present study also only 10% had written suicide notes prior to their attempt. Even though this is a small number, suicidal messages from children and adolescents need to be taken very seriously as it sometimes may offer an opportunity for suicide prevention.

In contrast to adult counter parts, the adolescent group had lesser rates of past psychiatric illnesses, past suicidal attempts, family history of psychiatric illnesses/suicide and current psychiatric illnesses. These findings shows that adult attempters may have more severe psychiatric problems compared to adolescents where attempts are more likely to be related to immediate life stressors. These findings have important implications in developing specific suicide prevention strategies in adolescents. Adequate focus on screening for adjustment problems and developing healthy coping strategies as well as ensuring availability of social support for handling psycho-social stressors should be given due importance in adolescents.

Psychoactive substance abuse is a major problem in adolescents especially so in those who attempt suicide. However, in the present study only a small proportion had a history of alcohol or drug abuse and intoxication at the time of attempt. Other than adjustment disorder, neurotic disorders also significantly outnumbered among adolescents.

Stressors such as conflicts with parents, breakup of a relationship, school difficulties or failure, death of dear ones, and physical ailments were the commonly cited reasons by adolescents for attempting suicide in this study. Among young people, suicidal behavior was found to be associated with female gender, not attending school or college, independent decision making, premarital sex, physical abuse at home, lifetime experience of sexual abuse, and probable common mental disorders. Violence and psychological distress were independently associated with suicidal behavior. Factors associated with gender disadvantage increased vulnerability, particularly in rural women[23]. Family disruptions and discord stemming from excessive arguments and overt violence, loss of relatives due to marital separation or divorce, and problems in family interpersonal relations are reported as stressful circumstances experienced by suicidal adolescents[24]. We also found out that the quality of stressful life events the adolescents have faced in the preceding month is significantly different from adults. This particular aspect highlights the need of early intervention focusing on specific issues in the adolescent period related to their developmental period.

Categorizing the stress according to the source may also be useful. Majority of the adolescents in our study had interpersonal problems with family members and friends as the main precipitating factor for the attempt. When adolescents have problems in their close relationships with

family and friends, they may lose important sources of social support which may in turn increase the risk of suicidal behaviour. Early intervention may be necessary to protect the quality and integrity of these interpersonal relationships. The occurrence of these stressful life events in the recent past should be "red flags" for the clinician working with potentially suicidal adolescents. However, it is also important to note that these events most often occur without suicide as a consequence.

Limitations

Our study does have certain limitations. Cross sectional nature of the study, possibility of retrospective bias especially in the aftermath of the suicide attempt, lack of scales for assessing psychiatric morbidity or severity of suicidal risk could be the important ones. However, considering that the study is a non-purposive comparison study, any rater bias appears to be unlikely. Another issue would the comparatively smaller sample size in the adolescent group. But the strength of our study is that all the evaluations have been consistently done by the same person (a trained psychiatrist) on a consecutive sample.

Conclusions

This study clearly differentiates adolescent suicide attempters from adult counter parts with certain unique risk factors. Adolescent attempters were mostly females, hailing from nuclear urban family, had higher frequency of medical illnesses and had specific life events related to their developmental period. Majority had medical contact within one week of attempt and attempted suicide within a week after the stressor. Their most frequent psychiatric diagnosis was adjustment disorder. Adult attempters were mostly males, had higher frequency of family history of suicide, past psychiatric illnesses, past suicide attempts and current psychiatric diagnoses.

This study suggests psychosocial intervention with specific focus on developmental issues as the most important strategy for adolescent suicide prevention. Future research should examine the role of those intervening variables that are capable of reducing the negative impacts of chronic strains, such as social supports, personality styles and coping skills. Studies with control groups comprising non-suicidal adolescents are also necessary for confirmation of our findings. Adolescents experiencing higher rates of cumulative stressful life events should be the target population for repeated monitoring for identification of suicidal behaviour.

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Original Article

Prevalence of anaemia in school going adolescents in a municipality town of West Bengal

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Anaemia is a major public health problem in India. It directly causes many premature deaths in population. The deaths due to anaemia as indirect cause far outweigh the number due to many well-known causes of mortality in a developing nation. A cross-sectional survey was conducted in two schools of a municipal town of West Bengal. One school was public and the other was private. The haemoglobin was estimated by HaemoCue® instrument. Two hundred students finally participated in the study. 118 (59%) of these students were studying in a government run institute. 105 (53%) of the study participants were females. The mean (SD) age of the study participants was 14.05 (0.8) years. Majority of the participants belonged to lower middle class. About half (51%) of the study participants have correct knowledge about the cause of anaemia. Out of three major meals of the day, study participants'were taking dinner regularly. Around 47% of them missed or never took a breakfast within last week. Around 91% of the study participants were non-vegetarian, a usual diet pattern in this part of the country. The mean (SD) Haemoglobin concentration of students was 12.58 (1.20) gm/dl. The mean haemoglobin concentration of male students was significantly more than that of female. Overall 70 (35%) students were suffering from anaemia. 45 out 105 (42.9%) female students were suffering from anaemia, whereas 25 (26.3%) male students were suffering from anaemia. Male students were significantly more tall and heavier when compared with female students. Anaemia was statistically more common in students belonging to low socioeconomic strata of the society.

The awareness about anaemia and its causes is low in school students. The prevalence of anaemia is high amongst school going adolescents in urban areas of West Bengal.

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Key words **: Anaemia, Prevalence, India, Adolescents, Diet, Nutrition.**

Anaemia is the qualitative and or quantitative diminution of haemoglobin or red blood cells (RBC) or both in respect to the age and sex of individual. The net effect of which is failure in transport of adequate amount of oxygen to the tissues. Generally, anaemia is said to occur when Haemoglobin (Hb) is less than a critical value which depends upon the sex and age of the individual, but symptoms depend not only on the reduction but also on the rate of reduction of Hb[1]. There are several different types of anaemia and each one has a different cause. Nutritional anaemia of which iron deficiency anaemia is a sub-type is the most common type. Other nutritional causes of anaemia are lack of vitamin B12 or folic acid. Iron deficiency anaemia occurs when there is lack of iron in the body. The major dietary sources of iron are meat, dried fruit and some vegetables. Some food items and medicines make iron absorption difficult. Iron is used by the body to make haemoglobin, which helps store and carry oxygen in red blood cells. There are many conditions that can lead to a lack of iron. In men, and postmenopausal women the most common cause is bleeding in the stomach and intestines caused by regular and indiscriminate use of non-steroidal anti-inflammatory drugs (NSAIDs), peptic ulcer, stomach cancer or bowel cancer. In women of reproductive age, the most common causes of iron deficiency anaemia are heavy menstruation and pregnancy. If iron deficiency anaemia is left untreated it can make one susceptible to repeated episodes of illness and infection, as lack of iron in the body affects one's immune system. Severe iron deficiency anaemia may increase the risk of developing complications that affect the heart or lungs such as, tachycardia and heart failure. Pregnant women also have a

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higher risk of complications before and after birth. A major underlying cause of maternal deaths in India is anaemia.

Anaemia is India's major public health problem. There is a wide range of prevalence data available from different regions of the country. In India, anaemia is primarily due to poor nutrition. According to the fourth round of National Family Health Survey (NFHS - 4) conducted during 2015-16, anaemia is prevalent in 53% of women in the age group of 15 to 49 years. It is present in 23% of men in the age group of 15 to 45 years[2].

Adolescence is the period of rapid growth when iron requirement for both boys and girls increase. The incidence of iron deficiency anaemia among adolescents is rising. The awareness regarding anaemia and appropriate diet is extremely poor among adolescents which are made worse by the misleading advertisements in the media. Risk factors for anaemia among adolescents are low intake of meat, fish, poultry and iron fortified foods, frequent dieting, vegetarian life style, heavy menstrual periods, rapid growth, overweight and obesity.

Keeping in view of the importance of anaemia amongst adolescents in Indian context and paucity of studies relating the dietary habits and prevalence of anaemia amongst school going students, a cross-sectional study was done with the aim of finding the prevalence of anaemia in the adolescent boys and girls.

Materials and Methods

A cross-sectional survey was conducted with the primary objective of finding out prevalence of anaemia amongst school going students. The secondary objectives were finding out the factors associated with decreased level of haemoglobin in school students and finding out the gender difference in haemoglobin level and factors associated with these differences. Both boys and girls students studying in two identified schools in the study area were told about the study. They were enrolled once they gave written informed assent. Students studying in standard IX of these schools were enrolled for the study. For comparison purpose schools catering to two different socio-economic background students were covered. Students suffering from serious medical condition where haemoglobin concentration is known to be low were excluded from the study. A sample size of 200 students was calculated based upon the assumption of prevalence of anaemia to be 50% amongst the study population and an absolute error of 7%. We enrolled 100 students studying in standard IX of each of the selected two schools. There was more than one section of class IX in the two schools. Students were randomly selected from the three sections of class IX of each school. The sampling frame contained only those students of class IX of all sections present on the day of the interview and blood draw for haemoglobin estimation. The study was conducted in Kalyani which is a municipality town in Nadia District of state of West Bengal. The two schools chosen were Kalyani Experimental Higher Secondary School, a renowned private educational institution, located in the heart of the city and the Kalyani Shikshayatan, run by the Government of West Bengal. The later school normally caters to students belonging to lower socio-economic strata of the society.

The clearance from the Institutional Ethics Committee (IEC) was taken prior to initiation of the study. Students were told in detail about the study and the procedure to be performed for measurement of the haemoglobin level. Since the students were below 18 years of age, written informed consent of their parent was taken. The students were free to opt out of the study at any time they felt like. The confidentiality of the study participants was maintained, and no personal identifying data were collected. Proper dietary advices for correction of anaemia were imparted to all students after the blood collection. The students identified to be anaemic were given health education regarding the prevention and management of anaemia. Those found anaemic were referred to their nearest health care centre for further evaluation and management of anaemia.

A semi-structured self-administered questionnaire was designed in English. It had questions related to basic socio-demographics-economic status of the participants. Usual dietary history of students was collected. The questionnaire was pre-tested in the same school but in different class which was not part of the study before the conduction of the study. The haemoglobin of the students was measured by an instrument called HaemoCue®. The HemoCue® haemoglobin analyser is a portable, rapid and accurate method of measuring haemoglobin at the bedside. It has a sensitivity of 99.4% and specificity of 88.4%[3]. Height and weight of the students were measured following standard procedures. For the study purpose, anaemia was defined as per the World Health Organization criteria of haemoglobin of less than 12 gm/dl in females and males less than 15 years of age. For males of age ≥15 years the cut-off for anaemia was haemoglobin level of 13 gm/dl[4].

The data collected were entered in MS Excel 2010. The data was analysed by IBM SPSS® version 22.0. The difference of mean haemoglobin concentrations between the schools and also between the genders was tested by independent t- test. Chi-square test was used to compare the proportions. Two-tailed significance test with p value of 0.05 or less was considered to be statistically significant.

Results

Two hundred students finally participated in the study. 118 (59%) of these students were studying in Kalyani Shikshayatan School, a Government run Institute. 105 (53%) of the study participants were females. The mean (SD) age of the study participants was 14.05 (.8) years. The minimum age was 12 years and the maximum age was 16 years. While 15% of the participants' father possessed some professional qualification, majorly (27.5%) were high school pass. All the study participants were classified for their socioeconomic status using modified Kuppuswamy socioeconomic scale. The income ranges for the year 2019 was taken into account[5]. Majority of the subjects belonged to lower middle class (Table 1).

About half (51%) of the study participants have correct knowledge about the cause of anaemia. Rest were either ignorant or had false information about the causes of anaemia. When asked whether they were suffering from anaemia, 8 (4%) replied affirmatively (Table 2).

Out of three major meals of the day, study participants took dinner regularly. Around 47% of them missed or never took breakfast in the preceding week (Fig 1).

Majority of the students were taking any one or more fast foods during 1 to 3 days in a week. 95% of the study participants were in the habit of washing hands before taking any meal. Helminthiasis is one of the prime reasons of anaemia in our country. Students' were asked whether they took an anti-helminthic tablet or suspension within last six months of the date of study. 83% of them either did not take it or they were unaware about it. Around 91% of the study participants were non-vegetarian, a usual diet pattern in this part of the country. Majority (112, 56%) of the non-vegetarians were taking any meat product for 1-3 days in a week. Only 10% of the students were taking any fruit every day. Around 80% of the students were taking at least two servings of green leafy vegetables, a rich source of iron every day. The mean (SD) Haemoglobin concentration of students was 12.58 (1.20) gm/dl. The minimum value of Hb was 9.3 gm/dl and the maximum were 16.4 gm/dl. The mean haemoglobin concentration of male students was significantly more than that of female (13.13 *versus* 12.09, p value <0.000, Table 3).

Overall 70 (35%) students were suffering from anaemia. 45 out 105 (42.9%) female students were suffering from anaemia, whereas 25 out of 95 (26.3%) of male students were suffering from anaemia (Table 4). Anaemia was significantly more common in females compared to males (Chi square statistic 5.99, p value: 0.014)

Out of 70, 54 (77%) students were suffering from mild anaemia and 16 (23%) were suffering from moderate anaemia; no one had severe anaemia (Fig 2).

Male students were significantly more tall and heavier when compared with female students (p value <0.01, Table 5).

Anaemia was not statistically associated with the usual food habits of the respondents (chi square statistic 0.454, p value 0.501). It may be due to large number of non-vegetarians in the sample. Anaemia was statistically more common in students belonging to low socioeconomic strata of the society (Table 6).

Discussion

The findings of this school-based study to find out

Table 1 — *Distribution of study participants according to their socioeconomic status (n=200)*

Socioeconomic class	Frequency	Percentage
Upper (I)	23	11.5
Upper middle (II)	52	26.0
Lower middle (III)	73	36.5
Upper lower (IV)	52	26.0
Lower (V)	0	0.0
Total	200	100.0

Table 2 — *Self-reported prevalence of anaemia (n=200)*

Suffering from anaemia	Frequency	Percentage
Yes	8	4.0
No	42	21.0
Don't know	150	75.0
Total	200	100.0

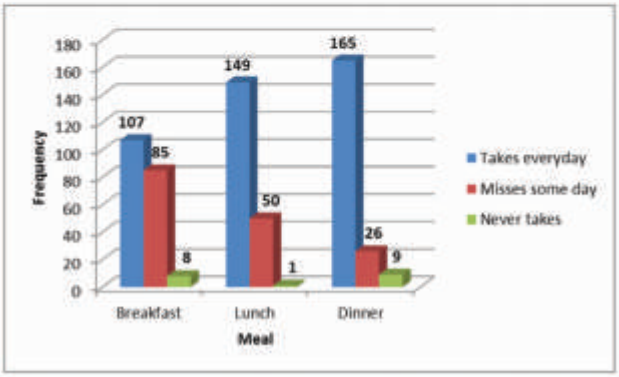

Fig 1 — Intake of regular meals of the day of participants (n=200)

Table 3 — *Sex-wise distribution of mean haemoglobin of study participant (n=200)*

Sex	Mean Hb (in gm/dl)	Standard deviation	t-statistic, p value
Male	13.13	1.07	6.8, <0.000
Female	12.09	1.09	

Table 4 — *Prevalence of anaemia in different sexes (n=70)*

Sex	Frequency	Percentage	Chi square statistic, p value
Male	25	26.3	5.99, 0.014
Female	45	42.9	
Total	70	35.0	

Table 5 — *Anthropometric detail of study subjects (n=200)*

Sex	Male (n=95)	Female (n=105)	t-statistic and p value
Mean (SD) height in cms	158.8 (9.5)	149.6 (5.3)	8.52, 0.0000
Mean (SD) weight in kgs	46.2 (9.9)	43.4 (7.9)	2.22, 0.027

Table 6 — *Distribution of study participants according to their socioeconomic and anaemia status (n=200)*

Socioeconomic class	No anaemia	Anaemia	Total	Chi square statistic, p value
Upper (I)	16	17	23	10.065, 0.017
Upper middle (II)	42	10	52	
Lower middle (III)	45	28	73	
Upper lower (IV)	27	25	52	
Total	130	70	200	

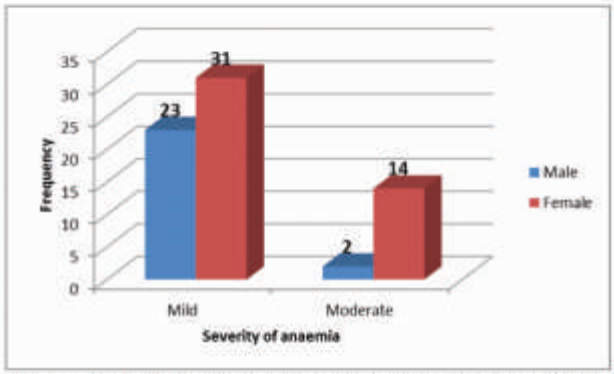

Fig 2 — Distribution of anaemic students according to the severity of anaemia (n=70)

prevalence of anaemia amongst students revealed that 35% of the total sample population had anaemia. We could not find any case of severe anaemia. Majority were suffering from mild anaemia. Various studies found out the prevalence of anaemia to be between 19 to 88% in different part of the country[6]. Soma Gupta *et al*[7] conducted a study in the Midnapore district of West Bengal wherein they measured the haemoglobin concentration of school students (6 - 16 years). They found out that overall prevalence of anaemia in school going students was 80.2%. It was more in female students (86.1%) compared to male (76.0%). According to a study done by Saratha A *et al*[8] in South India, out of total 300 medical and nursing female students 228 (76%) were anaemic. Of them 170 (56.67%) had mild and 58 (19.33%) had moderate anaemia. A community-based cross-sectional study was carried out in rural areas of West Bengal by Arlappa N *et al*[9] during 2002 - 2003. A total of 437 pre-school children were covered for the estimation of blood haemoglobin levels. Majority (81%) of them were anaemic, and the prevalence was significantly (p<0.001) higher among 1 – 3 year-old (91%) as compared to 4 - 5 year-old (74.6%) children. Santanu K Sharma *et al*[10] did a community-based survey in Assam to find out anaemia amongst adolescent females. They found out that 71.5% of the surveyed females had anaemia. Sabita Basu *et al*[11] conducted a study to assess the prevalence of anaemia among 1120 apparently healthy adolescents (12 to 18 years) sampled from 11 city and 2 rural schools in Chandigarh. All the boys and the girls were subjected to anthropometric examination and haemoglobin estimation. The estimation of haemoglobin was done by cyanmethemoglobin method. The overall prevalence of anaemia calculated as per WHO Guidelines was significantly higher among girls (23.9%) as compared to boys (odds ratio 3.75, 95% CI2.59 to 5.43, P<0.01). A cross sectional study done in urban schools of Ludhiana, Punjab found out that overall prevalence of anaemia was 51.5%. Girls had a significantly higher prevalence of anaemia except at 5 years and 10-12 years age[12]. Another cross-sectional survey done in Bangalore of South India amongst 2030 boys and girls, aged 5-15 years, attending schools found out that mean (SD) Hb concentration of all children were 12.6 (1.1) g/dl (range 5.6-16.7). The overall anaemia prevalence was 13.6%. Anaemia prevalence was lower in boys than girls (12.0% *versus* 15.3%)[13]. Researchers estimated the prevalence of iron deficiency anaemia among adolescent schoolgirls in the age group of 13-17 years in Chennai. Haemoglobin was estimated using cyan method. The prevalence of anaemia was found to be 78.75% among school students[14].

Saratha A *et al*[8] found out that 157 (89.71%) students who did not consume green leafy vegetable regularly were anaemic. They also found out that anaemia was associated with increasing age, increasing academic year, consumption of non-green leafy vegetable and passage of worms in stool. They could not find any significant association between anaemia and consumption of veg/non-veg foods, history of chronic illness, type and duration of menstrual cycle. Similarly, there was no significant association between anaemia with height, weight and BMI. According to Arlappa N *et al*[9] children belonging to lower socio-economic Scheduled Caste and Scheduled Tribe communities were at higher risk for anaemia (OR=2.3; 95% CI 1.3–3.9). Ludhiana study[12] found out that more menarcheal girls were anaemic as compared to non-menarcheal ones. The prevalence of anaemia was high (38%) even in higher socioeconomic groups. Nearly half (47.6%) of well-nourished children were anaemic. The mean Hb also was lower than expected normal values in both nutritional groups. Compared to non-vegetarians (38%), more vegetarians (65.9%) were anaemic. Chennai study[14] showed significant association of anaemia with type of

family, socioeconomic status and diet. In this study 42.5% of girls with BMI < 18 were found to be anaemic.

The result of the present study is somewhat in between of these extremes. This study is unique in a sense that it was carried out amongst students studying in a particular class of two schools. There was little variability in the age of the sample students. The major difference between the prevalence of anaemia in adolescents in this research and others may be due to three reasons. First, none of the study found out by us was conducted by HemoCue® device. The other reason may be the students were comparatively belonging to better socio-economic strata of the society compared to others tudies. The third reason of finding a low prevalence of anaemia may be the school health programme run by the Indian government wherein iron folic acid tablets and albendazole tablet is regularly given to school students. The finding of this study that anaemia is more prevalent in female students compared to male is similar to almost all searched studies. The mean haemoglobin concentration of all students of our study (12.58 gm/dl) is similar to that of the Bangalore study[13] (12.6 gm/dl).We could not find any association between the consumption of vegetarian food with anaemia. Saratha A *et al*[8] also could not find any similar association. Our finding of increased anaemia in lower socioeconomic strata of society is consistent with Arlappa N *et al*[8] study. Low quality of nutrient intake is common in those who cannot afford to buy green leafy vegetable and meat products. The limitation of the study is that the researchers did not attempt to find out the reason of anaemia whether iron, vitamin B12 or folate deficiency in diagnosed cases of anaemia.

We conclude that the awareness about anaemia and its causes is low in school students. The prevalence of anaemia is high amongst school going adolescents in urban areas of West Bengal. Anaemia is more common in female adolescents compare to their male counterparts. Low socioeconomic status is significantly associated with high prevalence of anaemia. The mean haemoglobin concentration of females is low compared to males even when analysed for all children below 15 years of age.

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Case Report

Idiopathic Pancreatic Pseudocyst in a Child : a rare entity

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Pancreatitis is uncommon in children. Pseudocyst formation as a complication of pancreatitis is even more uncommon, and leads to significant morbidity and mortality as compared to adult patients. Aetiologically, paediatric pseudocyst formation in children, most commonly occurs following trauma. Other possible aetiological factors can be other anomalies of the pancreaticobiliary system, viral illnesses and use of steroids. We report a case of a 3 year old child who presented with pseudocyst of pancreas of idiopathic aetiology and discuss the management of such a case.

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Key words **: Pseudocyst of pancreas, Pancreatitis, Paediatric, Idiopathic.**

Pancreatitis is uncommon in children. Pseudocyst formation as a complication of pancreatitis is even more uncommon. Aetiologically, paediatric pseudocyst formation in children, most commonly occurs following trauma. Other possible aetiological factors can be other anomalies of the pancreaticobiliary system, viral illnesses and use of steroids. Idiopathic aetiology is extremely rare and in view of this rarity, a high level of clinical suspicion and supporting imaging is necessary, to diagnose this disorder in the paediatric population. We report a case of a 3 year old child who presented with pseudocyst of pancreas of idiopathic aetiology, and discuss the management of such a case.

Case Report

A well nourished, fully immunised, active 3 year old girl presented to the outpatient clinic complaining of vague upper abdominal discomfort intermittently since 3-4months. The mother noticed an upper abdominal fullness since the preceding 10 days. There was no history of associated fever, vomiting, abdominal pain or any history of abdominal trauma or any significant past illness.

Examinations **—** On examination, there was fullness in the epigastric region, extending laterally onto both hypochondria and inferiorly to the umbilicus. It was soft, non-tender, with ill-defined margins. Biochemical investigations were unremarkable. Ultrasonography (USG) revealed a large, hypoechoic lesion in the epigastrium, posterior to the stomach and pushing it anteriorly. Computed Tomography (CT) scan confirmed a smooth, enhancing cystic lesion arising from the pancreas suggestive of a pancreatic pseudocyst (Fig 1), displacing the stomach anteriorly and the transverse colon inferiorly. Pancreaticobiliary malformation was ruled out on MRCP.

The child was given a conservative trial for a month, but, the mass had not regressed in size. After further 2 weeks, ie, 6 weeks since presentation, since the mass had not resolved nor regressed in size, she was taken up for surgery.

On exploration, a huge pseudocyst was seen arising from the pancreatic body, densely adherent to the posterior stomach wall, displacing the stomach anteriorly and the transverse colon inferiorly. Over a litre of clear fluid was aspirated from the pseudocyst and a cystogastrostomy done (Fig 2 a, b, c).

The child had an uneventful recovery and was discharged. She was followed up over 1 year, and has not had any similar complaints during the period.

Discussion

Pancreatitis is rare in children, and pseudocyst formation, as a complication of pancreatitis, is even rarer. While evaluating a child with abdominal pain, a clinician should have a high index of suspicion for diagnosing it. The pathogenesis involves disruptions in the pancreatic duct followed by secretions extravasating from the acinar

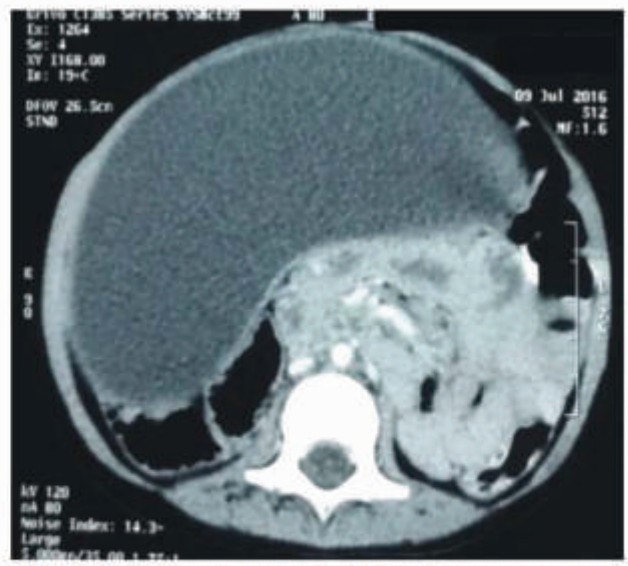

Fig 1 — CT Scan showing bulky heterogeneous pancreas with large smooth, enhancing, cystic SOL in upper abdomen, with mass effects

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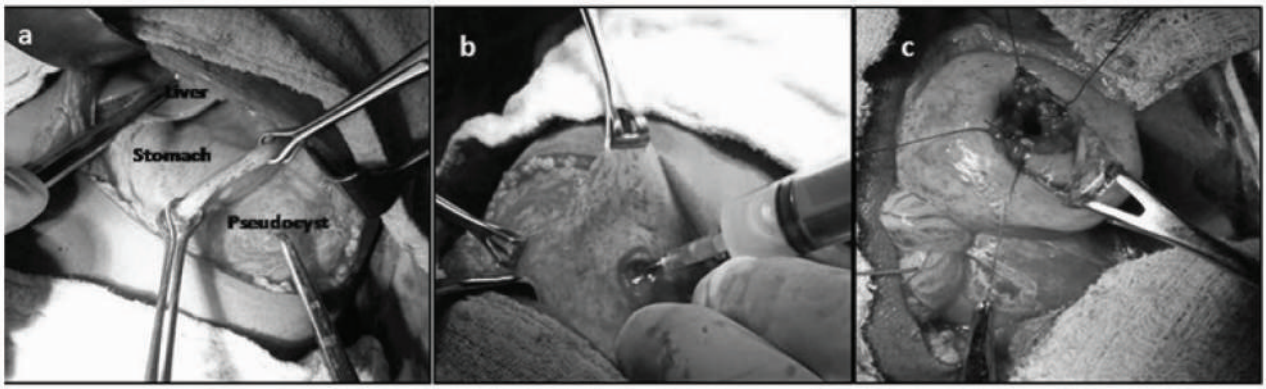

Fig 2 — (a) Relation of pseudocyst with stomach, (b) Aspiration to confirm pseudocyst, (c) Cystogastrostomy being fashioned

cells of the pancreas.Trauma is the commonest cause of pseudocyst formation in children (over 60%), when the pancreas gets compressed against the vertebral column. It may also form as a sequelae of pancreatitis, pancreaticobiliary system anomalies like pancreatic divisum, viral illnesses and steroid use. Our patient did not have any history of trauma, nor did her history, biochemical or imaging findings suggest any other aetiology. Hence, itwas considered to be idiopathic. The challenge of diagnosing such a case increases, in view of no suggestive aetiological history.

USG is the initial imaging of choice in children, since there is no ionizing radiation. On USG, pseudocysts are seen as unilocular or multilocular (with internal septations), well defined, smooth walled, hypoechoic lesions. If hemorrhage or infection is present, internal echoes or may be seen.

CT scan is mandatory for planning the treatment. It identifies the size, margin and nature of the pancreas with presence or absence of peripancreatic fluid. The pseudocyst appears as an area with well defined wall or capsule which enhances on contrast, and a central area of low attenuation. CT scan can accurately evaluate the presence and extent of pancreatic necrosis and peripancreatic fat inflammation.

ERCP / MRCP is essential to rule out any pancreatico-biliary anomalies.

Since paediatric pseudocysts are rare, there are few reported large series, and there is no consensus on optimal management. Pseudocysts <5cm usually resolve spontaneously or with conservative management, which involves hydration, analgesia, bowel rest and parenteral nutrition. Larger cysts are less likely to resolve spontaneously, and may be complicated by rupture, haemorrhage, infection, or lead to gastric outlet obstruction. So, larger pseudocysts and those failing a conservative trial require either internal or external drainage. Asymptomatic cysts >5cm even with minimal symptoms or those without any morphological or size change after a 6 week conservative trial require intervention[1]. Even if drainage is contemplated, conservative management for 4-6weeks, is needed for cyst wall maturation[2]. Though laparoscopic internal drainage has made advances in management of pseudocyst of pancreas over the last two decades, experience in paediatric population is limited and long-term outcome of relevant studies is awaited[3]. Open internal drainage, either cystogastrostomy, cystoduodenostomy or cystojejunostomy, remains the mainstay of management, the option depending on the anatomic location of the pseudocyst.

Advances in imaging and endoscopy have made image guided percutaneous drainage and endoscopic drainage safe and effective in skilled hands. Endoscopic treatment aims to create a communication between the cyst cavity and the gastrointestinal tract. However, it is dependent on the anatomical location of the pseudocyst. For endoscopic treatment to be feasible, the distance between the pseudocyst and the gastrointestinal wall has to be <1cm[4]. However, recurrence rates with percutaneous and endoscopic drainage procedures are higher than surgical internal drainage. Since most studies on percutaneous and endoscopic drainage procedures have been performed on adults, further studies to compare these techniques in children are required to determine the optimal management in children[5,6].

Till then, surgical drainage remains the management of choice in paediatric pseudocyst of pancreas.

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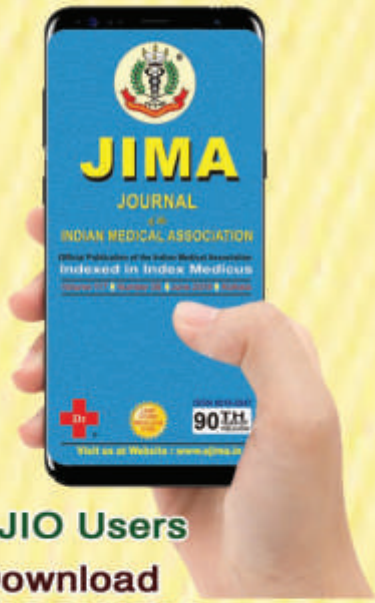

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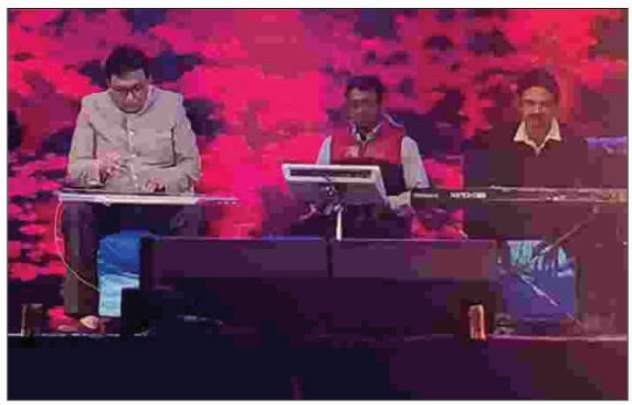

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