

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

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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.

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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 Maharashtra⁵. 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 flooding⁶. 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 Pythons⁷. 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 to 70 years of age and 17 (10.6%) between 11 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/compartamental 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 bites⁹⁻¹¹.

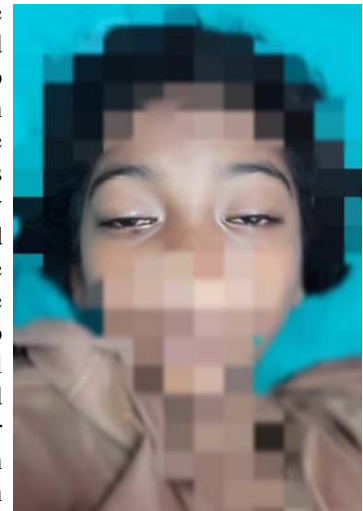
Males were found to be more affected (above 70%) and that more than 70% of middle aged persons with age ranging from 30 to 49 years were affected. In Bankura District of West Bengal more than 50% of the snake bite victims were in the 30 – 50 years aged group¹². In Paschim Midnapore District of West Bengal too the majority age group (>42%) affected was the 31 -50 age group¹³. Similarly, males accounted for more than 56% in Paschim Midnapore¹³. 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 forests⁶.

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 season¹⁰.

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.

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}.



Before Treatment



After Treatment



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

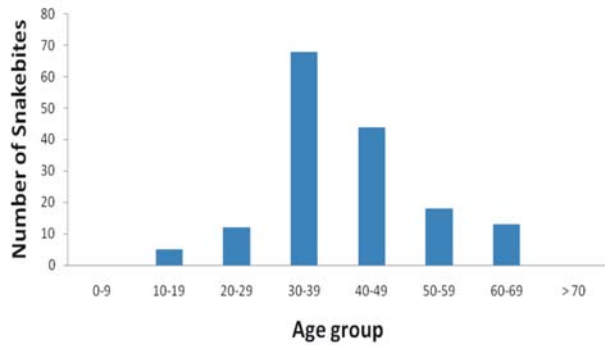


Fig 2 — Age distribution of Snakebites, Alipurduar District Hospital, Alipurduar, West Bengal

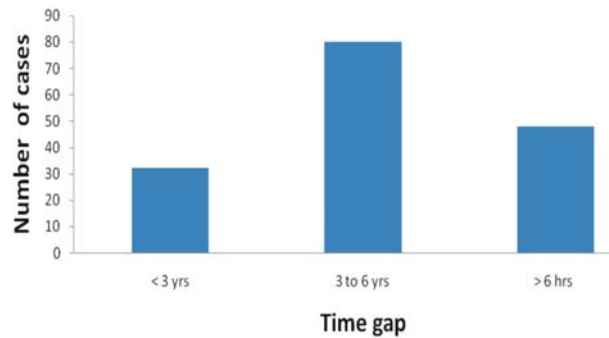


Fig 4 — Time gap between Snakebite and Hospitalisation, 2013-2014, Alipurduar District Hospital, West Bengal

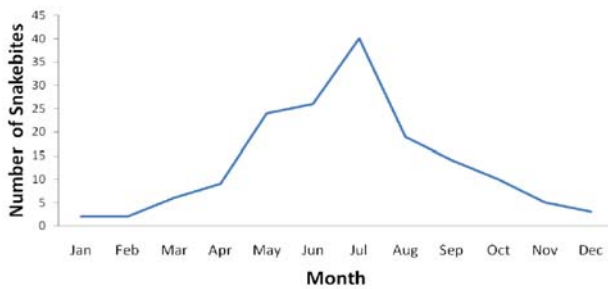


Fig 3 — Monthly distribution of Snakebites in 2013-2014, Alipurduar District Hospital, West Bengal

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 depression¹⁷. Anxious people may over-breathe so that they develop pins 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 effects¹⁷. 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

of venom¹⁵.

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 envenomation¹⁸. 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 snakebite¹⁹. In Purulia District in West Bengal, less than 30% snakebite victims reached the hospital within 6 hours of bite²⁰. This reflects that the awareness level and service access in Alipurduar District is relatively better.

Only 12.5% of the patients sought interventions from

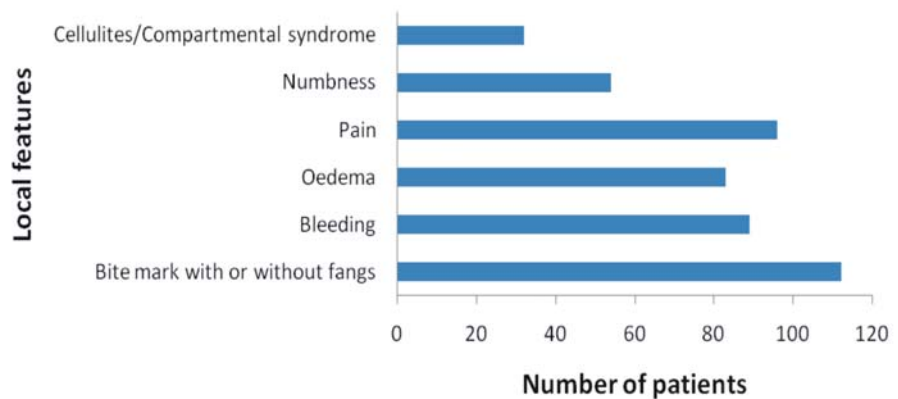


Fig 5 — Local freatures in Snakebite cases, 2013-2014, Alipurduar District Hospital, West Bengal

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 healers¹⁴. 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 Bengal¹⁹. In Bankura district of West Bengal around 50% of snakebite deaths were due to neurotoxic envenomation¹². 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 Alipurduar⁷.

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 victims⁹.

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 world²¹⁻²³. 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 caused 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 year⁶.

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 state¹⁴. 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 be 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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