Original article

Analysis of snake bite victims in a tertiary care center

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Abstract

Background: Snake-bite is a common cause of morbidity and mortality in tropical countries. In India, there are 216 species of snakes, of which only four (cobra, krait, Russell's viper and saw scaled viper) are venomous. **Objective:** The aim of the study was to evaluate the epidemiological profile, clinical features, complications and mortality rate of snake bite victims admitted in a tertiary care hospital in Andhra Pradesh, India. **Methods:** The study was conducted at Mamata General Hospital, khammam from June 2010 to May 2012. A total of 39 cases with history of snake bite were analysed. **Results:** Out of 39 cases, majority of the cases were observed in the age group 20-50 year (66%). High incidence of snake bite was observed in males 62%). The common victims were farmers and housewives. The bite was commonly encountered while walking bare foot (30%) followed by while sleeping (14%). Fifty Four percent of victim were bitten during outdoor and agriculture related activities. Maximum number of cases (54%) presented within 12 hour of snake bite and 66% cases had 1-5 days of hospital stay. Majority (82%) were bitten on the legs below knee. Localized oedema at the site of bite was present in 70% victim. Fang/teeth marks were noted in (41%) cases. There were 59% neurotoxic snake bites, 26% haemolytic, 5% mixed and 8% non-poisonous snake bites. Most of the cases developed cellulitis at the site of snake bite (21%), shock (12%), and acute kidney injury (8%). One tenth of the cases required assisted ventilation and overall mortality rate was 8%. **Conclusion:** Snakebites are still common in the rural population of India. There is need to educate the public about the preventive measures of snake bite, advantages of early hospital referral and treatment.

Keywords: anti- snake venom, ASV mortality, snake bite

Introduction

In tropical countries like India, snake bite is an occupational disease of the farmers and plantation workers. The frequency of contact between snakes and humans depends on population densities, diurnal and seasonal variations in activity and types of behavior (e.g. human agricultural activities). Severity of envenoming depends on dose of venom injected (-depends on mechanical efficiency of bite and species and size of snake); composition and hence potency of venom (-depends on species and, within a species, the geographical location, season and age of the snake); health, age, size and probably specific immunity of human victim; and nature and timings of first aid and medical treatment. The victims of snake bites are mainly of rural population, who are bitten during field work and when sleeping outdoors. (1) It has been estimated that 5 million snake-bite cases occur worldwide every year, causing about 100,000 deaths. On an average, nearly 2, 00,000 persons fall prey to snake-bite per year in India and 35,000-50,000 of them die every year.(2) In spite of snake bite being the common public health problem in India, there are few reliable data as most victims are

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treated by traditional methods and are lost to the official statistics.This cross sectional study was undertaken to develop an epidemiological profile of snake bites that includes age and sex specific incidence of snake bites, consequences of snake bites and mortality in the context of rural Andhra Pradesh.

Methods

The patient population included in this study was snake bite victims aged 14 years and above who had been admitted in ICU or Emergency Department under General Medicine of our hospital during two years period from June 2010 to May 2012. Ethical clearance was obtained from Institutional Ethics Committee and informed consent was taken from the patients or from the guardians. All the patients were treated with a standard institutional treatment protocol. Antibiotic and anti snake venom (ASV) administration were left to the discretion of the treating physicians, although following the World Health Organization practice guideline for South-East Asians countries was encouraged. Various parameters were noted against each patient during the course of treatment. Accordingly the data were initially recorded under three major groups:

***Group 1*:** victims who were brought dead

***Group 2*:** victims who left against medical advice

***Group 3*:** victims who were managed in the medical college hospital

Only data of patients of group 3 were further analyzed for the following parameters:

- Number of patients admitted with history of snake bite
- Number of patients developed cardiac or respiratory arrest during hospitalization
- Site of bite
- Visible bite mark present or absent
- Type of snake bite
- Time elapsed between the bite and ASV administration (lag time)
- Hypersensitivity reactions to ASV
- Total dose of ASV received
- Duration of hospital stay
- Complications developed during management
- Mortality

Results

Over a period of 2 years, from June 2010 to May 2012, a total of 41 patients reported to the emergency department with history of snake bite, of whom 1 patient was brought dead, 1 patient opted treatment at government health care facility after initial first aid. The demography of the study population, bite site, clinical findings, investigations, toxicity and ASV reactions in addition to final outcome are depicted in Table 1. Snake bite was noted predominantly in the rural agricultural population of Andhra Pradesh, with male predominance (male to female ratio being 1.3: 1). The main species which had been identified in the study area are Russell's viper (*Daboia russelii*), common cobra (*Naja naja*) and common krait (*Bungarus caeruleus*). The common victims were farmers and housewives. The bite was commonly encountered while walking barefoot during night time (30%) followed by sleeping in the open, during summer months (14%). Fifty four per cent (54%) cases were bitten during outdoor and agriculture related activities. Bite site was mostly in the lower limbs. Nearly fifty per cent of the patients sought first aid in the local clinics and primary health centers prior to recieving definitive treatment in the Medical College hospital. Only 54% cases were admitted within 12 hours of the bite.

Local pain and swelling, blurring of vision, loss of consciousness, frothing from mouth and difficulty in breathing were the most common presenting complaints at the time of admission. Systemic manifestations observed in cases of cobra bite included blurring of vision, ptosis, ophthalmoplegia, dysarthria, muscular weakness and respiratory embarrassment. Ptosis (46%) was the chief neurotoxic feature followed by dysarthria.

As a specific treatment, polyvalent ASV vials were used during treatment. The number ASV vials administered to each patient of neurotoxic bite ranged from 5 to 15 vials, at an average

of 11 ASV vials per patient, haemolytic snake bite ranged from 5 to 30 vials, with an average of 14 vials, mixed snake bite with an average of 13 vials. 10% cases did not receive ASV as they are non-poisonous snake bites. Surgical intervention included debridement of necrosed tissue, incision and drainage. Tetanus toxoid was administered in all patients. The hypersensitivity reaction rate was about 3% and was predominantly minor anaphylactoid in nature-pruritus, hypotension, urticarial rash, syncope, fever etc. About 28% demonstrated clinical evidence of bleeding. However, 5% of these patients did not have laboratory evidence of bleeding disorder. This is statistically significant ($p<0.001$). Laboratory evidence of acute renal failure was noted in 10% of patients with clinical signs of haematotoxicity and 10% cases required haemodialysis. Abnormal platelet count (defined in our study as <1,00,000) was noted in 10% and approximately 26% demonstrated leucocytosis (WBC> 11,000), ranging up to 37,000/mm^3. Admission to the intensive care unit was required in 75% of the total cases. About 10% required mechanical ventilation, which extended up to 8 days (Fig. 1). The indications were respiratory failure due to neurotoxicity. Of these, two patients expired. Of the remaining patients who did not require the assisted ventilation, one patient died. Length of hospital stay ranged from 1 to 15 days with an average of 4.8 days (±4). Morbidity included renal failure, hemiplegia, coagulopathy, pancreatitis and post-anoxic encephalopathy. The overall mortality rate was 8%.

Table 1: Patient characteristics, clinical finding, management and outcome

Demography	Age (years)	35.23 ± 16.06
	Male	24 (62%)
	Hospitalization within 12 hrs	21 (54%)
Bite site	Upper limb	7 (18%)
	Lower limb	32 (82%)
	Trunk and head	Nil
Clinical findings	Heart rate/min	92.41±22.26
	Mean systolic pressure (mmHg)	116.92±29.26
	Respiratory rate/min	21.92±3.45
	Abnormal pulse	28%
	Oximetry %	94.87
	Loss of consciousness	28%
	Vomiting	21%
	Ptosis	46%
	Diplopia	13%
	Ophthalmoplegia	Nil
	Dyspnea	5%
	Dysarthria	38%
	Muscle weakness	10%
	Bleeding at bite site	23%
Laboratory findings	Haematuria	46%
	Prolonged PT	23%
	Prolonged INR	17.5%
	Prolonged PTT	23%
	Leucocytosis	25.6%
Toxicity	Nil	10%
	Haemato-toxicity	26%
	Neurotoxicity	59%
	Mixed	5%
ASV reaction	Anaphylaxis	Nil
	Anaphylactoid reactions	2.5%
	Nil reactions	97.5%
Management	Mechanical ventilation	10%
	Inotrope support	28%
	Blood transfusion	12.8%
	FFP transfusion	5%
	Surgical intervention	7.6%
Outcome	Non-envenomated cases	10%
	Acute kidney injury	10%
	Mortality	7.6%
	Mean length of hospital stay (days)	4.82±4.03

Discussion

In this study, most of the victims were male (62%) residing in the villages surrounding the medical college hospital. The male preponderance was similar to the findings of the previous studies.[3,4] Working outdoors and in the paddy fields barefoot could be the cause of male preponderance. The age group 20 to 50 years with a peak incidence in the third decade has been observed in India and South-East Asian region.[1,5-8] The bite was commonly encountered while walking bare foot during night time (30%) or sleeping outdoors (14%). Most of the houses in the villages are muddy and the snakes live in the holes of these muddy floors. Moreover, people store grains like paddy etc in their houses which provides shelter to the snakes and thereby increase the risk of snake bite. Similar observations were also reported from Bangladesh.(9)The majority of the patients (82%) had snake bites in the lower extremities. This may be due to snakes being trodden upon by the victims while walking in the agriculture fields or indoors. Cobras are common sources of daytime bites. Similar findings were reported from other south-east asian countries including Bangladesh, Nepal, Malaysia and Hong Kong.[9-14]

Fifty four percent of the victims presented to hospital for treatment within twelve hours of the snake bite. Seventy percent of the victims first went to the local quacks to seek treatment, only thirty percent went to a registered medical practitioner or hospital directly after the bite. The present study shows that majority of the people residing in the rural areas do not go to the doctor or the hospital immediately following snake bite and waste the golden hour of survival. The reason for this requires thorough evaluation but may include lack of awareness about medical treatment and advantages of early presentation to the hospital, lack of availability of anti snake venom in the public hospital, lack of transport facilities and poor economic conditions to afford transportation and subsequent treatment. Similar observations were made in previous studies conducted in Nepal.[11,15]

Intravenous ASV is the most effective treatment for the management of snake bites. Quacks in Andhra Pradesh practice many unhygienic measures such as multiple incisions, tight tourniquet around the limb, sucking of blood from the bite wound etc. Therefore, these quacks and rural practitioners should be trained in the first aid measures as a priority, so that the risky behaviors can be prevented. They can be trained to apply tourniquets properly and educated to immediately refer the patients to the nearest primary health care center. ASV should be made available in the government hospitals, particularly in the remote areas where snake bite incidence is high.One of the challenges to the emergency physician is to quantify the anti-venom dose. Dosage requirements and recommendations have varied significantly from an average of 51.2 vials for cobra bites and 31 vilas for viper bites.[16] In the present study, the number vials required for the neurotoxic envenomation was 11 vials, for hemolytic envenomation was 14 and for mixed features 13 vials. This is encouraging and provides the impetus for further investigations. This further strengthens the evidence in favour of low-dose protocol with an overall mortality of 8 % in adults which is comparable with the previous studies. In this study, only fifty four percent victims reached the hospital within 12 hrs after bite. The mean time taken by patients to arrive to the hospital was 0.5 to 10 hrs in various studies.[3,17,18]. This indicates that the public awareness regarding snake bite and its consequences is very poor amongst the rural people. Further, the poor transportation facilities and socio-economic condition are the contributory factors for the delay in arriving at the hospital. This study shows that bites were common when working and sleeping outdoors. Therefore, community awareness programs about snake bite, emphasizing the importance of wearing shoes and sleeping indoors will be effective preventive steps. The findings would be of use for planning and formulating strategies and specific interventions to prevent snake bite related morbidity and mortality in

Andhra Pradesh. Poor access to health care facility increases the risk of complications of envenomation. Scarcity of supply of anti snake venom in the government health facility is a major contributory factor for increased morbidity in rural areas which needs to be addressed by local administration.

Conclusion

Snake bite related morbidity and mortality is preventable. Availability of anti-venom and better facilities at primary health centres with rapid transportation facilities may change the morbidity associated with snakebites. Early administration of the polyvalent anti-venom has reduced morbidity and mortality. Therefore, there is need to educate the rural population about the preventive measures, hazards and treatment of snake bites.

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