

Presentation, treatment profiles, and outcome of snake bite patients presented in emergency department at a tertiary hospital in Eastern Nepal

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ABSTRACT

Background: Snake bite is one of the most common animal bites in Nepal. Different species of snake cause different clinical presentations. The incidence of snakebite is very high in rural Nepal. The objectives were to assess the presenting pattern, demographic profile, outcome, and treatment profiles of snakebite victims admitted to the emergency ward. **Materials and Methods:** A retrospective cross-sectional study was conducted among the patients who presented in emergency department with alleged history of snake bites from 2015 to 2016. The patient's record files were reviewed and the relevant data were recorded on a self-designed proforma. Descriptive statistics were calculated using SPSS version 11.5. **Results:** Out of 137 snakebite victims, 73 (53.3%) were female. The mean age was 35.17 ± 18.27 years. The upper limb (59%) was the most common site for snake bites followed by the lower limb (35.1%). Fifty patients (36.2%) were bitten by snakes during night (20.00–2.59 AM). Twenty-eight (20.4%) patients presented with ptosis as the most common sign and symptom followed by diplopia (15.3%). Out of 137 patients, 39 (28.5%) were admitted, 65 (47.4%) discharged, and 12 (8.8%) patients expired. Antisnake venom was given to 30 patients among which 23 patients (76.7%) were improved. **Conclusions:** Snake bite is one of the major problems in rural Nepal. It can be easily managed if treatment is given properly and in a timely manner. The importance of effective first aid management and effective treatment have to be disseminated among the peoples in rural areas via social media and radio.

Keywords: Antisnake venom, emergency, neglected disease, snakebite

Introduction

Snake bite is the most common animal bite in Nepal and is one of the neglected conditions distributed widely throughout the world. It is one of the emergency conditions present in tropical and subtropical countries.^[1] Around 40,000 individuals are reported to be bitten by snakes each year resulting in nearly 3000

death in Nepal.^[2] The clinical presentation varies with the species involved and the severity of envenomation.^[3] The severity of the bite depends upon the size and species of snake; amount and degree of toxicity of venom; location of bite, first-aid measures taken, timing of treatment, presence of comorbidity, and unique susceptibility of victim to venom.^[4]

The highest incidence of venomous snakebites in Asia occurs in the southeastern Nepal.^[5] The incidence of snake bites is particularly high in rural areas of warm regions where snakes are abundant and human activities, mainly agriculture, increase the risks of man-snake encounters.^[6] The case fatality ratio is

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high (3–58%) in Nepal; however, snakebite is not a major public health issue in Nepal.^[5] Snake bite has been neglected by many in comparison with other public health issues, which received a lot of attention from health care providers and policymakers. An epidemiological knowledge gap exists due to inconsistent and incomplete hospital medical records of admitted snakebite cases.^[7] Hence, the current study was conducted with the objectives of assessing the presenting pattern, demographic profile, outcome, and treatment profiles of snakebite victims admitted to a tertiary care hospital in Eastern Nepal.

Methods

A retrospective cross-sectional study was conducted among snake bite patients at emergency ward of B. P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal from January to June 2018. All patients who presented in the emergency department with an alleged history of snake bite from January 2015 to December 2016 were enrolled. The case files having incomplete data and other animal or insect bites were excluded. Data were collected from the medical records of BPKIHS. A convenience sampling technique was used. Ethical clearance was taken from the Institutional Review Committee of BPKIHS. A self-designed data collection tool was used to collect the data after reviewing the patient's medical record. Sociodemographic data (age, gender, occupation, and address), documentation of snake bite and its treatment [type of snake bite, site and place of bite, time of bite, initial clinical presentation of the patient, dose, route, and frequency of administration of antsnake venom (ASV)] and adverse reactions were collected in the data collection sheet. The data were entered to Microsoft Excel 2016 and descriptive statistics were calculated using Statistical Package for the Social Sciences (version 11.5). The findings were presented as tables and graphs.

Results

Out of 137 snakebite victims, 73 (53.3%) were female and 57 (41.6%) were farmers. The common age group was 25–34 years (29.9%) with mean age of 35.17 years (SD = 18.273) and median age of 32 [Tables 1 and 2].

The upper limb (59%) was the most common site for snake bites followed by the lower limb (35.1%) [Table 3].

Fifty patients (36.2%) were bitten by snakes during the night (20.00–2.59 AM) [Table 4].

Twenty-eight (20.4%) patients presented with ptosis as the most common sign and symptom followed by diplopia (15.3%). Signs and symptoms of envenomation were observed only in 30 patients (21.9%). Both local and systemic signs and symptoms were present in 18 patients (13.1%) out of 30 patients [Table 5].

Out of 137 patients, 39 (28.5%) were admitted, 65 (47.4%) were discharged, and 12 patients (8.8%) expired [Table 6].

Table 1: Demographic profile of the patients with snakebite (n=137)

Characteristics	Frequency (%)
Sex	
Male	64 (46.7)
Female	73 (53.3)
Age (years)	
15–24	20 (14.6)
25–34	41 (29.9)
35–44	33 (24.1)
45–54	29 (21.2)
>55	14 (10.2)
Occupation	
Farmer	57 (41.6)
Worker	33 (24.1)
Student	21 (15.3)
Business	16 (11.7)
Employed	10 (7.3)

Table 2: Mean, median, and percentile of the age of the patients with snakebite

Particulars	n=137
Mean±SD	35.17±18.273
Median	32
Percentile	
25	19.5
50	32
75	50

Table 3: Site of snake bite (n=137)

Site	Male (%)	Female (%)	Total (%)
Upper Limb	27 (19.7)	32 (23.4)	59 (43.1)
Lower Limb	20 (14.6)	28 (20.4)	48 (35.1)
Not Mentioned	14 (10.2)	11 (8.0)	25 (18.2)
Head and Neck	3 (2.2)	2 (1.5)	5 (3.6)

Table 4: Circumstances of snake bite (n=137)

Characteristics	Male (%)	Female (%)	Total (%)
Early morning (03:00–04:59)	17 (12.4)	19 (13.9)	36 (26.3)
Morning (05:00–09:59)	11 (8.0)	12 (8.8)	23 (16.8)
Day (10:00–16:59)	6 (4.4)	5 (3.6)	11 (8.0)
Evening (17:00–19:59)	9 (6.6)	8 (5.8)	17 (12.4)
Night (20:00–02:59)	21 (15.3)	29 (21.2)	50 (36.2)

The ASV was given to 30 patients among which 23 patients (76.7%) were improved. Anaphylaxis was observed in one female patient taking ASV who also improved later [Table 7].

Discussion

Snakebite is a widely distributed but neglected condition.^[8] The present study assessed the profile of 137 snakebite victims and analyzed their presenting pattern, demographic profile, and outcome and treatment profiles. The victims were predominantly females (53.3%) as they are actively engaged in farming and

Table 5: Clinical Presentation of the patients with snake bite (n=137)

Signs and symptoms	Male	Female	Total (%)
Ptosis	17	11	28 (20.4)
Diplopia	12	9	21 (15.3)
Pain	8	10	18 (13.1)
Swelling	10	7	17 (12.4)
Derange INR	10	6	16 (11.7)
Abdominal pain	11	3	14 (10.2)
Syncope	9	5	14 (10.2)
Vomiting	6	2	8 (5.8)
Hematuria	5	3	8 (5.8)
Oliguria	3	2	5 (3.6)
Local bleeding	3	1	4 (2.9)
Envenomation			
Local and systemic	12	6	18 (13.1)
Local Only	7	5	12 (8.8)
No Envenomation	45	62	107 (78.1)

Table 6: Outcome of the patients with snakebite (n=137)

Characteristics	Male	Female	Total (%)
1. Admitted	22	17	39 (28.5)
Medicine ward	15	8	23 (16.8)
Surgery ward	3	6	9 (6.6)
ICU	4	3	7 (5.1)
2. Discharged	26	39	65 (47.4)
3. Referred	3	4	7 (5.1)
4. Leave against medical advice	9	5	14 (10.2)
5. Expired	4	8	12 (8.8)
Total	64	73	137 (100.0)

Table 7: Details of treatment with antsnake venom (n=31)

Characteristics	Male	Female	Total (%)
Anaphylaxis	0	1	1
Improvement after antsnake venom	15	8	23 (76.7)
No improvement after antsnake venom	4	3	7 (23.3)
Total	19	11	30 (100.0)

other outdoor activities. These findings were in contrast to other studies in which males were affected more often than females.^[9,10] Agriculture is the predominant occupation in this part of the country that requires outdoor activities mainly. More females are usually involved in agriculture-related activities than males and hence, there was a predominance of female victims of snakebites in our study.

More than half of the patients (57%) were farmers. They are more prone to accidental contact with snakes in the field being barefooted. Similar findings were reported by other reports.^[9,11] Snake bite is an important occupational injury affecting farmers, plantation workers, herders, and fishermen. Open-style habitation and the practice of sleeping on the floor also expose people to bites from nocturnal snakes.^[12] Predominantly the younger population (25–34 years, 29.9%) was affected more by snakebites.

These groups of patients are more ambulant and actively involved in various indoor and outdoor works. Very few cases were observed in the extremes of the ages. This finding was in congruence with the findings of Halesha *et al.*^[9] Most of the cases of snakebite were from the age group between 20 and 50 years in another study from Sikkim India.^[11]

The upper limb (43.1%) was the most common site for snake bites. Similar findings were reported by Chaudhary *et al.*^[13] in which upper limbs were involved in 59.25% of victims. The common site of snake bite was the left hand (38.3%) in another study.^[14] This finding was in contrast to the report of Halesha *et al.*^[9] and Thapar *et al.*^[10] in which the most frequently bitten site was the lower extremity. People may be bitten on their forearms and chest while sleeping on the floor when snakes enter the human habitat in search of their prey or sometimes when the snake is accidentally handled while lifting the vegetation. The majority of snakebite envenomation (36.2%) occurred during night, i.e., 20:00–2:59 hour. Similar findings had been reported by Pandey *et al.*^[5] This suggests that the majority of snake bites are due to the nocturnal elapid snake (probably krait) species in this region. It is during the time of dusk that snakes come out in search of their prey and become active during this period. Due to diminished vision during dusk and at night, people may accidentally step on the snakes resulting in bites.^[10] Most of the encounters of snake bites (68%) were during the day time between 10 am and 3 pm in an Indian study.^[11]

In our study, only 21.9% of patients exhibited clinical features of envenomation. This finding was in contrast to the reports of Pandey *et al.*^[5] in which 92% of patients had the signs and symptoms of envenomation. The majority (81.4%) of snakebites were venomous bites in another study.^[15] The higher rate of envenomation signs and symptoms in their study was due to the enrollment of confirmed cases of envenomation whereas all patients with suspected snake bites were included in our study. More than three-fourths of the patients (78.1%) did not have signs and symptoms of envenomation. A large survey conducted in ten hospitals of southern Nepal revealed that envenoming occurred in only 10% of the victims.^[16] It might be due to dry bites. A widespread belief is that snake bites inevitably result in envenoming. However, bites by nonvenomous snakes are common and bites by venomous species are not always accompanied by the injection of venom called dry bites.

Ptosis (20.4%) was the most common sign and symptom of snake bite patients in our study. Similar observations were also reported in other reports.^[9,17] It is the earliest sign of neurotoxic envenomation due to elapid bites and is widely considered to be the trigger for ASV administration.^[18] Local pain was the most common symptom of envenomation in other report.^[10] Snake venom is a complex mixture of toxins and enzymes, each of which may be responsible for one or more distinct toxic actions. In bites by South Asian viperid snakes, envenoming results in

local pain and tissue damage, characterized by swelling, blistering, bleeding, and necrosis at the bite site, sometimes extending to the whole limb.^[19] Among the Elapidae, bites by *N. naja* and *N. kaouthia* can cause significant local swelling and sometimes extensive tissue necrosis of the bitten limb, whereas bites by kraits or sea snakes do not usually cause signs.^[20,21] Progressive descending paralysis is the hallmark of systemic envenoming by elapid snakes in South Asia. Extraocular muscles are particularly sensitive to neuromuscular blockade, leading to a drop of upper eyelids (bilateral ptosis), a frequently observed early sign of paralysis.^[22]

Our study showed that almost one-fourth of the victims were admitted to the hospital. In contrast to our findings, more than three-fourths of the victims were admitted to a hospital within 24 hours of snakebite in a study conducted by Thapar *et al.* in India.^[10] About 54% of patients presented to the hospital 6 hours after the snake bite in another study.^[23] Only half of the patients reach a health center within 6 hours of a bite in many parts of South Asia. Delayed treatment of snake bite, especially beyond 6 hours after the bite, can be fatal.^[24]

The one-fifth (21.9%) of the victims received ASV after admission to the hospital. In contrast to this finding, a higher number of victims (69.6%) were given ASV in other reports from India.^[10,25] It has been emphasized that immobilization and prompt hospitalization, with timely medical intervention in the form of ASV, significantly reduces the mortality associated with snakebites. The low frequency (3.3%, 1 out of 30) of anaphylaxis to ASV in our study suggests that this should not be an important concern in the treatment of snake bites. Adverse drug reactions are common with ASV but can be easily managed by the use of hydrocortisone, adrenaline, and promethazine. Up to 80% of patients treated with Indian ASV presented one or more adverse effects such as anaphylactoid or pyrogenic reactions, or late serum sickness.^[12]

Most of the snakebite victims (76.7%) improved after ASV administration. A higher improvement (95.3%) was observed after ASV administration in a study conducted in Pakistan.^[26] Most of the ASVs that are routinely used in South Asia have never been subjected to independent preclinical testing and formal evaluation in clinical trials. Their efficacy and safety profiles have not been properly established.^[12] Overall mortality rate was 8.8% in our study. A lower mortality rate of 5% and 5.2% had been reported by Pore *et al.*^[27] and Inamdar *et al.*^[28], respectively. Overall mortality rate was lower (2.38%) in another study.^[29] The difference in mortality may be due to several factors. The ASV, which is used here was manufactured in India and hence might not be efficacious in our center as there is geographical variation in the venom content of the snake.^[30] The high mortality rate may also be due to a predominantly rural population dependent on agriculture as an occupation. We could not assess the seasonal variation in the snakebite. Being a single-center study, the findings could not be generalized to other geographical areas of the country.

Conclusion

Snake bite is one of the major problems in Nepal especially in rural areas. It can be easily managed if treatment is given properly and in a timely manner. Importance of effective first aid management and effective treatment has to be disseminated among the peoples in rural areas via social media, national newspapers, booklets and radio. General public should be educated about urgent shifting of snake bite patients to hospital. Syndromic approach can be helpful in the management of snake bites in case the snake is not identified.

Ethical policy and Institutional Review board statement

The ethical approval was obtained from the Institutional Review Committee, BPKIHS.

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Conflicts of interest

There are no conflicts of interest.

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