Study of clinical profile and outcome of patients with snake envenomation at Bheri Hospital Nepal

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ABSTRACT

BACKGROUND
Snake bite is a public health problem in terai and inner terai of Nepal. It is a medical emergency leading to significant morbidity and mortality every year. This study aims to find the clinical profile and outcome of snake bite envenomation patients in Bheri Hospital Nepalgunj.

METHODS
This was a cross-sectional, observational study from April 2021 to November 2021. Patients with history of snake bite and clinical features suggesting envenomation were enrolled in this study; their clinical data and outcome were recorded in Excel sheet and analyzed by SPSS 20.

RESULTS
A total of 58 cases of snake envenomation was admitted and managed, out of which 3 cases expired with case fatality of 5.17%. Krait and cobra were the common snake bites in this region. 84.48% of the snake bites occur inside houses and more than half 53.44% of the patients were bitten between 12 am to 6 am. The most common features of envenomation were ptosis, blurring of vision, swallowing difficulty, dysphonia, neck muscle weakness, epigastric pain and salivation. Majority of cases 96.55% was given 10 vials of Anti snake venom (ASV). Only 4 patients 6.89% needed ventilator assistance.

CONCLUSION
Mortality with snake bites can be minimized by strengthening the treatment centers and readily availability of ASV at such centers. Public awareness about snake bite, first aid, rapid transport to health facilities would be the key to success in reducing morbidity and mortality.

KEYWORDS: snake bite; envenomation; clinical profile; outcome

INTRODUCTION
Snakebite envenomation and its consequences are significant public health problem in the tropical regions throughout the world.¹ The majority of snake bites occur in rural areas in tropical and subtropical countries of Asia, Africa and America with a high fatality rate.² About 5.4 million snake bites occur each year, resulting in 1.8 to 2.7 million cases of envenomation (poisoning from snake bites). There are between 81,410 and 137,880 deaths and around three times as many amputations and other permanent disabilities each year.³

Envenoming affects women, children and farmers in poor rural communities in low- and middle-income countries.³ In Nepal, WHO estimates that 20,000 people are bitten by snakes each year, resulting in over 1000 deaths.⁴ So far, 89 snake species have been recorded in Nepal.⁴ Among this great diversity of snakes, we know with certainty of 17

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species of snake that are found in Nepal and have the front-fanged type of venom apparatus and thus are considered to be highly venomous and dangerous. The commonest poisonous snakes in the terai and inner terai regions of Nepal are Krait and Cobra. In Nepal, incidence of snake bite shows a distinct seasonal pattern closely related to rainfall and temperature, and snake bite is observed in all age groups, the large majorities (90%) are in males aged 11-50 years.

Treatment for poisonous snakebite is divided into supportive care and antivenom administration. Krait venom blocks both the pre and postsynaptic receptors and needs prolonged mechanical respiration until their receptors are regenerated. Cobra venom blocks the postsynaptic receptors and needs more ASV and neostigmine. This study aims to find the socio demographic characteristics, common sign and symptoms of envenomation and the factors affecting the outcome of snake bite envenomation.

**METHODS**

This was a cross sectional observational study conducted at Bheri Hospital, Nepalgunj, Nepal in the Department of Emergency and Department of Medicine from April 2021 to November 2021. The proposal for the research was accepted by Nepal Health Research council (NHRC) Reg. No. 3088. All the patients visiting with a history of snake bite were admitted in the emergency and were kept on observation. The patients were observed for the signs and symptoms of envenomation. The diagnosis of snake bite was made by the history of the definite snake bite which was given by the patient or their relatives. Those cases where, snake was not seen or type of snake was not conformed were observed for the clinical manifestations. According to the symptoms and signs of envenomation, the snake bites were classified as neurotoxic or hemotoxic. Those not developing any symptoms at least after 8 hours were discharged to home. They were either non venomous or dry bites. Those developing envenomations were enrolled in this study. They were managed with polyvalent Anti snake venoms in the Emergency, ward and intensive care facility according to the severity of the clinical manifestations. The patient was observed and followed till discharge. The pre-formed proforma was filled for each patient. The data obtained was entered in the Microsoft Excel and descriptive statistics were calculated by Statistical Package for the Social Sciences (SPSS)20. Those data were represented in figures and tables.

**RESULTS**

A total of 58 cases of snake bite envenomation was recorded at Bheri hospital in the study period. Majority of the victims were young adults and middle aged between 20 to 40 years. Males were more vulnerable to snake bite than females. Brahmin/ chhetri ethnic group accounted to be 50% of the cases. Nearly half of the patients were from Banke districts (27/58) followed by Bardiya district with 32.75%. Bajinath municipality 9, Kohalpur 6, Dhuduwa 4, Nepalgunj 3, Khajura 2, Raptisonari 2 and Janaki 1 cases according to the distribution in local bodies. Agricultural workers seemed to be more affected than other groups with snake bite envenomation (Table 1).

Table 1: Socio-Demographic Characteristics of snake bite victims.

| Age group | Number | Percentage (%) |
|-----------|--------|----------------|
| 0-10      | 2      | 3.44           |
| 10-20     | 12     | 20.68          |
| 20-30     | 18     | 31.03          |
| 30-40     | 11     | 19.66          |
| 40-50     | 5      | 8.62           |
| 50-60     | 3      | 5.17           |
| 60 Above  | 6      | 10.34          |

| Gender     | Number | Percentage (%) |
|------------|--------|----------------|
| Male       | 35     | 60.34          |
| Female     | 23     | 39.65          |

| Ethnic Group | Number | Percentage (%) |
|--------------|--------|----------------|
| Dalit        | 5      | 8.62           |
| Janjati      | 4      | 6.89           |
| Tharu        | 9      | 15.51          |
| Madhesi      | 7      | 12.06          |
| Muslims      | 4      | 6.89           |
| Brahmin/chhetri | 29 | 50             |

| District | Number | Percentage (%) |
|----------|--------|----------------|
| Banke    | 27     | 46.55          |
| Bardiya  | 19     | 32.75          |
| Kailali  | 7      | 12.06          |
| Dang     | 5      | 8.62           |

| Occupation | Number | Percentage (%) |
|------------|--------|----------------|
| Agriculture| 31     | 53.44          |
| student    | 16     | 27.58          |
| service    | 5      | 8.62           |
| others     | 6      | 10.34          |

The snake bites are seen between the months of may to october which coincides with the summer and rainy season (Figure 1).

![Month wise distribution of Snake bite](image-url)
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Table 2: Snake bite characteristics.

| Type of Snake          | Number | Percentage (%) |
|------------------------|--------|----------------|
| Krait                  | 14     | 24.13          |
| Cobra                  | 4      | 6.89           |
| Viper                  | 1      | 1.72           |
| Unknown neurotoxic     | 26     | 44.82          |
| Snake seen but not identified | 13     | 22.41          |
| Fang marks Present     | 37     | 63.79          |
| Snake Seen             | 32     | 55.17          |

Table 2 shows: Krait was the most common snake which was identified. Fang marks were present in 63.79% of the cases. There was no disparity between upper or lower limb for snake bites. Most of the victims 84.48% were bitten inside the house and night time between 12am and 6am was the most active time for snake bites.

Around one fourth of the patients washed the bitten area with soap and water while 20.68% had tourniquet as first aid for snake bite. Most of the patients reached the hospital beyond one hour and ambulance and motorcycle were common modes of transportation for reaching hospital (table 3).

Table 3: First Aid and Hospitalization.

| First Aid            | Number | Percentage (%) |
|----------------------|--------|----------------|
| Tourniquet           | 12     | 20.68          |
| Sucking              | 2      | 3.44           |
| Soap/water           | 15     | 25.86          |
| Incision             | 2      | 3.44           |
| Traditional healer   | 7      | 12.06          |
| Ayurvedic/herbs      | 5      | 8.62           |
| None                 | 15     | 25.86          |

Ptosis, blurring of vision and swallowing difficulty were the most common clinical presentations of the snake bite (Figure 2).

Figure 2: Clinical features of snake bite envenomation.

The patients were admitted and the clinical diagnosis of snake envenomation was made according to the history of snake bite or clinical signs and features consisting of snake bites. Most of the patients were managed in Emergency and Medicine wards (89.65%). Six patients were admitted in intensive care and four of them were intubated and required ventilator assistance. Polyvalent Anti Snake Venoms were used for treatment. National Guidelines for snake bite management of Nepal and World Health Organization protocol was followed during the treatment. Majority of the cases required 10 vials of Anti snake venom. Most of the patients were discharged between 2 to 6 days. Around 95% of snake bite victims were able to go home after successful management while there was a case fatality of 5.17% (Table 4).

Table 4: Hospital stay and outcome.

| Admission | Number | Percentage |
|-----------|--------|------------|
| Within 60min | 8   | 13.79      |
| 1 to 4 hour  | 23  | 39.65      |
| More than 4 hours | 27 | 46.55      |
| Mode of Transport of snake victims |
| Ambulance | 25 | 43.10 |
| Motorcycle | 17 | 29.31 |
| Jeep/ private vehicle | 7 | 12.06 |
| Auto/Electric Rickshaw | 5 | 8.62 |
| Cycle     | 1   | 1.72       |

Table 3: Mode of Transport of snake victims.

Table 4: Hospital stay and outcome.
Krait was the most prevalent snake among the identified one, a larger number of snakes remain unidentified and unknown. This is due to the bite occurring during sleep or due to the lack of awareness among the general public about the type of snake. Krait was predominant in other study from the same center and other centers across Nepal. However other study from Western Nepal revealed green snake to be most prevalent. Most of the people was bitten during sleep or early morning between 12am to 6am in this study which is similar to the study done in India. Another study from western Nepal the maximum bites were between 5 to 7am which is also similar to our finding. Few studies report maximum bite during evening to midnight and day time respectively. The snakes during monsoon season find shelter in houses and garden where they can encounter humans. Moreover snakes hide in the bed, beddings, quilt where they get stamped by body parts and thus snake bite occur. Since the maximum bite had occurred during sleep both upper and lower limbs are equally bitten by snakes however other studies report maximum bites in lower limb.

Half of the patients belong to brahmin and chhetri ethnicity followed by tharu and madhesi. This is due to the demographic distribution in this area where upper caste are predominant as well as referral cases from neighbouring districts. Similar finding are noted from study from the farwest region of Nepal. Most of the case are from Banke and Bardiya and few cases from Kailali and Dang. This is because this centre is the tertiary center with an ICU and ventilator facility. This study reports that most of the patients were agricultural workers which is supported by other studies as well. Snakes hide in the grass, bushes, firewood and people are vulnerable for bites when they encounter them. The snake bites occur from may to october with peak in july and august and then decline from september, these months correspond to the rainy season. Snakes habitats, holes are flooded by water and they hide in the houses, bushes, fields where they encounter humans.

Krait was the most prevalent snake among the identified

| Emergency/ Medicine Ward | 52 | 89.65 |
|--------------------------|----|-------|
| Intensive Care           | 6  | 10.34 |
| Ventilator Assistance    | 4  | 6.89  |

### Anti Snake Venom Used

|          |          |
|----------|----------|
| 0-10 vials | 56 | 96.55 |
| 10-15 vials | 2  | 3.44  |
| >15 vials  | 0   |       |

### Duration of hospital stay in days

|          |          |
|----------|----------|
| <2 days  | 5  | 8.62  |
| 2-6 days | 44 | 75.86 |
| 6-10 days| 9  | 15.51 |
| >10 days | 0  |       |

### Outcome of Patients

|          |          |
|----------|----------|
| Successfully Discharged to home | 55 | 94.82 |
| Expired                                      | 3  | 5.17  |

DISCUSSION

The study revealed that most of the snake bite victims 70.67% were in the age group 10 to 40. This finding was similar with several studies from Nepal. A study from Bangladesh reported 10 to 19 years to be at highest risk group for snake envenomation. 10 to 40 age group being active in outdoor activities, job, fields. Male were predominantly affected than female with snake envenomation, this may be attributed to the fact that males being more active outdoors and in field activities. This finding was consistent with other studies across the country. However study by Pandey 2006 and Poudel et al. 2016 reported equal prevalence of snake envenomation in both male and female.

Around one fourth of the patients had tourniquet as first aid for snake bite. There were few cases of sucking wound, incision and consultation with traditional healers which was similar with the finding of other studies. There are few studies where upper limb was found to be mostly bitten. Upper limb are mainly bitten when snakes are suddenly mishandled by hands during cutting grass, working in fields, putting hands in holes for fishing, collecting fire woods. Similarly feet are more involved by sudden stamping over the snake during walking or working. More than two third bite are within the house and mostly during sleep. This finding is contrast to other studies where most of the bite had taken place outdoors in fields or garden.

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Disease symptoms and signs of envenomation. Ptosis was the most common presenting feature in most of the studies. Pototic was followed by shortness of breath in these studies however in this study ptosis was swallowing difficulty. GI symptoms nausea, vomiting, pain abdomen and parotid
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CONCLUSIONS
Snake bite is a neglected public health issue in terai and inner terai of Nepal. The traditional practices, lack of awareness leads to delay in seeking hospital care which is responsible for morbidity and mortality. Early transfer and recognition of envenomation and prompt administration of ASV is the key to management of snake bite. Hospitals should have trained medical staff along with ICU and ventilators. Public awareness regarding snake bite, prevention, first aid and early transfer to hospital facilities should be done. Tourniquet application and seeking traditional healers/ dhami should be discouraged.

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