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Prevalence of Snake Bites and its management in the South-Central Region of Nepal: A retrospective study

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Abstract: Introduction: Lack of awareness and delayed arrival at health facilities are important factors for morbidity and mortality in snake envenomation. Respiratory paralysis, fatal bleeding, cardiotoxicity, and renal failure are the main underlying factors. The objective of the study is to know the snake envenomation incidence and distribution, presenting signs and symptoms, traditional first aid, and management options at the district hospital during treatment.

Methods: A hospital-based retrospective cross-sectional study was conducted among 163 poisonous snake bite patients admitted at Kalaiya Hospital from 1st April to 30th October 2021. Ethical approval was taken from the Nepal Health Research Council. A convenience sampling method was followed. Data regarding demographic variables, signs and symptoms of snake bites, and outcomes were collected in a structured questionnaire. The data were entered and analyzed through SPSS version 22.0.

Results: Males were involved in (52.8%, 86) of snake bites. The snake bite occurred during the evening time (51, 31.3%) followed by noontime (43, 26.4%) and nighttime (37, 22.7%). (46.6%, 76) cases had cobra bites followed respectively by unknown snake bites (44, 27%) and Krait bites (36, 22.1%). The tourniquet was used as a first aid (128, 78.5%). The symptoms were ptosis, blurring of vision, and hypersalivation in (73, 44.8%), (39, 23.9%) and (31, 19%) cases respectively. The observation only, anti-snake venom and referral were respectively required in 134 (82.2%); 19 cases (11.7%), and 10 cases (6.1%) of snake bites.

Conclusions: Snake envenomation requires timely patient transportation and the use of specific anti snake venom, to avoid morbidity and mortality from poisonous snake bites.

Keywords: *blurring; demographic; distribution; emergency; envenomation.*

Cite this Article

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Introduction

Snakebite envenoming is a potentially life-threatening disease caused by toxins in the bite of a venomous snake. Many victims do not attend health centers or hospitals and instead rely on traditional treatments. (1) We estimate that, globally, at least 421,000 envenoming and 20,000 deaths occur each year due to snakebite.(2) The southeastern part of Nepal has the highest incidence of venomous snakebites.(3) In FY20777/78, Nepal documented 7902 snake bite incidents out of them 967 were poisonous bites.(4) Bites by venomous snakes can cause paralysis that may prevent breathing, bleeding disorders that can lead to a fatal hemorrhage, irreversible kidney failure, and tissue damage that can cause permanent disability and limb amputation.(5) The purpose of the study is to know the snake envenomation incidence, common presenting symptoms, common traditional first aid and commonly followed management options at the district hospital during snake bite treatment.

Methods

Ethical consideration

On 04th December, 2022, Nepal Health Research Council (NHRC) passed the proposal letter with a reference no. 1058, after submitting the proposal online.

Description of Study design and setting

This is a hospital-based descriptive cross-sectional study, conducted among patients with signs and symptoms of snake envenomation presenting at the emergency department of Kalaiya Provincial hospital dated 1st April to 30th October 2021. The hospital is located at the district headquarters of Bara, Kalaiya, Nepal, in southern bordering India. It is a primary referral center for all health posts, primary health care (PHC), and local private clinics located in and around the district. The Ministry of Health and Population of Nepal (MoHP) has categorized it as a 55 bedded hospital with more than 70% occupancy on average. Now Madhesh Pradesh run this hospital that monitor its overall health services. On peak season, the hospital reports 35 patients with poisonous snake bite per month.

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines were strictly followed during the study.

Sample size calculation

A total of 163 samples were estimated considering an infinite population proportion of poisonous snake bite incidence among all snake bites in Nepal (12%) (6); p=0.12; q=0.88; alpha 5% level of significance; with the allowable error of (E) =5%. The hospital record section will be consulted for random selection of case

The detailed calculation is following:

$$n = z^2 x \frac{pxq}{E^2} = 1.96^2 x \frac{0.12x0.88}{0.05^2} = \sim 163$$

Where,

n= required sample size

z=1.96 at alpha 5% level of significance

p=prevalence = 0.12; q (compliment of prevalence) =0.88

E=allowable error, 5%

After ethical clearance from NHRC, the study began by reviewing hospital records from the Department of emergency medicine, Kalaiya Hospital, and the record section of the hospital. We selected samples of snake bites via convenience sampling methods from all patients with known or suspected case of poisonous snake bite admitted to Emergency from 1st April to 30th October 2021. A proper written consent was completed after fully explanation of study procedure, before commencement of study proper via a validated proforma. Data was collected through a structured questionnaire. The demographic variables such as name, age, sex, and address was recorded first from register. Different timing (morning, evening, noon or nigh time) and type of snake bite (Cobra, Krait and Viper) were mentioned in the questionnaire. The traditional local practices for example torniquet, incision and drainage sucking or other methods, immediately after snake bite were noted. Likewise different local and systemic symptoms development following snake bite were searched in register for documentation. Finally methods of snake bite management followed at Health Centre were recorded.

Inclusion criteria:

All patients with known or suspected case of poisonous snake

Exclusion criteria:

Cases with incomplete data and ambiguous information and suspected multiple species bite.

Statistical analysis

The collected data were entered and analyzed using Statistical Packages for Social Sciences (SPSS), IBM SPSS® v22. Descriptive statistics such as frequency, percentage, mean, ranges, and standard deviations were used to express the statistics. The statistics were tabulated in different defined tables.

Results

Our study included total 163 snake bite cases. The mean age of participant was 28.9±20.6. Out of 163 cases, male patients were predominant (52.8%, 86) whereas female counted 47.2% (77). **Table 1**

According to **table 2,** snake bite occurred mostly during the evening time (51, 31.3%) followed by noon time (43, 26.4%), nighttime (37, 22.7%) and morning time (32, 19.6%) respectively. The cobra bite (46.6%, 76) was most common followed respectively by unknown snake bite (44, 27%) and Krait bite (36, 22.1%).

The common practices followed during snake bite was torniquet application (128, 78.5%). The other methods of local treatment were incision and drainage (25, 15.3%) and sucking (10, 6.1%).

Table: 3

Most of the snake bite patients complained of pain (75, 46%), bleeding (40, 24.5%), burning sensation at bite site (38, 23.3%). Other rare symptoms were necrosis (three cases), swelling (two cases), neuritis (two cases), blister (one case), cellulitis (one case), and compartment syndrome (one case).

Table: 4

Most common symptoms developed among snake bite cases were ptosis (73, 44.8%), blurring of vision (39, 23.9%) and hypersalivation (31, 19%). Difficulty in Swallowing

Altered Sensorium, Diplopia, Bleeding, Dysphonia, Neck Muscle Weakness, Respiratory Muscle Weakness were the rare outcomes. **Table: 5**

As shown in **table 6**, the observation was only required in 134 (82.2%) patients of snake bite. The anti-snake venom was used only in 19 cases (11.7%). However, Referral was needed in 10 cases (6.1%).

Discussion

The current study showed more than half of snake bite cases were seen in Male gender. This fact is supported by a study performed in south east Asia where male and female were involved in 2:1 ratio.(7) and 60% male involvement in another retrospective study.(8) Most incidences of snake bite occur in male population as they are more likely to get involved in outdoor agricultural activities where they encounter snake habitat. Similarly, the mean age of snake bite cases involved adult population 28.9±20.6 who are likely to get exposure to outdoor environments. The age at risk is almost similar to the findings in a review article. (7) As per our study, evening and noon time were the predominant period of day to have a maximal number of snake bite cases. The findings however, depend on the type of snake bite. A review article based in Nepal, concluded that cobra bite commonly occurs at dawn and dusk whereas Krait bite occur in night time mostly.(9) another article from eastern Nepal demonstrated 7% of snake bite occurs during sleep time. Remaining cases occurs during daytime (10).

Our study included cases belonging to Terai, southern part on (mostly cobra bite) (46.6%). A review article showed similar results. cobra was found as most encountered snake bite in Terai.(11) This may be because of favorable tropical environment for cobra habitation in that region. Different traditional first aid practices are prevailed in our study. It showed torniquet application soon after snake bite was commonly practiced methods. Pain, bleeding and burning sensation at bite site were the common symptoms following snake bite in our study. National guidelines for snake bite in Nepal mentioned swelling and local pain with or without erythema or discoloration at the bite site, Blistering, bullae formation and local necrosis are common symptoms in cobra bite. However, krait bite had no local symptoms. (12) Our study revealed that ptosis, blurring of vision and hypersalivation were the predominant systemic symptoms. Especially in elapidae family snake bite, Ptosis and external ophthalmoplegia were the earliest symptoms followed later by bulbar palsy and ultimately diaphragmatic and intercostal muscle paralysis.(13) Most of the cases (82.2%) under study got treated with clinical observation for 24 hours followed by discharge. They are called dry bite as the snakes barely inject venom into blood stream. Only few 11.7 percent required anti snake venom who developed the symptoms of envenomation, mostly ptosis. The antivenom is specific treatment of snake bite that saves human lives. Only 10 cases got transferred to nearest tertiary center. The reason includes deterioration in clinical conditions and co existing co morbid conditions. The exact data is not available to compare in similar type of studies.

Conclusions

The exact scenario of snake bite case is difficult to delineate because of variabilities in treatment protocol, local epidemiology and climate. Snake bite is a medical emergency. The timely identification and management with a specific anti snake venom are important steps to avoid morbidity and mortality from poisonous snake bite.

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Nepal that revealed the predominance of elapidae family snake bite

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