

Original Article

Clinico-epidemiological Profile of Snake Bite Envenomation at a Tertiary Care Centre in Eastern Rajasthan : A Longitudinal Prospective Study

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Background : To study the epidemiology and clinical profile of Snake Bite Envenomation in patients presenting to Tertiary Care Centre in Eastern Rajasthan.

Methodology : A cross sectional study was conducted on 30 patients presenting to emergency department with history of Snake Bite between the months of March, 2020 to November, 2020. The data about demography were collected using proformas, patients were admitted and followed up till discharge. Data was analysed.

Results : Out of 30 patients maximum were between age group 19 to 44 (70 %) and 60 % were male, much of them (93.3%) presented between July to November. Lower extremities were the most commonly involved body part (53.33%). Most common type of Snake Bite was due to Viper (46.67%) followed by unknown bite (36.67%), 73.3 % patients presented with local toxicity. Numbers of ASV vials required for treatment were 20, on average.

Conclusions : Snake Bite is a serious health concern in nations with thriving agriculture sector like India. And the successful specialised treatment is Anti Snake Venom (ASV). Death and complications in snake bite are due to treatment delays.

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Key words : Snake Bite, Anti Snake Venom, Neurotoxic, Envenomation.

More than 100,000 people die from Snake Bite envenomation each year, and in around 400,000 cases, it results in severe disability or disfigurement¹. South Asia is the most affected region due to snake bite envenomation^{2,3} and India contributes to 50 per cent of the estimated deaths due to venomous Snake Bite globally¹. In India, the highest numbers of deaths due to Snake Bite have been reported in Uttar Pradesh, Andhra Pradesh, Bihar, Tamil Nadu, West Bengal and Maharashtra⁴.

Varied countries and geographical regions within the same country, such as India, have different epidemiological and clinical presentations⁵. Although Pit vipers can cause hematoxicity, Russell's vipers have substantially higher fatality and morbidity rates⁶. Cobra and viper bites can cause a local reaction with soft tissue necrosis, whereas Krait bites seldom cause a local reaction⁷. Ptosis, external ophthalmoplegia, dysphagia, dysphonia, paralysis of the facial muscles, and respiratory muscle weakness are the primary neurotoxic clinical symptoms. The primary cause of mortality and morbidity in south India⁸ is Russell's viper

Editor's Comment :

- After suspecting any snake bite, the patient should be taken to the hospital immediately and Anti Snake Venom (ASV) should be administered as soon as possible, if indicated.

causing hematoxicity and nephrotoxicity.

The frequency of contact between snakes and humans has a significant impact on the incidence of Snake Bites. Seasonal peaks in the frequency of snake bites are typically linked to increases in agricultural activities or seasonal rains, sometimes coinciding with exceptional snake migration and activity.

The length of time it takes for symptoms to appear after a venomous Snake Bite and how they manifest clinically can vary depending on the species involved, how much venom was injected, and where the bite occurred. Most bites that envenomate induce localised discomfort, swollen soft tissues, and ecchymosis. Bullae and hemorrhagic or serum-filled vesicles may form at the bite site over the course of many hours to days. Systemic symptoms can vary and can include haemorrhage from any anatomic site, nausea, tachycardia or bradycardia, hypotension, and renal failure. About 50% of Pit viper and Russell's viper bites, 30% of cobra bites, and 5-10% of saw scale viper bites don't cause any symptoms or tell-tale signs of envenoming⁸.

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The only effective particular treatment for Snake Bite envenoming is anti snake venom (ASV)⁹. From a medical perspective, polyvalent antivenom neutralises the venoms of numerous distinct species in a specific geographic area¹⁰. For instance, it works well against the four common snake species found in India: saw-scaled viper, Russell's viper, Indian krait and common cobra.

The purpose of the current study was to understand the clinical, epidemiological and long-term effects of snake bite.

MATERIAL AND METHODS

Study Design & Setting : 30 patients with Snake Bites older than 14 years old who were admitted to the medical ward and Intensive Care Unit at the Government Medical College Hospital in Kota, Rajasthan, between March 2020 and November 2020 were included in this cross-sectional study.

Inclusion Criteria : Patients older than 14 years with a definite history of Snake Bite and developed features of envenomation.

Exclusion Criteria : Patients with no signs of envenomation after a period of observation were excluded.

Sample Size Calculation : Sample size calculation was based on the incidence of Snake Bite during that particular season of year.

Methodology : The history that patients provided was used to gather information about patients who had been bitten by snakes, which was then recorded into proformas that were created especially for evaluation. The location of the bite, travel time to the hospital, the patient's occupation, any treatments received before arriving, the total amount of ASV administered, as well as the treatment's success, were all noted. Only when the snake was brought along with the victim by the patient or the medical staff, was the species of snake identified. Local toxicity at the site of the bite, systemic toxicity or both were clinical characteristics of bites. Pain, oedema, bruising, blistering, cellulitis, bleeding and consequences such as compartment syndrome, abscess development and gangrene were all parts of local toxicity. Hemostatic dysfunction or neurological characteristics were used to define systemic toxicity. Neurotoxicity symptoms included drowsiness, paraesthesia, ptosis, external ophthalmoplegia, facial muscle paralysis, regurgitation via the nose, trouble swallowing, respiratory and widespread flaccid paralysis. Fang marks, venepuncture sites, coagulopathy, hemolysis and prolonged bleeding from recent wounds are examples of hemotoxicity symptoms.

If they had clinical signs of envenomation, all patients with Snake Bites were given polyvalent Anti Snake Venom (ASV) when they arrived at the hospital. For all patients with Snake Bites, a starting dose of 10 vials of ASV was administered. Clinical response to ASV was maintained, as did the 20-minute Whole Blood Clotting Time (WBCT 20). A repeat dose of ASV was administered if the signs of envenomation persisted.

Statistical Analysis : Statistical Analysis was done with mean, range, numbers and percentage.

RESULTS

Participants : A total of 54 patients were found potentially eligible candidates for the study, out of which 10 were not eligible due to various reasons and 44 were confirmed eligible candidates. Out of 44, 30 candidates completed the follow up and 14 lost to follow up & did not consent for the study (Fig 1 & Table 1).

There were 30 cases of Snake Bite during the study period of nine months. The overall distribution of Snake Bite was higher in male (n = 18, 60%) than females (n = 12, 40%). Majority of the Snake Bites were in the age group of 18- 45 years (n = 21, 70%). The mean age of snake bite was 34.5, median 33 and range 15-62 years.

Majority of the Snake Bite cases were admitted during the months of July to November (n = 28, 93.3%). Snake Bites occurred more on lower limbs. Maximum of 16 bites were on lower extremity (53.33%)(Table 2).

Majority of patients (n = 24, 80%) reached hospital within 6 hours of bite. The mean time duration between Snake Bite and access to hospital was 4.43 hours. Snake identified the most common was viper (n = 14, 46.6%). Maximum of 6 Patients(20 %) cases showed evidence of neurotoxic manifestation, apart from local toxicity which was present in most of the cases(n= 22, 73.3 %). Among local toxicity most common symptom was pain at bite site (n= 22, 73.3%) followed by local swelling (n=15, 50%).

Among neurotoxic manifestations most common symptom was ptosis (n=4, 13.3%) followed by double vision (n=3, 10%). General flaccid paralysis and respiratory muscle weakness was evidenced in 2 patients necessitating mechanical ventilation. In bleeding manifestations, haematuria was seen in both patients with bleeding gums and local bleeding at bite site.

Treatment : All Snake Bite patients received injection tetanus toxoid. The average dose of ASV administered to all Snake Bite cases was 25.5 vials (range 5-60, median 27.5). Two snake bite cases

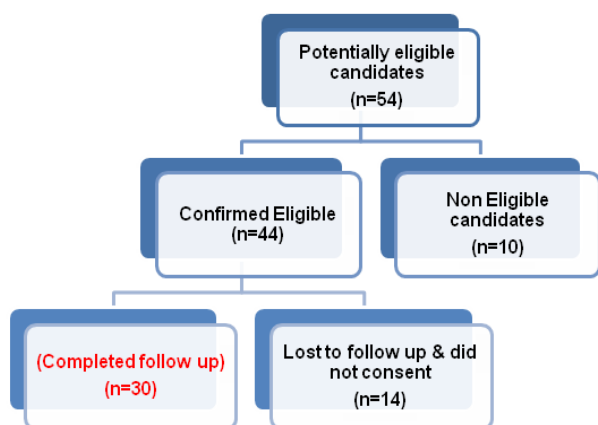


Fig 1 – The study flow diagram

Items	N	Percentage
Age group (years)		
19 - 44	21	70 %
≤18	3	10 %
≥45	6	20 %
Gender		
Male	18	60 %
Female	12	40 %
Admission month		
March	1	3.33 %
April	2	6.66 %
May	0	0 %
June	1	3.33 %
July	3	10 %
August	7	23.33 %
September	8	26.66 %
October	5	16.66 %
November	3	10 %
Body part involved		
Upper extremities	13	43.33 %
Lower extremities	16	53.33 %
Trunk	1	3.33 %

received <10 ASV vials, 12 cases received 10-20 vials, 12 cases received 21- 40 ASV vials, more than 40 vials in 4 patients.

Majority of patients (n=28, 93.3%) were discharged. The average duration of hospital stay was 4.13 days, range 2-14 days. Two patients died due to delay in ASV administration after bites as both cases were brought 24 hours after the bite.

DISCUSSION

According to study conducted by Mathew, *et al*¹¹ and Gajbhiye R, *et al*¹², the majority of the patients were males (70% & 52.4% respectively) which is similar to our study (60%). This is likely related to their outdoor activity. In our investigation, the majority of Snake Bites occurred in people between the ages of 18 and 45

Characteristic	Number	Percentage
Snake Type		
Viper	14	46.67%
Cobra	3	10%
Krait	2	6.67%
Unknown Bites	11	36.67 %
Manifestation		
Neurotoxic	6	20 %
Hematotoxic	2	6.6 %
Local toxicity	22	73.3 %
Number of ASV Vials given		
10- 20	12	40%
21- 40	12	40%
>40	4	13.33%
< 10	2	6.67%
Total	30	100%

(n=21), which is comparable to the findings of Gajbhiye R, *et al*¹² (66 %) and other studies from India¹³, Nepal¹⁴, and India¹⁵.

Similar to Gajbhiye R, *et al*¹², the majority of bites occurred from July to November (n=28, 93.3%) because it was monsoon season. Similar to Gajbhiye R, *et al*¹², bites to the extremities were more frequent in the current investigation (upper extremity n=13, lower extremity n=16, 63%).

Most of the patients (n=24, 80%) reached hospital within first 6 hours comparable to Mathews M, *et al*¹¹ WHO reported 70% cases came to hospital within 6 hours. Timely arrival at hospital may be because of increased awareness of people for early medical help.

The majority of snakes found in our study were vipers (n=14, 46.6%) which is similar to study conducted by Mathews M, *et al*¹¹ (64.4%). While Gajbhiye R *et al*¹² reported neurotoxic manifestations in 19% and 27% of cases, respectively, our investigation found hematotoxic manifestations in 10% of cases and neurotoxic manifestations in 16.7% of cases.

Anti Snake Venom (ASV) was given in the current trial at an average dose of 25.5 vials (range 5-60, median 27.5). The exact dose of ASV to be administered in the cases of Snake Bite is still a matter of discussion, with some studies showing insignificant association between cure and ASV dose administered¹⁷.

The study's low mortality rate (n=2, 6.67%) may be attributable to increased public awareness of the need for prompt medical attention, improved transportation and access to hospitals, the availability of facilities such as ventilator support, better ICU care, and a dialysis facility, among other factors. Joshi M, *et al*¹⁶ and Mathew M, *et al*¹¹ also showed similarly low mortality.

Limitations of the study : Limitations of our study are short sample size & single health facility based study. Thus the results cannot be generalized to the population.

CONCLUSION

In nations with a thriving agricultural sector, such as India, Snake Bites remain a serious health concern. The only successful specialised treatment for a Snake Bite is Anti Snake Venom (ASV). The study also demonstrates that a high prevalence of complications and a high fatality rate in individuals with Snake Bites are related to treatment delays.

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Conflict of interest : None declared.

Ethical approval : The study was approved by the IEC.

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