

Clinical Profile of Snake Bite in a Tertiary Care Hospital in South India

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Abstract: ***Background & Objectives:** Snake bite envenomation is a common acute life threatening medical emergency presenting to the emergency with significant morbidity and mortality. This study attempts to evaluate the clinical outcomes of snake bite with early recognition of poisonous nature of snake bite and prompt initiation of Anti snake venom. **Materials and methods:** The present descriptive observational study was carried out in tertiary referral hospital over a period of 6 months. Time interval between the poisonous snake bite and first administration of Anti snake venom was determined and outcomes studied. **Results:** Out of 360 patients enrolled, 239(66.4%) were male and 121(33.6%) were female. Maximum patients i.e. 109(30.3%) were in 21-30 age group. The patients getting treatment in <6 hours had a good outcome in 249(72%) patients whereas the outcome was poor in 3(21.4%) patients. **Conclusion and interpretation:** Majority of snake bite involve non poisonous bites and occurs in younger age group population. Early hospitalisation with recognition of poisonous nature of the snakebite with prompt Anti snake venom administration results in reduced complications and improved outcomes.*

Keywords: AKI-Acute Kidney Injury, ASV-Anti Snake Venom, CHC-Community Health Centre, Envenomation, Neuroparalytic, PHC-Primary health Centre, Poisonous, VT- Vasculotoxic, LT- Locallytoxic, WBCT-Whole Blood Clotting Time.

1. Introduction

Snake bite is a significant public health problem causing considerable morbidity and mortality worldwide, particularly in the tropics. Snakebite is now recognized as a Neglected tropical disease (ntd) By the world health organization (who). An accurate measure of The global burden of snakebite Envenoming remains elusive,¹⁻⁵ the Vast majority of snakebite induced Deaths occur in asia (15,400- 57,600 deaths per annum) and Sub-saharan africa (3,500-32,100 Deaths per annum).³ the mortality due to venomous snakebite in India is estimated between 35,000- 50,000 per annum, which is the Highest in the world according to World Health Organization (WHO) direct estimates.^{2,3,5} Most of the estimates of incidence, morbidity and mortality associated with venomous snakebite are extrapolations from a few regional studies³ and the actual incidence and burden would only be known from community based studies.^{2,3,6} 70 bites per 100,000 populations per year was recorded in Maharashtra one of the states of India with a high incidence.⁷ The principle effects of envenomation is on the nervous system, kidneys, heart,lungs, liver, blood coagulation system, vascular endothelium and local effects at the site of bite.⁴

There are about 216 species of snakes identifiable in India, of which 52 are known to be poisonous. Medically Important snakes of India include the so called "Big 4", Russel's viper (Daboia russelli russelli), Cobra (Naja naja), Common Krait (Bungarus caeruleus) and Saw scaled viper (Echiscarinatus) that occur throughout the country. The pit viper species - Malabar, green and the hump-nosed, sea snakes and others like the king cobra (Ophiophagus hannah), monocle cobra (Naja Kaouthia), Banded Krait (Bungarus fasciatus) and Echis sochureki are important causes in certain geographical areas. The mortality due to venomous snakebite in India continuous to be high due to various social, economic and cultural reasons.⁸

The purpose of this study to evaluate the clinical outcomes of snake bite envenomation with early recognition of poisonous snake bite and prompt initiation of Anti snake venom.

2. Materials and Methods

The present descriptive observational study was carried out in medicine wards of Victoria hospital, Bangalore medical college and Research Institute, Bangalore, India during May 2015 to October 2015. A total of 360 cases of snake bite were admitted in medicine wards during the study period. After obtaining consent, data was collected on predesigned, pretested, and structured questionnaire by interviewing the study subjects who were hospitalized during the study period. A detailed information regarding demographic and epidemiological parameters such as age, sex, residence, occupation, site of bite and place of bite, type of snake if identified, etc., was obtained. Time interval to reach the health facility after snake bite and first aid, ASV if received was asked to them. Thorough clinical examination was carried out in each case. For identification of type of snake bite (Vasculotoxic, Neuroparalytic, Locallytoxic and Nonpoisonous) opinion from treating physician was taken. All the relevant tests (20 min Whole blood clotting time, Complete blood count, PT, INR, aPTT, Liver function test, Kidney function test) were carried out. Subsequent information was collected on the day of discharge or death of the patient from the case record of the patient.

3. Results

In our study we included 360 patients out of which 239 (66.4%) were male and 121 (33.6%) were female. Maximum patients, i.e. 109 (30.3%) were belonging to 21-30 year age group. Only 3 patients (0.8%) were >70

year old. 216 patients(60%) were hospitalised for <3 days. 252(70%) patients received treatment within 6 hours of bite constituting the maximum proportion, whereas only 3(0.8%) patients received delayed treatment,i.e after >36 hours. In 205 (56.9%) patients there were signs of local envenomation, 221(61.4%) patients were given anti snake venom. 35(9.7%) patients had bleeding diathesis and 23(6.4%) patients were transfused fresh frozen plasma.

In our study group, 64(17.8%) and 17(4.7%) patients were bitten by hematotoxic and neurotoxic snakes respectively. 22(6.1%) patients required ICU and 26(7.2%) patients developed acute kidney injury out of which 3(0.8%) patients required hemodialysis.14 patients had poor outcome in our study population out of which 8 had neurotoxic bite and 3 had hematotoxic bite. The patients getting treatment in <6 hours had good outcome in 249 (72%) patients whereas the outcome was poor in 3(21.4%) patients. When treatment was given after 6-12 hours of bite, the outcome was good in 69(19.9%) patients but it was poor in 8(57.1%) patients. This association was statistically significant. When ASV was given better outcome was noted in 208(60.1%) patients whereas out of 14 patients who had poor outcome ,13 (92.9%) had recieved ASV. In those requiring ICU care,5 patients had poor outcome whereas those who did not get ICU care, in them 9 patients had poor outcome.(p<0.001). In patients who developed AKI ,only 21 patients had good outcome whereas 5 patients developed poor outcome which makes 35.7% of mortality.

Table 1: Time gap in receiving definitive Rx (Hrs) in relation to outcome

Time gap in receiving definitive Rx (Hrs)	Outcome		Total
	Good	Unsatisfactory	
<6	249(72%)	3(21.4%)	252(70%)
6-12	69(19.9%)	8(57.1%)	77(21.4%)
12-24	18(5.2%)	3(21.4%)	21(5.8%)
24-36	7(2%)	0(0%)	7(1.9%)
>36	3(0.9%)	0(0%)	3(0.8%)
Total	346(100%)	14(100%)	360(100%)

Table 2: Relationship between ASV administration and outcome

	Outcome		Total (n=360)	P value
	Good (n=346)	Unsatisfactory (n=14)		
ASV administration	208(60.1%)	13(92.9%)	221(61.4%)	0.014*

4. Discussion

Snakebite is a common medical emergency and an occupational hazard especially in tropical countries like India. It is observed that the snakebite affected males more (70%), as they constitute the community that is actively engaged in outdoor activities, predominantly farming in rural areas. Our study results concur with those of earlier studies, ^{4, 5} which further exemplifies that snakebite is an occupational hazard in tropical regions as recognised by WHO.¹

In the present study, 360 cases of snake bites including poisonous and non-poisonous bites were studied in the medicine inpatient ward of Victoria hospital, Bangalore from 1st may 2015 to 31st october 2015.

Type of Snake Bite

The number of poisonous cases were 81 and the number of non-poisonous cases were 279, which shows non poisonous snake bites was clearly outnumbering the poisonous snake bites. Among the poisonous snake bites, the number of Viperine bites were 64, the number of neurotoxic bites were 17.

Age and Sex

In the present study, maximum no. of patients bitten were between the age group of 21-30 years of age years. These observations go in favor of the study done by Russel *et al.*⁹ In the age group above 70, five bites were non-poisonous in nature. In the present study, 239 (66.4%) patients were male victims, whereas the female victims were 121 (33.6%) in number. The predominance of male victims suggests a special risk of outdoor activity. This is comparable to the studies done by other authors¹⁰⁻¹⁴. Bhat *et al.*¹⁴ in 1974 reported the incidence as 7:3 (M: F). In the study by Gaurav Bhalla *et al*¹⁵, out of 150 patients, 99 (66%) patients were male victims, whereas the female victims were 51 (34%) in number.

Type of Snake

In the present study, we have noted 2 cases of snake catcher who were professionals, they had a neurotoxic cobra bite. Remaining cases were all unprovoked. 20 patients had brought snakes along with them and they were identified in this hospital. Among them 13 were vipers, 6 were cobra and 1 was krait. In the study of Ram N *et al*¹⁶ Most patients identified the snake whereas 23.7% were unable to identify the snake species either because of ignorance or poor visibility in darkness. Many studies suggest that significant number of dead species should be brought to the hospital by the victims. They suggest that this will provide sound epidemiological data and also helps in the identification of species that are causing morbidity and mortality in a given area.¹⁷

In the present study, 252(70%) patients were admitted within first 6 hrs. In this series out of 81 cases of poisonous bites, 64 were vasculotoxic, 17 were neurotoxic. In the study done by Gaurav Bhalla *et al*¹⁵, 76% of neuromuscular bites got admitted within the first 6 hrs, 52 patients were admitted within the first 24 hrs but after 6 hrs, among which 15 were vasculotoxic and 4 were neurotoxic. Two neurotoxic bites expired within 1 to 2 hrs after admission.

Clinical Manifestation

In our study, we found that 34 (9.4%) patients had hematemesis, 11(3%) patients had amputation of the right finger, 8(2.2%) had left foot cellulitis , 5 (1.3%) patients developed nephrotoxicity, 5(1.3%) had diplopia and only 1(0.2%) patient had aphasia, unconsciousness and quadriplegia. 1(0.2%) patient had bleeding gum and hemoptysis. 2 (0.5%) patients developed ptosis. In the study of Bhalla *et al*¹⁵, 53 (69.73%) patients had local pain.

Among which 9 (16.98%) were LT, 33 (62.26%) were VT and 11 (20.75%) were neuromuscular bites. In the present study, local edema was present in 64 (84.20%) patients of poisonous snake bite. Out of which 40 patients had VT snake bite, 11 patients had neuromuscular snake bite, and 13 bites were LT. In VT bite 95.23% patients had local edema while in neuromuscular snake bite 52.38% patients had local edema. Local cellulitis was seen in 24 (57.14%) patients of VT snake bite and 6 (28.57%) patients of neuromuscular snake bites. Purohit (1944) described gum bleeding as the commonest manifestation of viperine bite whereas Bhat et al¹⁴ showed that 37 patients among 310 patients had hematemesis, AKI was found in 26 (7.2%) patients, out of them 3 patients underwent on hemodialysis. In patients developing AKI, poor outcome was found in 5 patients whereas in those not developing AKI, poor outcome was seen in 9 patients. Basu *et al.* (1977) observed ARF in 27 cases of viper bite and attributed it to circulatory collapse and shock in 5 cases, direct nephrotoxicity was seen in 4 cases. Saini *et al.*¹⁸ reported 8 cases of ARF and 7 cases recovered with conservative treatment. In the present study 22 patients required ICU care with ventilation. In the study done by Gaurav bhalla *et al.*¹⁵ among 21 patients of neuromuscular bite (71.42%), 15 needed ventilator support and 4 (19.04%) patients needed only intubation.

Mortality Rate

In the present study, 14 (3.8%) patients died. The mortality rate of 3.8% is well below to the estimates of other studies. Further, it is to be noted that our figures are significantly lower than other reported estimates from New Delhi (13.5%), Gujarat (11%), Maharashtra (4.3 and 5.4%) within India.^{6,11,13,19} It is well known fact that these figures are underestimates as several surveys have shown that hospital data, record less than half of the deaths^{4,20} as many snakebite victims choose village based traditional therapists which are not recorded. Community based surveys would throw light on the actual incidence and death, however only few studies have been conducted. A Community based survey in some localities of West Bengal have shown a much higher annual mortality rates of 16.4 deaths/100,000 in West Bengal.²¹ As, such focal data cannot be extrapolated to provide national or even state estimates^{3,5} due to heterogeneity of snakebite incidence.

The patients getting treatment in <6 hours had good outcome in 249 (72%) patients whereas the outcome was poor in 3 (21.4%) patients. When treatment was given after 6-12 hours of bite, the outcome was good in 69 (19.9%) patients but it was poor in 8 (57.1%) patients. This association was statistically significant.

It is concluded that majority of snake bite involve non poisonous bites and occurs in younger age group population. Early hospitalisation with recognition of poisonous nature of the snakebite with prompt ASV administration results in reduced complications and improved outcomes. With the introduction of E-108 (emergency medical aid facility at the patient's place) in many states of India, training of the para medical personnel regarding recognition of the symptoms and signs of poisonous snake bite, first aid measures along

with equipping the primary health care system with ASV and giving wide publicity to the National Snake bite Management Protocol 2009 which is probably the best evidence based approach to dealing with snake bite in India at present among medical professionals at all levels of health care delivery system & general public may surely bring down the mortality rate & related complications as well as the health care costs and burden on the tertiary level health care system. It seems absolutely relevant and feasible given the present deficiency in providing health care for a huge population. Given the magnitude of the problem and the scope for improvement in health care delivery system the operational strategies and the probable outcomes provide arenas for further research for the policy makers and public health researchers.

5. Limitation

The special investigations like d-Dimer, fibrinogen, APTT, PT, creatinine phosphokinase, peripheral smear, lipid profile and fundal examination were not done in all patients. The lack of renal biopsies that would demonstrate the histological pattern of renal involvement, the lack of complete coagulation profile as evidence for DIC, and the lack of ELISA test to identify the snake venom are the other lacunae. Further, ASV is a key determinant of survival after snakebite, injected early and in adequate quantities it neutralizes the snake venom and reduces the in-hospital mortality. Even though, we evaluated the risk factors related to envenoming (vomiting, clotting test, neurotoxicity and serum creatinine concentration) but did not adjust for ASV administration to assess its association with morbidity and mortality.

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7. Source of Support

Nil

8. Conflict of Interest

None

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