

# A Retrospective Study of Epidemiological Factors, Clinical Profile and Management of Snake Bite Cases Presented to a Tertiary Care Hospital in Punjab

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## ABSTRACT

**Introduction:** Snake bite is an occupational hazard and a neglected public health problem especially in rural India. Agriculture is a common profession of majority of rural people of Punjab (a northern state of India). Current research aimed to study the prevalence of snake bites in the northern part of Punjab with reference to demographic profile, part of body involved in bite, time of snake bite, seasonal variation and the types of poisonous snakes common in this locality and their clinical manifestations along with the systemic envenomation from various types of poisonous snakes and their effective management.

**Material and methods:** This was a retrospective study conducted between November 2018 to November 2020 at a tertiary care hospital in Punjab.

**Result:** A total of 150 patients were studied in our hospital. Out of 150, 74 patients were of non-poisonous snake bite and 76 patients were of poisonous snake bite. Out of these 76 poisonous snake bites, 42 were viperine snake bites, 21 were neuroparalytic snake bites and 13 were locally toxic snake bites. Maximum incidence of snake bite was found in farmers in rural areas. Bites were commonly seen on the lower extremities during the night. Only 57.33% patients reported to medical help within 6 hours. Time of onset of systemic manifestation was earlier in neuroparalytic snake bites.

**Conclusion:** Snake bite is a common life-threatening emergency in this area. Increase mortality and poor prognosis is due to delay in hospitalization. Increased mortality rate is because of consumptive coagulopathy, renal failure, and respiratory failure. Other unusual complications like pulmonary edema, Disseminated intravascular coagulation, intracerebral hemorrhage and renal failure were observed in present study.

**Keywords:** Poisonous Bite, Neuroparalytic Bite, Non-Poisonous Bite, Vasculotoxic Bite

emergency of Government Medical College, Amritsar, Punjab, India during November 2018 to November 2020. A total of 150 cases of snake bite were admitted in Surgery department during the study period. After obtaining consent, data was collected on pre-designed, 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 received if any was asked to them. Clinical examination was carried out in each case. Subsequent information was collected on the day of discharge or death of the patient from the case paper of the patient.

## DISCUSSION

Snake bite was included in the list of neglected tropical diseases by World Health Organization in the year 2009. <sup>1</sup>Globally every year, an estimated more than 5 million people are bitten by snakes, <sup>2</sup>resulting in approximately 20,000–1, 25,000 deaths<sup>3</sup>. In the present study, 150 cases of snake bites including poisonous and non-poisonous bites were studied in the Surgical Emergency of Government Medical College, Amritsar from November 2018 to November 2020. The number of poisonous cases were 76 and the number of non-poisonous cases were 74. Among the poisonous snake bites, the number of Viperine bites were 42, the number of neuroparalytic bites were 21 and the number of LT cases were 13. In the present study, maximum no. of patients bitten were between the age-group of 14-30 years of age. Next in order of frequency was the age-group 31-50 years. These observations go more in favor of the study of Russel et al. (1979)<sup>4</sup>. Among the group of 14-30 years, 43 patients had poisonous snake bite and in the age-group of 31-50 years, 28

## INTRODUCTION

Snake bite was included in the list of neglected tropical diseases by World Health Organization in the year 2009.<sup>1</sup> Globally every year, an estimated more than 5 million people are bitten by snakes,<sup>2</sup> resulting in approximately 20,000–1, 25,000 deaths<sup>3</sup>. Farming is an occupation of majority of rural people of Punjab who are more prone to snake bites. Very little attention is paid by the public health experts and clinicians to this occupational hazard related to agriculture.

## MATERIAL AND METHODS

An observational study was carried out in Surgical

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**Table 1** Age-wise prevalence of poisonous snake bites

Age-group (years)	No. of poisonous bites (%)	Total no. of snake bites %
14-30	43 (56.57)	89
31-50	28 (36.84)	50
>50	5 (6.57)	11

**Table 2** Occupational incidence of snake bites

Occupation	No. of cases	Percentage
Farmer	122	81.33
Housewife	14	9.33
Student	13	8.66
Snake charmer	1	0.66

**Table 3** Loss of time from the bite till the admission

Time	No. of non-poisonous cases	No. of poisonous cases			
		VT	NT	LT	Death
Within 6 hours	48	21	16	1	-
6 to 24 hours	26	15	4	5	2
>24 hours	0	6	1	7	1

VT = Vasculotoxic, NT = Neuroparalytic, LT = Locally toxic

**Table 4** The no. of patients who received first-aid

	No. of non-poisonous cases	No. of poisonous cases		
		VT	NT	LT
Tourniquet	22	23	12	10
ASV	-	7	2	1
False beliefs	-	2	3	-
No. Rx	51	9	4	2

VT = Vasculotoxic, NT = Neuroparalytic, ASV = Antivenom serum, LT = Locally toxic

patients had poisonous bites. In the age-group above 51, five bites were poisonous in nature.

In the present study, 99 (66%) patients were male whereas the female were 51 (34%) in number. Ahuja and Singh<sup>5</sup> in 1954 reported the ratio as 4:1 (M: F). Bhat et al. in 1974 reported the incidence as 7:3 (M: F).<sup>6</sup> Among male patients, 61 were poisonous, whereas in females, 15 were poisonous snake bites. In the present study, 122 were farmers, 13 were

students, 14 were housewives, and 1 was a snake charmer. Studies undertaken by Bhat et al. (1974), Saini et al. in (1984), and Sarangi et al. in (1977) showed the incidence in farmers to be 75%, 78%, and 72%, respectively.<sup>6,7,8</sup> In the present study, rural prevalence of snake bite was 117 out of 150 cases. Among them, 69 were poisonous snake bites. The prevalence in urban area was 33 out of 150 cases, among which 7 were poisonous cases. Incidence of bites in present

**Table 5** Incidence of toxicity in poisonous snake bite

	LT	VT	NT
Pain	9	33	11
Local bleed	11	35	3
Cellulitis	4	24	6
Gangrene	0	8	1

VT = Vasculotoxic, NT = Neuroparalytic, LT = Locally toxic

**Table 6** Incidence of symptomatology of neuro paralytic snake bite poisoning

S/s	No. of cases	Percentage
Ptosis	21	100
Dysphagia	9	42.85
Ophthalmoplegia	18	85.71
Unconsciousness	6	28.57
Flaccid limb paralysis	6	28.67
Convulsions	-	0
Cellulitis	8	38.09
Respiratory paralysis	19	90.47

**Table 7** Incidence of symptomatology in viperine snake bite

S/s	No. of cases	Percentage
Local bleed	35	83.33
Gum bleed	3	7.14
Hemoptysis (H3)	2	4.76
Epistaxis (E)	1	2.3
Hematemesis (H2)	2	4.76
Malena	2	4.76
Hematuria (H1)	18	42.85
Oliguria	20	47.61
Ecchymosis (ec)	2	4.76
Intracerebral hem.	1	2.3
Subconjunctival hem.	2	4.76
Cellulitis	24	57.14
ARF	20	47.61

ARF = Acute renal failure

**Table 8** Incidence of complications of vasculotoxic snake bite

VT	ARF	Sur. inter	DIC	Death
42	20	8	24	4

VT = Vasculotoxic, ARF = Acute renal failure, DIC = Disseminated intravascular coagulation

**Table 9** Incidence in relation to condition at discharged

	LT	NP	VT
Complete recovery	13	17	10
Complications	0	1	28
Death	0	3	4

VT = Vasculotoxic, NP = Non-poisonous, LT = Locally toxic

studies are as follows. In lower extremities bites are 133 (88.66%) and in upper extremities 17 (11.33%). Among them, upper extremity poisonous cases were 3 and lower extremity poisonous cases were 73. Reid mentions that most of the bites in tropical countries are on lower extremities because the victims are bitten by treading on or near the snake, while in non-tropical countries most bites are on fingers and hands because the victim deliberately handles the snake.<sup>9</sup> In the present study, the day was divided into four groups. Maximum number of cases were detected in the interval between 4.00 PM to 8.00 PM. The documented figure was 109 among 150 patients. Next on the list was the time interval between 8.00 PM to 6.00 AM where number of patients bitten was 41. These figures show close resemblance with the observation of Virmani and Dutt.<sup>10</sup> They have noted 12% cases during day time. In the present study, higher incidence was found in summer (March to May), 77 (51.33%) were total snake bites in summer, among them 42 were poisonous bites and 35 were non-poisonous bites. Next on the list was monsoon where the total number of snake bites was 52, among which 24 were poisonous bites and 28 were non-poisonous. Neuroparalytic snake bites were more at the end of summer and beginning of monsoon. Incidence of VT bites were comparatively more in winter. Banerjee(1978) noted incidence of 70-80% during May to October.<sup>11</sup> In the present study, we have noted only one snake bite case of a snake catcher who was a professional. He had a neuroparalytic cobra bite.

In the present study, 86 (57.33%) patients were admitted within first 6 hrs. Among which 21 cases (24.41%) were VT and 16 (18.60%) were neuroparalytic. Seventy-six percent of neuroparalytic bites got admitted within the first 6 hrs. Fifty-two patients were admitted within the first 24 hrs but after 6 hrs, among which 15 were VT and 4 were NT. Two NT bites expired within 1 to 2 hrs after admission. In a series of 135 patient by Lahori et al., 85% patients were admitted

in the first 24 hours after bite. Among 150 patients, 67 (44.66%) had applied tourniquet. Out of 67 patients, 45 were poisonous bites and 22 non-poisonous bites. Out of 45 cases of poisonous bites, 23 were VT, 12 were neuroparalytic, and 10 were LT bites. In a study conducted by George Watt et al. (May 1988), tourniquet was applied in 94% patients, 4 were asymptomatic prior to release of their tourniquet, and in 11 patients symptoms worsened precipitously.<sup>12</sup> In the present series, 53 (69.73%) patients had local pain. Among which 9 (16.98%) were LT, 33 (62.26%) were VT and 11 (20.75%) were neuroparalytic 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 neuroparalytic snake bite, and 13 bites were LT. In VT bite 95.23% patients had local edema while in neuroparalytic 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 neuroparalytic snake bites.

A total of 32.66% of the patients in the present study had local bleeding. Out of which 11 patients had LT bite, 35 patients had VT bite and 3 patients had neuroparalytic snake bites. In the present study, 3 (7.14%) patients had gum bleeding. Corkill (1956) described hematuria as the commonest manifestation<sup>13</sup> but in the present study, 18 (42.85%) patients had hematuria. Ecchymosis was present in 2 (4.75%) patients in the present study but Bhat (1974) described ecchymosis in 43% of patients. Hematemesis was present in 2 (4.75%) patients in the present study, whereas Bhat showed that 37 patients among 310 patients had hematemesis.<sup>6</sup> In the present study, 2 (4.75%) patients had haemoptysis and 1 (2.3%) patient had epistaxis. Fundal hemorrhage was seen in one patient (2.3%) who expired within 2 days. Reid et al. in his study of 281 cases of viper bite had not found a single case with fundal haemorrhage.<sup>14</sup> Saini and Sharma et al. (1984) in their study of 200 cases of poisonous bite do not report about fundal hemorrhage.<sup>7</sup> In the present study, 100%

patients developed ptosis among 21 cases of Neuroparalytic bite. Ophthalmoplegia was seen in 18 (85.71%) patients of Neuroparalytic bite. Six (28.57%) patients became unconscious, 6 (28.57%) patients with flaccid limb paralysis, 19 (90.47%) patients developed respiratory paralysis, among which 15 patients needed respirator.

ARF was seen in 20 (47.61%) patients of VT bite. In all the cases of ARF except one, DIC was the cause for it. 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 in 4 cases. In the present study, 7 patients died of poisonous snake bites out of which 3 (3.94%) were neuroparalytic bite patients and 4 were VT bite patients. Among neuroparalytic bites, mortality rate (14.28%) was higher than in VT bite (9.52%). All 3 patients died because of delay in receiving respiratory assistance. Among four deaths of VT bites, three patients died of acute renal failure, and one patient died of DIC and intracerebral hemorrhage. Lahori et al. (1981) showed mortality rate to be 2% and 3 deaths were due to central nervous system (CNS) involvement.<sup>14</sup>

Bleeding time, clotting time was raised in all patients of VT snake bites. Similar incidence has been reported by Saini et al. and Lahori et al. in their studies.<sup>7</sup> BT, CT, PT gradually returned to normal within 3-4 days after full dose of ASV and blood transfusion in present study. Prothrombin time was abnormal in almost all the VT bites. In the present study, thrombocytopenia was noted in 24/41 patients of VT bite with coagulation defects. Saini et al. (1981) noted thrombocytopenia in only 5% patients and Reid mentioned that platelet count may be depressed but is often normal in viperine bites.<sup>7,9</sup>

In the present study, two patients developed anaphylaxis for ASV and they were treated with steroids and adrenaline. In the present study, 76 (50.66%) patients received ASV. According to Reid et al., ASV is not very effective against local effects of venom. In the present study, 69 patients out of total 76 reversed completely. Three deaths in neuroparalytics were because of delay in administration of ASV producing respiratory paralysis and delay in ventilatory support who were transferred from other hospital to our hospital. In the present study, four (9.52%) patients of viperine snake bites received blood transfusions. Saini et al. (1984) and Reid et al. feel that blood transfusion is not required routinely.<sup>7</sup> In the present series, neostigmine with atropine was given to 13 patients out of 21 patients of neuroparalytic snake bite. Most of the patients responded to it within 4-6 hours. In these patients, first to improve was respiratory paralysis, then ophthalmoplegia and lastly ptosis. Dubay et al. (1981), Banerjee et al., Dash et al. (1976) are strong supporters of this regime.<sup>15,16,17</sup>

In the present series, ARF was observed in 20 patients among 42 (47.61%) patients of VT snake bite. Eleven patients were treated conservatively with diuretics, renal diet, and fluid restriction. Seven patients needed hemodialysis. Three patients died of renal failure among which 2 patients died after hemodialysis and one died because of acute renal failure. Saini et al. reported 8 cases of ARF and 7 cases

recovered with conservative treatment.<sup>7</sup> In the present study, among 21 patients of neuroparalytic bite (71.42%), 15 needed ventilatory support and 4 (19.04%) patients needed only intubation. Among which 3 patients died. Total duration of ventilator was less than 24 hrs for most of the patients except one. Not a single patient needed tracheostomy. In the present study, 9 patients required surgical intervention, out of which 8 patients had viper bite and one patient had Elapid bite. Early surgical intervention is recommended to prevent extension of infection and development of gangrene.<sup>17,18</sup>

## RESULT

In all, 150 patients of snake bite were studied. Out of 150 patients, 74 patients had non-poisonous snake bites and 76 patients had poisonous snake bites. Maximum incidence of snake bite was found in farmers (81.33%) than in any other occupation. Males (66%) were bitten more than females (34%) among poisonous bites. Maximum incidence of snake bites was found in rural areas (85%) than urban areas (15%). Poisonous snake bites were more prevalent in rural than urban areas. Bites were commonly seen on the lower extremities 88.6% than upper (11.33%). Maximum bites were in the night (72.66%) than day time (27.33%) among which 73.68% were poisonous bites at night and 27% were poisonous bites at day time. Higher incidence of snake bites was found in summer (51.33%) i.e. March to May. A total of 57.33% patients reported to medical help within 6 hours, among which 24.41% were VT and 18.60% were NT. Sixty-seven patients came with tourniquet application, out of which 45 had poisonous bite, out of which 9 patients had received ASV. Fifty-one cases did not receive any sort of medical help before admission. Five cases had received non-medical treatment. Time of onset of systemic manifestation was earlier in neuroparalytic snake bites than VT snake bite. VT snake bites (55.26%) were more common than neuroparalytic bites (27.63%). Commonest VT manifestation was local bleed (83.33%) and next on the list was cellulitis (57.14%). Hematuria (42.85%) was the commonest manifestation in those patients who developed ARF. Ptosis (100%) was the commonest and earliest manifestation of neuroparalytic snake bite. Out of VT snake bites, 20 were of ARF, 7 required hemodialysis. Four DIC patients received blood transfusion. Thirteen patients of ARF received diuretics and recovered completely. Thirteen cases were LT; out of them, 4 patients developed cellulitis. Nineteen patients with neuroparalytic bite required artificial ventilation. Seven patients died because they came late to seek medical treatment and by that time, complications were beyond control and were associated with systemic infection. Two patients developed anaphylactic reaction to ASV and were treated conservatively and recovered completely.

## CONCLUSION

Snake bite is a common life-threatening emergency in the Northern rural Punjab where nearly 2/3<sup>rd</sup> of the population is agriculture dependent. Increase mortality and poor prognosis is due to delay in hospitalization because snake bite

victims seek treatment with traditional healers rather than government hospitals. Increased mortality rate is because of consumptive coagulopathy, renal failure, and respiratory failure. Other unusual complications like pulmonary edema, Disseminated intravascular coagulation, intracerebral hemorrhage and renal failure were observed in present study. The ready availability and appropriate use of ASV, close monitoring of patients, the institution of ventilator support and if required, early referral to a larger hospital all help to reduce the mortality.

In the present study we have attempted to report the hospital based snakebite statistics reported to this institute which actually reflects part of the snakebite scenario of the area. Further documentation of snakebite data from community based surveys and information from traditional healers can provide substantial information about the snakebite burden of the area. Thus knowledge of the varied clinical manifestations of snake bite is important for effective management in hospitals by a complete health care team.

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