

# Profile of snake bite patients and their outcome: Our experience at a tertiary care hospital in Vadodara

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## Abstract

**Background:** Snake bite is a common medical emergency in a tropical country like India where a majority of people depend on agriculture for their livelihood. Objective - To study the profile and outcome of snake bite patients. **Material and Methods:** This was a retrospective study carried out in GMERS Medical College and General Hospital, Gotri-Vadodara from 1st January 2017 to 31st December 2018. Records of 114 snake bite patients were studied, data was collected and statistically analysed. **Observation:** 114 patients were admitted with snake bite. 28.1% patients belonged to age group of 31 – 40 years. A majority of patients were males (52.6%), married (82.5%), and from rural areas (81.6%). 39.5 % patients were farmers. More incidents occurred in July-September (64.9%), during day time (56.1%). outdoors (57 %) and were unprovoked (99.1%). 85 % patients came directly to our hospital. 52.6% patients were bitten over lower limbs. Most common presenting features were local pain (78.9%), fang marks (76.3%), local swelling (74.6%), and respiratory paralysis (14.9%). Neurotoxicity was present in 14.9% patients. **Conclusion:** Need for mechanical ventilation, inotropic support, total leucocyte count on presentation > 11000 /cumm, serum creatinine on presentation > 1.4 mg/dl, serum bilirubin on presentation >1 mg/dl and the presence of neurotoxicity were associated with poor outcome in our centre.

**Key Words:** anti-snake venom, neurotoxic, snake bite, vasculotoxic.

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## INTRODUCTION

Snake bite is a common medical emergency, especially in a country like India where a majority of people depend on agriculture for their livelihood. Approximately 2.8 million people are bitten by snakes in India every year. Snake bites claim as many as 46,900 lives in India every

year. <sup>1</sup> Out of the 216 species of snakes identified in India, 52 species are poisonous. The most commonly found poisonous snakes in India are Elapidae (common cobra, king cobra and common krait), Viperidae (Russell's viper, saw scaled viper, pit viper) and hydrophiidae (sea snakes).<sup>2</sup> When a person is bitten by a poisonous snake, there should be no delay in taking the patient to a well-equipped hospital. The main treatment of a poisonous snake bite is timely administration of anti-snake venom (ASV) <sup>3</sup>Several demographic, clinical and laboratory parameters can help clinicians identify patients who are at a high risk of developing complications. This can lead to better management of patients as well as proper use of resources such as anti-snake venom, mechanical ventilation, blood products and haemodialysis. <sup>4</sup>Snakebite envenoming has been added to the priority list of neglected tropical diseases by the World Health Organization in June 2017. <sup>5</sup>

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## OBJECTIVE

To study the profile and outcome of snake bite patients.

## MATERIALS AND METHODS

This was a retrospective study carried out in GMERS Medical College and General Hospital, Gotri-Vadodara. It was approved by Institutional Human Ethics Committee. All patients, above the age of 18 years, admitted with history of snake bite, from 1st January 2017 to 31st December 2018, were included in this study. The records of these patients were studied for all demographic and epidemiological data, clinical and laboratory data and pre hospital care and in hospital treatment received, along with clinical course and outcome of the patients. Data was entered in Microsoft Excel and was analysed using Epi-Info software. Categorical variables have been described as frequencies

and percentage. Continuous variables have been described as mean, standard deviation (SD), minimum and maximum values for range. Factors associated with death among snake bite patients have been analysed using Chi-square test. A p- value of less than 0.05 is considered to be statistically significant.

## OBSERVATION AND RESULTS

Total 114 patients were included in this study. Table 1 shows the demographic details of these patients. Maximum patients (28.1%) were in the age group of 31 – 40 years and the least number of patients (7%) were in the age group of more than 60 years. There was a male preponderance seen as 52.6% of patients were males. A majority (82.5%) of the patients were married. Most of the patients (81.6%) resided in rural areas. More than one third of the patients (39.5 %) were farmers by occupation.

**Table 1:** Demographic profile of snake bite patients (N = 114)

Variables	Number of patients	Percentage
Age		
≤ 20 years	20	17.5
21 - 30 years	28	24.6
31 - 40 years	32	28.1
41 - 50 years	17	14.9
51 - 60 years	9	7.9
More than 60 years	8	7
Gender		
Male	60	52.6
Female	54	47.4
Marital status		
Married	94	82.5
Unmarried	20	17.5
Residence		
Rural	93	81.6
Urban	21	18.4
Occupation		
Farmer	45	39.5
Non farmer	69	60.5

Table 2 shows the epidemiological profile of snake bite patients. More than half of the cases (64.9%) were seen in the months of July, August and September. More cases (56.1%) were reported during day time (from 7 am to 7 pm). 57 % of the incidents took place outdoors. A majority of patients (39.5 %) were working in fields when they were bitten by a snake. Almost all (99.1%) snake bites were unprovoked.

**Table 2:** Epidemiological profile of snake bite patients (N = 114)

Variables	Number of patients	Percentage
Month		
January – March	1	0.9
April – June	18	15.8
July – September	74	64.9
October – December	21	18.4
Time		
Day (From 7 am to 7 pm)	64	56.1
Night (From 7 pm to 7 am)	50	43.9

Place		
Indoor	49	43
Outdoor	65	57
Activity		
Sleeping	26	22.8
Working in field	45	39.5
Others	43	37.7
Circumstances		
Provoked	1	0.9
Unprovoked	113	99.1

As shown in table 3, 13.2 % of the patients were referred from community health centres, 1.8% patients were referred from private hospitals and a majority of patients (85 %) came directly to our hospital. Before reaching our hospital, only 10.5 % patients received ASV, 12.3 % patients received tetanus toxoid and only 4.4% patients had applied tourniquet. 7.9% of the patients had taken some sort of traditional or folk remedy before arriving at our hospital.

**Table 3: Pre hospital care received by snake bite patients (N = 114)**

Pre hospital care	Number	Percentage
Referred from community health centre	15	13.2
Referred from private hospital	2	1.8
Came directly	97	85
Received ASV	12	10.5
Received tetanus toxoid	14	12.3
Tourniquet application	5	4.4
Any traditional / folk remedies taken	9	7.9

As shown in table 4, maximum patients (52.6%) were bitten over lower limbs. 3.5% patients were hypertensive. Most common presenting signs and symptoms were local pain (78.9%), presence of fang marks (76.3%), local swelling (74.6%), respiratory paralysis (14.9%), nausea/ vomiting (11.4%), and ptosis (10.5%). Neurological manifestations were present in 14.9% patients. Local and systemic bleeding was present in 9.6% patients.

**Table 4: Clinical profile of snake bite patients (N = 114)**

Variables	Number	Percentage
Site of snake bite		
Upper limb	49	43.0
Lower limb	60	52.6
Axial	5	4.4
Comorbid conditions		
Hypertension	4	3.5
Presence of fang marks	87	76.3
Local pain	90	78.9
Local swelling	85	74.6
Fever	7	6.1
Nausea / vomiting	13	11.4
Oliguria	1	0.9
Bleeding from bite site	7	6.1
Hematemesis	3	2.6
Haematuria	2	1.8
Ecchymosis	2	1.8
Ptosis	12	10.5
Ophthalmoplegia	3	2.6
Respiratory paralysis	17	14.9
Bulbar weakness	8	7
Weakness in limbs	2	1.8
Altered sensorium	3	2.6
Seizures	1	0.9
Local wound pain / swelling / ecchymosis within 7.5 cm of bite site	83	72.8
Local wound pain / swelling / ecchymosis extending beyond 7.5 cm of bite site but involving less than half of the limb	6	5.3
Local wound pain / swelling / ecchymosis involving more than half of the limb	1	0.9

As described in table 5, almost half of the patients (53.5%) reached our hospital within 4 hours of snake bite. About one third of the patients (31.6%) were critical and required intensive care. ASV was given to 87.7% of patients. 10.5% of patients required transfusion of blood products like red cell concentrate or fresh frozen plasma, 14.9% of patients required mechanical ventilation, 12.3% of patients had hypotension requiring inotropic support, 0.9% of patients had acute kidney injury requiring haemodialysis and 6.1% of patients required surgical wound debridement. Almost half of the patients (52.6%) required hospitalization for 4 or more days. A majority (91.2%) of patients were discharged.

**Table 5: Hospital care in snake bite patients (N = 114)**

Variables	Number	Percentage
Time interval between snake bite and hospital admission		
Less than 4 hours	61	53.5
4-24 hours	45	39.5
More than 24 hours	8	7
Ward admission	78	68.4
ICU admission	36	31.6
ASV given	100	87.7
Blood products received	12	10.5
Mechanical ventilation	17	14.9
Inotropes	14	12.3
Haemodialysis	1	0.9
Wound debridement	7	6.1
Hospital stay < 4 days	54	47.4
Hospital stay ≥ 4 days	60	52.6
Patients discharged	104	91.2
Patients expired	10	8.8

Laboratory parameters of patients at the time of presentation to the hospital were as detailed in Table 6. Whole blood clotting time (WBCT) > 20 minutes was seen in 9.6% patients. Prothrombin time / international normalized ratio (PT/INR) was deranged (raised) in 9.6% of patients.

**Table 6: Laboratory parameters of snake bite patients on presentation (N = 114)**

Laboratory parameters	Mean	Standard deviation	Minimum	Maximum
Haemoglobin (g/dl)	11.35526	2.09568	6	17.7
Total leucocyte count (/cumm)	12402.11	7111.071	3100	35800
Platelets (/cumm)	242700.2	109577.1	72000	600000
Serum creatinine (mg/dl)	1.003509	0.732305	0.5	7.5
Serum bilirubin (mg/dl)	1.114035	0.795549	0.2	4.7
International Normalized Ratio	1.414035	1.133561	0.7	7
WBCT	Number	Percentage		
Normal	103	90.4		
Raised (>20 minutes)	11	9.6		
PT/INR	Number	Percentage		
Normal	103	90.4		
Raised	11	9.6		

We observed that factors significantly associated with death in snake bite patients were need for mechanical ventilation, need for inotropic support, total leucocyte count on presentation > 11000 /cumm, serum creatinine on presentation > 1.4 mg/dl, serum bilirubin on presentation >1 mg/dl and the presence of neurotoxicity. Presence of vasculotoxicity and requirement of blood product transfusion was not significantly associated with mortality.

**Table 7: Factors associated with outcome of snakebite patients (N=114)**

Variables	Death (n=10)	Discharge (n=104)	X <sup>2</sup>	p-value
Mechanical ventilation	8	9	31.12	<0.0001*
Blood products	3	9	2.43	0.11
Inotropes	8	6	40.02	<0.0001*
Neurotoxic snake bite	5	12	7.82	0.005*
TLC > 11000 / cumm	9	40	7.89	0.005*
S. Creatinine > 1.4 mg/dl	3	2	11.1	0.0009*
S. Bilirubin > 1 mg/dl	5	9	10.89	0.001*
Vasculotoxic snake bite	3	8	2.96	0.08

\*statistically significant

## DISCUSSION

In our study we analysed 114 cases of snake bite. We compared our findings with that of other studies done in India. In our study, maximum patients (28.1%) were in the age group of 31 – 40 years. Harshavardhana *et al*<sup>6</sup> reported that 58% patients in his study were above the age of 40 years which differs from our study where only 29.8% patients were above the age of 40 years and 70.2% were below the age of 40 years. In our study, 52.6% of patients were males and 47.4% were female. This is similar to the male preponderance reported by Gangadharam *et al*<sup>7</sup> (61.5%) and Harshavardhana *et al*<sup>6</sup> (72%). In our study, a majority of the patients were married (82.5%) and resided in rural areas (81.6%). Anjum *et al*<sup>8</sup> also reported that a majority of patients in their study were married (73.4%) and resided in rural areas (67.5%). In our study, a significant bulk of patients (39.5 %) was involved in farming by occupation. Anjum *et al*<sup>8</sup> also reported that a majority (48.5%) of patients in their study was involved in agriculture. We observed that maximum cases were seen in the months of July, August and September (64.9%) and this is similar to the study reported by Anjum *et al*<sup>8</sup> where 67.5% cases were reported in these 3 months. In our study, we noted that 57 % of the incidents took place outdoors. Anjum *et al*<sup>8</sup> also reported a similar finding (62.7% outdoor snake bites). We observed that more people (56.1%) were bitten during day time (from 7 am to 7 pm) which is similar to that reported by Bhelkar *et al*<sup>9</sup> (58.33% bitten during daytime). In our study, 39.5 % patients were working in fields and 22.8% patients were sleeping when they were bitten by a snake. Bhelkar *et al*<sup>9</sup> reported 48.08% patients were working in fields and only 10.26% patients were sleeping when they were bitten by a snake. This differs from our study. Almost all (99.1%) snake bites in our study were unprovoked which is more than that reported by Padhiyar *et al*<sup>4</sup> where 64.1% snake bites were unprovoked. In our study we noted that, 13.2 % of the patients were referred from community health centres, 1.8% patients were referred from private hospitals and maximum patients (85 %) came directly to our hospital. Padhiyar *et al*<sup>4</sup> reported that in their study, 57.8% patients were referred from rural health centres, 17.2% patients were self-referred and remaining patients were referred from primary health centre and private hospitals. The number of patients who came directly to our hospital is higher. Before reaching our hospital, only 10.5 % patients received ASV, 12.3 % patients received tetanus toxoid and only 4.4% patients had applied tourniquet at or above the site of bite. This is again different from that reported by Padhiyar *et al*<sup>4</sup> where 62.5% patients had received ASV, 51.6% had received tetanus toxoid and 45.3% had applied a tourniquet. This difference can be attributed to

the fact that maximum patients in our study had come directly to our hospital. In our study we noted that 7.9% of the patients had taken some sort of traditional or folk remedy before arriving at our hospital which is lower than that reported by Bhelkar *et al*<sup>9</sup> (30.77%). Maximum patients (52.6%) in our study were bitten over lower limbs. Anjum *et al*<sup>8</sup> also reported that 69.2% patients had snake bites on lower limb in their study. Most common presenting signs and symptoms were local pain (78.9%), presence of fang marks (76.3%), local swelling (74.6%), respiratory paralysis (14.9%), nausea/ vomiting (11.4%), ptosis (10.5%), bulbar weakness (7%), bleeding from bite site (6.1%) and fever (6.1%). This is similar to findings of other studies.<sup>8, 9</sup> We observed that neurotoxicity was present in 14.9% patients and vasculotoxicity was present in 9.6% patients. Padhiyar *et al*<sup>4</sup> reported that 43.8% bites were vasculotoxic and 34.4% were neurotoxic. This was much higher than that observed in our study. Almost half of the patients (53.5%) reached our hospital within 4 hours of snake bite and only 7% patients reached after 24 hours. This is similar to that reported by Anjum *et al*<sup>8</sup>, where 48.5% patients reached hospital within 6 hours and only 5.9% patients reached after 24 hours. In our study 31.6% patients were critical and were admitted in intensive care unit and ASV was given to 87.7% of patients. Anjum *et al*<sup>8</sup> also reported similar data (30.8% ICU admissions and 81.1% patients received ASV). In our study we observed that 10.5% of patients required transfusion of blood products like red cell concentrate or fresh frozen plasma, 14.9% of patients required mechanical ventilation, 12.3% of patients had hypotension requiring inotropic support, 0.9% of patients had acute kidney injury requiring haemodialysis. In the study reported by Padhiyar *et al*<sup>4</sup>, blood transfusion was required in 20.3% patients, 18.75% patients required mechanical ventilation, 6.25% received haemodialysis and 6.25% required inotropic support. In our study more patients needed inotropic support while need for blood products, mechanical ventilation and haemodialysis was less as compared to their study. In our study, a majority (91.2%) of patients were cured and discharged, while 8.8% patients expired. Anjum *et al*<sup>8</sup> reported similar findings (92.3% cured and 7.7% expired). We observed that whole blood clotting time > 20 minutes was seen in 9.6% patients and raised PT/INR was seen in 9.6% of patients, which is lower than what was reported by Padhiyar *et al*<sup>4</sup> (34.3% and 23.4% respectively). We observed that factors significantly associated with death in snake bite patients were need for mechanical ventilation and need for inotropic support. Padhiyar *et al*<sup>4</sup> concluded that patients requiring blood product transfusion, inotropes, haemodialysis and mechanical ventilation had a statistically significant correlation with

poor outcome. We did not find that requirement of blood product transfusion was significantly associated with mortality. Padhiyar *et al*<sup>4</sup> also reported that acute kidney injury was significantly associated with poor outcome and hepatic involvement was not significantly associated with poor outcome. We observed that renal involvement (serum creatinine on presentation > 1.4 mg/dl) and hepatic involvement (serum bilirubin on presentation >1 mg/dl) was significantly associated with mortality. We also observed that total leucocyte count on presentation > 11000 /cumm and the presence of neurotoxicity was associated with mortality and presence of vasculotoxicity was not significantly associated with mortality.

## CONCLUSION

Snake bite is a common medical emergency in tropics. It is more common in farmers and in monsoon. Factors like - need for mechanical ventilation, need for inotropic support, total leucocyte count on presentation > 11000 /cumm, serum creatinine on presentation > 1.4 mg/dl, serum bilirubin on presentation >1 mg/dl and the presence of neurotoxicity were associated with poor outcome in our centre.

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