

A Study of Clinical Profile of Patients of Snake Bite in a Tertiary Care Hospital in Western Maharashtra

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Abstract:

Background: Snakebite is one of the major public health problems in the world, affecting several million people each year. Snake bite is a common medical emergency and occupational hazard, especially prevalent in tropical India where agriculture is the primary occupation. The majority of snakebites result from 4 species namely Russell's viper, Cobra, Krait, and Saw-scaled viper. Increased fatality is due to delayed visits to the hospital and a preference for traditional healers. There are limited studies available on the demographic and clinical profiles of snake bites from rural parts of Maharashtra, India.

Aim: To study the clinical and demographic profile of patients presenting with snake bite in a tertiary care hospital in Western Maharashtra.

Materials and Methods: A record-based retrospective study was carried out at VVPF'S Medical College and Hospital, Ahmednagar, north Maharashtra, India. All patients above 15 years of age admitted for snakebite in last one year were included in the study. Demographic, clinical profile, complications, management and outcome were recorded. The data were entered into a Microsoft Excel sheet and analysed using Statistical Package for Social Services (SPSS) software Version 23.

Results: Out of 79 snake-bite cases, 52% were males and 48% were females. Most snakebites were observed in the 36-45 (25%) age group. Snakebites commonly occurred during monsoon season (68%). Most of the people were farmer (71%). 56% of the bites happened during nighttime. The lower limb (68%) was the commonest site. Most of the patients developed neuromuscular symptoms and krait (52%) was the common snake responsible for envenomation. Ptosis (15%) was the most common clinical feature followed by pain at the bite site (20%), and abdominal pain (13%), difficulty in breathing (11%). ASV was administered in 88% of the patients and 15% required mechanical ventilation. The majority of the patients survived (94%) and three patients died (6%). Mean ICU stay was 7 days.

Conclusion: Patients of middle age, mostly males are vulnerable to snakebite due to outdoor activity like farming during Monsoon at night time; Common krait was the commonest type of snake bite. Most of the patients recovered. Awareness must be created among the public on the early visit to health care after a snake bite. There is an urgent need to strengthen primary and secondary health care centres to manage snake bite cases. Training of healthcare workers is essential to identify snake bite cases when the history of the bite is not obvious. The mortality is directly proportional to the clinical severity and delay in seeking medical attention. This study highlights the importance of rapid diagnosis, and initiation of early treatment.

Keywords: Snake-bite, Anti Snake Venom (ASV), Neurotoxic envenomation, Vasculotoxic envenomation, Mechanical ventilation.

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Introduction

Snakebite is one of the major public health problems throughout the world. According to

World Health Organization (WHO), nearly 81,000–1,38,000 people die each year from snakebites

worldwide. [1] Over 2,000 species of snakes are known worldwide, of which around 400 are poisonous. Approximately 200 species of snakes are identified in India. Among them most of the snakes are non-poisonous. The major number of snakebites in India, result from 4 species namely common krait (*Bungarus caeruleus*), Russell's viper (*Daboia russelii*), common Indian cobra (*Naja naja*) and saw-scaled viper (*Echis carinatus*). [2] It is studied that over 10,00,000 snakebites in India has alone caused 58,000 deaths in a year and approx. disability seen in almost four times the number [3].

The tendency of snake bite in humans is when they are being threatened, or being provoked, by an enemy and have no means of escape to surroundings when attacked, [6] But most of the snake bites are unprovoked and accidental and most common site of bite is in the lower extremities. [7] The mortality and morbidity due to snakebites are usually under-reported, because majority of victims are not treated in hospitals. [8] According to recent data analysis, snake bite is recently included in the list of neglected tropical diseases by WHO. [10]

Majority of the snake bites occur in rural areas than urban areas of India. Over 77% of snakebite victims die outside the healthcare facilities because they prefer local traditional treatment methods rather than well trained health care professionals, as a result mortality rate is high in rural areas. [11,14]

Other factors responsible for higher mortality in rural areas are lack of access, delay in reaching the health facility and unavailability of anti-snake venom at health facilities [12].

The key determining factor of outcome is the timely transport of patients to a tertiary care hospital and initiation of anti-snake venom administration and proper supportive care in the dedicated intensive care units. [13]

Complications like shock, systemic bleeding, respiratory failure, acute kidney failure, and bite site tissue necrosis also contribute significantly to mortality and morbidity [12].

The available data on the epidemiology of snakebite from the Indian subcontinent is very less so in the present study we conducted retrospective, descriptive study aims to ascertain demographic and clinical profile, complications, treatment and out-

comes in patients of snake bites in a tertiary care hospital in north Maharashtra, India.

Aim and Objective: To study the clinical and demographic profile of patients presenting with snake bite in a tertiary care hospital.

Materials and Methods: The study included 79 patients. A retrospective descriptive study was carried out in the patients admitted in medical ICU at DVVVF Medical College and Hospital, Ahmednagar, Maharashtra, India from July 2022 till July 2023

A detailed information about demographic parameters such as age, sex distribution, residence, site of bite and place of bite, type of snake if identified, etc., was obtained after written informed consent from legal guardian of each patients.

Inclusion Criteria: All patients above 15 years of age, reporting with confirmed history of snake bite or identification based on dead snake brought by victims or by clinical signs and symptoms were included in the study

Exclusion Criteria: The patients in whom bite was not positively identified as a case of snake bite or no clinical signs and symptoms suggestive of snake bite were excluded from the study.

The case records were reviewed and information regarding socio-demographic profile, clinical manifestations, complications, treatment and outcome was tabulated and analysed. Identification of the snake bite was carried out by history and physical examination of the bite site along with an examination of the dead snake brought by the attendees and using various photographs. All the data obtained were entered into a Microsoft excel sheet and Statistical analysis was conducted using the SPSS software, version 23. The results were expressed as percentages.

Result

Gender and Age: In this series, a total of 79 patients were registered for the study. Amongst them, 41 (52%) were male, and 38 (48%) were females. The highest incidence of Snakebite was observed in the age group of 36-45 years (25%), followed by 46-55 years (18%), and the least was seen in the age group of 66-90 (11%). [Diagram 1]

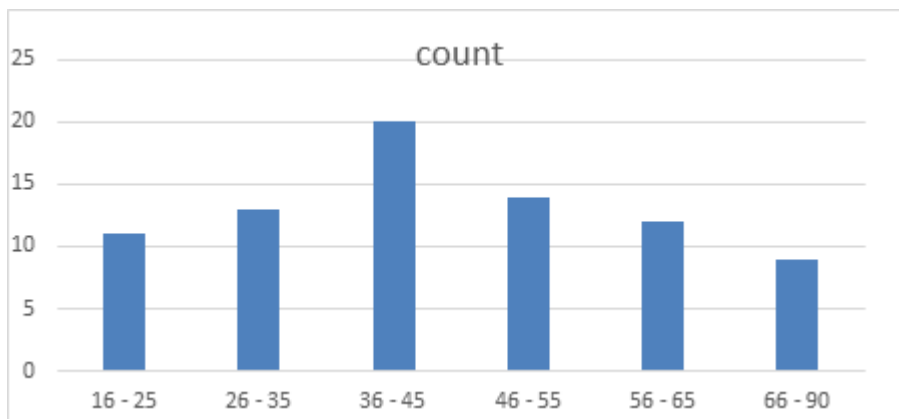


Diagram 1: Age wise distribution of the patients

Occupation: Most of the patients were farmers 56 (71%), laborers 5 (6%), homemaker 10 (13%) [Diagram 2]

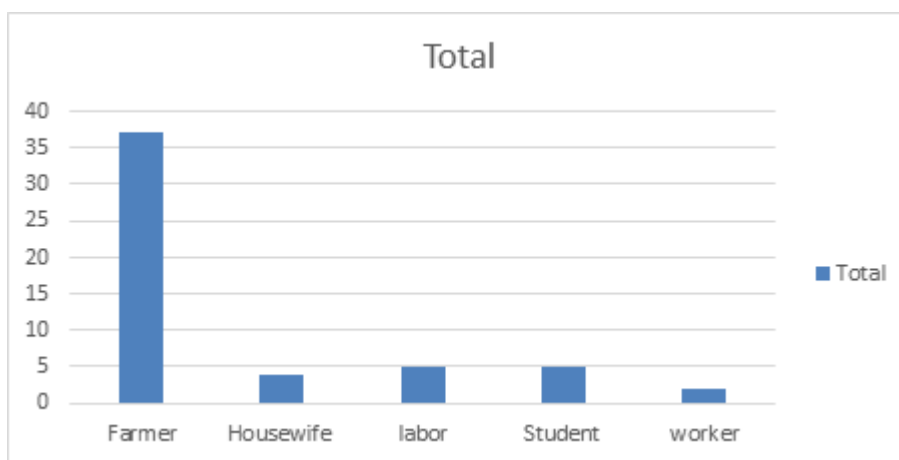


Diagram 2: Occupation

Season and Time of snakebite: Out of 79 snakebite cases, 54 (68%) occurred in Monsoon, 16 (20%) in Winter, and 9 (12%) in Summer. The snakebites happened mostly during nighttime 44 (56%) than during daytime 35 (44%) [Diagram 3].

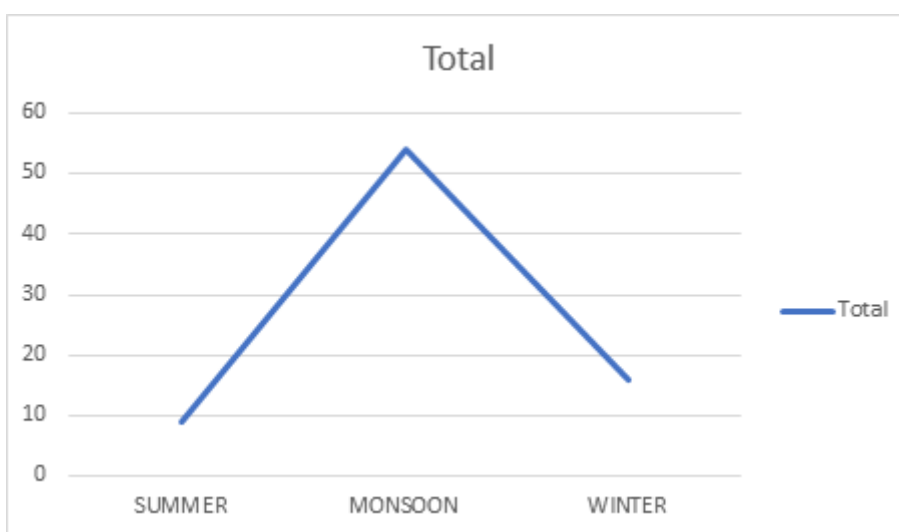


Diagram 3: Season wise distribution

Fang mark and Site of bite: Among the studied population, 70 (80%) had fang marks. Among

them, 49 (62%) had marks on lower limbs, 9 (11%) on upper limbs and 21 (27%) on trunk.

Time-lapse between bite and treatment: Most of the cases were admitted within 6 hours from the time of bite i.e. 69(88%), whereas 7 cases (9%) were admitted between 6-24 hours and 2 patients admitted after 24 hours.

First Aid: First aid was not received in 46 (58%) cases. Tourniquet was used in 6(8%) cases. Tradi-

tional and/or tantric therapies were given in 7 (9%) cases before reaching our hospital.

Identification of Snake and Type of snake: The type of snake was identified in 70 (88%) cases and not identified in 9 (12%). Among the identified snakebite, the majority were by common krait (23,29 %), followed by cobra (16, 12%), and viper (31,39 %).[Diagram 4]

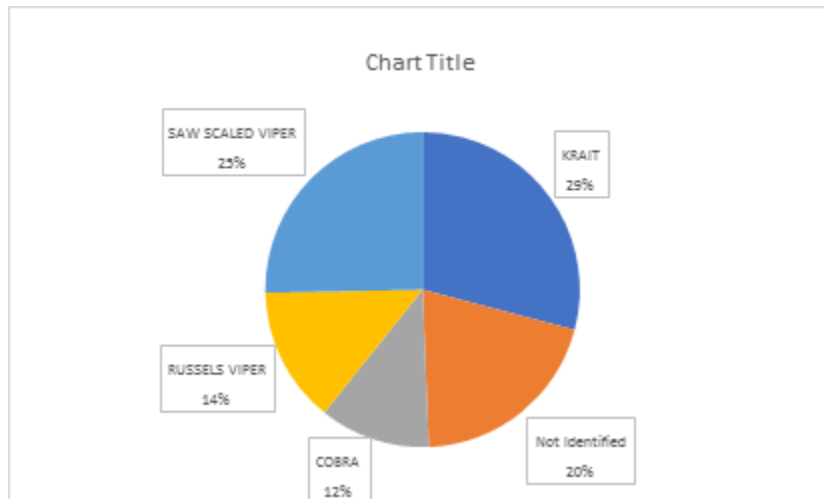


Diagram 4: Type of snake bite

Signs and symptoms: Features of neurotoxicity were observed in the majority of the cases, 10 (6%) had ptosis and 23(15%) had paralysis. Other symptoms observed were abdominal pain (21,13%), difficulty in breathing (17,11 %), nausea & vomiting (20,13 %), pain at the bite site (31,20%), edema at the site of the bite (36, 62%), bleeding from the site of the bite (12, 8%) bleeding from any other site (7,4%). [Diagram 5].

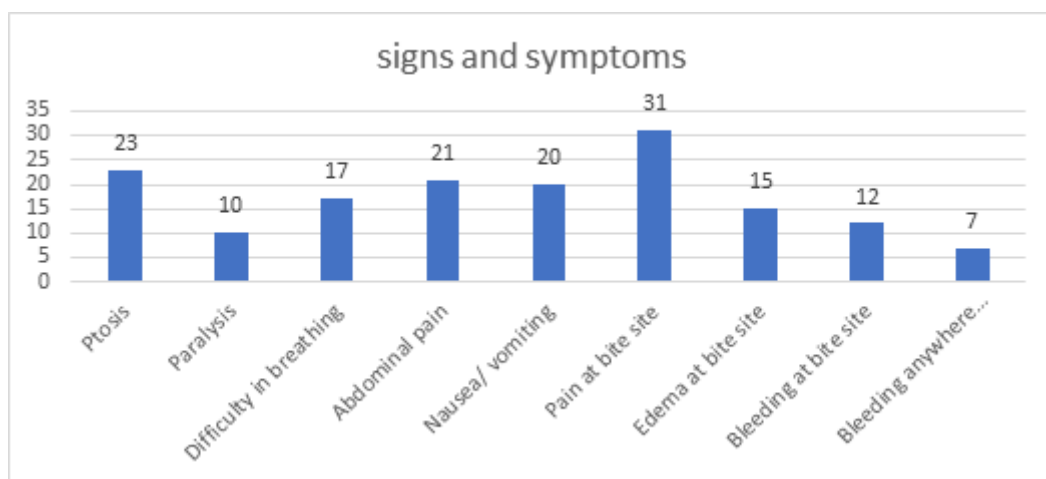


Diagram 5: Clinical manifestations and complications

Complications: Complications included were respiratory failure (12,31%), shock (10, 26%), acute kidney injury (5, 13%), anaphylaxis (5, 13%), coagulopathy (2, 5%), sepsis (2, 5%), encephalopathy (1, 2%), Tissue necrosis (2, 5%). [Diagram 6]

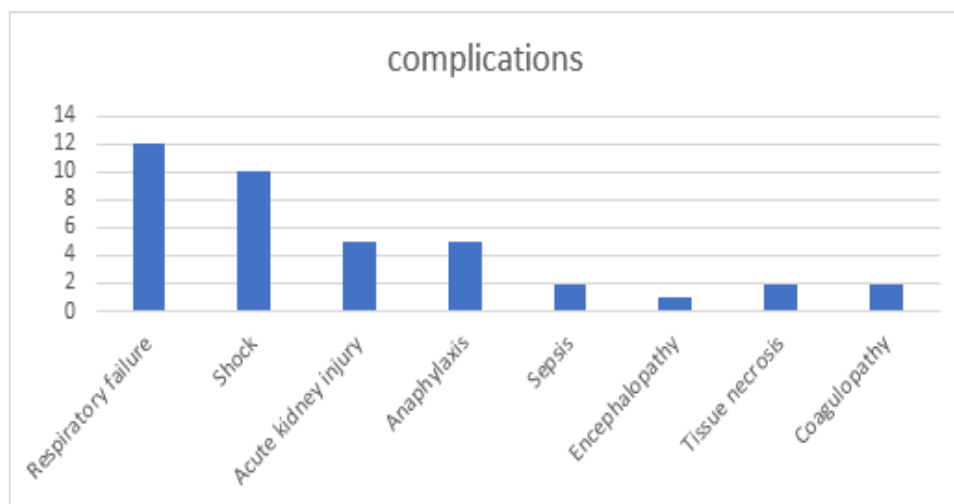


Diagram 6: Complications

Anti-snake venom requirement (ASV): ASV was administered in 70 (88%) cases, whereas in 9 (12%) cases ASV was not given.

Mechanical ventilation/Hemodialysis/Blood transfusion: Mechanical ventilation was required in 12 (15%) cases. 4 (5%) patients required hemodialysis. Blood transfusion was given in 16 (20%) cases.

Outcome: Most of the patients 75 (94%) were recovered and discharged, Mean duration of hospital stay was 10 days and 4 (6%) patients succumbed to death.

Discussion

In tropical regions snake bite is one of the most neglected medical emergencies [12]. Snake bite emerge as primary occupational health risk in developing nations, commonly seen in farmers, plantation workers, outdoor labourers and rural residents engaged in barefoot activities which contribute to recurrent encounters with snakebites [20].

A total of 79 patients presented with a snake bite to the Department of Medicine, DVVPF's Medical College and Hospital, Ahmednagar, Maharashtra were analysed systematically.

In our study, we found, that 25 % of cases were in the age group of 36-45 years. Similar findings were seen in a study done by Meenakshi Shah et al [18] and Thapar R et al [12].

The incidence of snakebite was common in males (52%) as compared to females (48%). Similar findings were noted by Mandal RK et al [13], Timsinha S et al [15] and Gajhyba R et al [16]. As males indulge in more outdoor work like farming, plantation working they are at increased risk of snakebite as compared to females.

On the basis of occupation (71%) farmers are the victim of snake bites. Similar study results were

seen in Halesha B.R[21] in which (84.9%) farmers were victim of snake bite.

Most of the bites are seen in monsoon season (68%). Similar findings were observed in studies done by Meenakshi Shah et al [18]. The higher incidence of snake-bite during this period coincides with the arrival of monsoons as snakes come out of their shelter as their pith holes are filled with water and since monsoon is the harvesting time for farmers majority of snake bites are observed.

In our study we found that Most bites occur during the night (56%). Similar study was seen in Meshram RM et al [6] But in Timsinha S et al [15] study most of the bites our during daytime (65.93%). In rural areas there are not much advanced toilet facilities so people prefer visiting field at night which has increased the number of bites during night time.

Lower limbs were the most common site of bites (44%). Similar results were observed in studies done by Meenakshi Shah et al [18].

The majority of cases were admitted within 6 hours of bite is 88%. Similar studies were seen in Chandrashekaraswamy SS et al [10]. Of 79, only 7 patients presented after 6 hrs. This delay was due to a lack of transportation facility during night hours, the primary centre was not approachable, to seek treatment from quacks, belief in the local native traditional treatment, and the patient's ignorance.

In our study, the majority of the snake-bite was by common krait (29%) similar studies were seen in Sumana Sarkhel et al [17], followed by unidentified snakes and cobra. Common kraits are nocturnal snakes and their fangs size is similar to that of insulin needle therefore they eject more venom at night. In search of rats and lizards during night kraits commonly bites humans. One of major components of krait venom is β -bungarotoxin, a presynaptic acetylcholine receptor blocker.

In our study, features of neurotoxic envenomation were observed the majority of snake-bite victims. The clinical findings observed included ptosis (15%), paralysis (6%), difficulty in breathing (11%), pain at the bite site (20%), abdominal pain (13%), nausea/vomiting (13%), pain at bite site (20%), oedema at bite site (10%), bleeding from the bite site (8%) bleeding anywhere other site (4%). Similar manifestations were reported in the study done in Nepal by Mandal RK et al,[13]and Meenakshi Shah et al [18] whereas studies by Dr Sivagami A et al,[19] and Gajbhiye R et al [16] observed both vasculotoxic and neurotoxic envenomation, with nearly equal proportions.

In our study we performed 20 minutes whole blood clotting time WBCT, 30% patients were positive for this test. It signifies envenomation by vasculotoxic snakes. In study by MeenakshiShah et al [18] 9.6% patients were tested positive and in study by Chandrashekaraswamy SS [10] 9.43% patients were tested positive.

In our study, (31%) patients had respiratory failure, (26%) patients suffered from shock, (13%) suffered from acute kidney injury, (13%) suffered from anaphylaxis, (5%) suffered from sepsis (2%) patient had encephalopathy, (5%) suffered from tissue necrosis and (5%) patients suffered from coagulopathy. Our findings were comparable to the study done by Kshirsagar VY et al [5], Meshram RM [6] and S., Hariprasad & Sukhani, Neha [21]

Before presenting to hospital (15%) patients received first aid treatment, (9%) were treated by tantrik and false beliefs, (8%) were treated by tourniquet, (10%) were treated with intentional cuts and (58%) did not receive treatment. Our findings were comparable to the study done by Dr Sivagami A et al [19] in which (58.6%) did not receive treatment and (15.5%) receive treatment by tantrik and false beliefs. But in study by Chandrashekaraswamy SS [10], (83.1%) did not

received treatment before reaching hospital and in (67.92%) peoples used tourniquet. But in study by Vaipayuri S^[8] (63.4%) patients did not receive first aid treatment, (11.6%) used tourniquet and (0.8%) used incision as line of treatment, (9.3%) used tourniquet and incision, (2.3%) used incision and sucking blood (3.9%) used calcium carbonate and (1%) used forced vomiting as treatments. this differs from our study results. This concludes that majority of people are not aware of first line of treatment in case of snake bite so people should be educated and more awareness should be spread about it.

Out of 79 cases, (88%) patients received ASV and (12%) did not receive ASV. similar results were seen in studies done by Chandrashekaraswamy SS et al^[10] in which (88.66%) patients received ASV and (11.32%) did not receive ASV. In Meenakshi Shah [18] study where (87.7) patients received ASV. But this study differs as in this study by Dr Sivagami A [19] (73.7%) patients received ASV within 6hrs and (26.3%) patients received after 6hrs.

There were (15%) patients who required mechanical ventilation, (5%) required haemodialysis, (20%) required blood transfusion. Similar comparable findings were noted in Meenakshi Shah [18] study in which (14.9) required mechanical ventilation, (10.5%) required blood transfusion and (0.9%) required haemodialysis. But in Pandala P [9] (20.33) required mechanical ventilation and (6.77%) required resuscitation which differ from our study.

The overall outcome in our study was, out of 79 patients 75 (94%) recovered and 4 (6%) patients succumbed to death. The mortality rate is 6% in this study. Similar findings were observed in Halesha B.R [21] in which mortality rate is 3.8% (7 patients succumbed to death) while in other studies mortality rate are as follows:

Sr. No	Author	Year published	Number of cases	Died number	Mortality rate
1.	S., Hariprasad & Sukhani, Neha	2018	120	16	13.3%
2.	Pandala P	2022	59	4	6.77%
3.	B R H, L H, A J L, P K C, K B V	2013	180	7	3.8%
4.	Dr Sivagami A		58	3	5.17%
5.	Reddy	2022	80	9	11.25%

Table 1: Demographic profile of snake bite cases

Parameters	Frequency (N=79)	Percentage (%)
Age		
16- 25	11	14%
26- 35	13	17%
36 – 45	20	25%
46 -55	14	18%
56 – 65	12	15%
66 – 90	9	11%

Gender		
Male	41	52%
Female	38	48%
Occupation		
Farmer	56	71%
Labor	5	6%
Housewife	10	13%
Student	6	8%
Other	2	2%
Season		
Summer	9	12%
Winter	16	20%
Monsoon	54	68%
Time		
Day (6am - 6pm)	35	44%
Night (6pm - 6am)	44	56%
Site of Bite		
Upper limb	9	27%
Lower limb	49	62%
Tunk	21	11%
Time laps (hrs)		
<6	69	88%
6-24	7	9%
>24	2	3%
Type of snake		
Identified	70	80%
Krait	23	29%
Cobra	16	12%
Saw Scaled Viper	20	25%
Russels Viper	11	14%
Not Identified	9	20%

Table 2: Clinical profile and complications

Parameters	Frequency (N=79)	Percentage (%)
Signs and symptoms		
Ptosis	23	15%
Paralysis	10	6%
Difficulty in breathing	17	11%
Abdominal pain	21	13%
Nausea/ vomiting	20	13%
Pain at bite site	31	20%
Edema at bite site	15	10%
Bleeding at bite site	12	8%
Bleeding anywhere other site	7	4%
20WBCT	24	30%
Complication		
Respiratory failure	12	31%
Shock	10	26%
Acute kidney injury	5	13%
Anaphylaxis	5	13%
Sepsis	2	5%
Encephalopathy	1	2%
Tissue necrosis	2	5%
Coagulopathy	2	5%

Table 3: Treatment and outcome

Treatment and Outcome		
Parameters	Frequency (N=79)	Percentage (%)

Treatment received before presenting to hospital		
First aid	12	15%
False belief/ tantric	7	9%
Tourniquet	6	8%
Intentional cuts	8	10%
No treatment	46	58%
ASV		
Given	70	88%
Not given	9	12%
Mechanical ventilation	12	15%
Haemodialysis	4	5%
Blood transfusion	16	20%
Outcome		
Recovered	75	94%
Succumbed to death	4	6%

Conclusion

We have presented the clinical profile of 79 patients, who presented with snake bite. Common krait was the most common type of snake bite. Most patients were young (<45 years). 12 needed ventilatory support. Out of all, 4 patients (6%) succumbed to death. From this study we conclude that, in rural areas snake bites can pose serious health risks due to limited access to medical facilities. Prevention, awareness, and prompt treatment are crucial for reducing the impact of snake bites in this region. Community education about identifying type of snake, first aid required and significance of seeking medical help is vital. Moreover, ensuring availability of antivenom in rural health care centre can substantially decrease the mortality rate. Furthermore, creating awareness campaigns to dispel myths and misconception about snakes can cultivate a better understanding about habitant of these reptiles, reducing superfluous fear and providing a safer coexistence in rural areas. This study highlights the importance of rapid diagnosis, and initiation of early treatment.

Snake bites in rural areas requires a multifaceted approach involving awareness, education, health care improvement and environmental management. By merging these efforts, it is possible to mitigate the impact of snake bites and improve the overall wellbeing of rural areas

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