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Retrospective Study of Clinical and Outcome Characteristics in Snake Bite Patients

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Abstract

Background: Snakebite envenomation is a major health concern in India, particularly in rural regions with significant agricultural activity. Despite its burden, it remains understudied and underreported, often leading to serious complications or death. This study evaluates the clinical and outcome characteristics of snakebite patients from a rural tertiary care center in Maharashtra.

Objectives: To analyze demographic, clinical, and treatment profiles, along with outcomes of snakebite patients, and to identify the complications and management patterns to inform improved clinical and public health strategies.

Methodology: A retrospective observational study was conducted at CPR Hospital Kolhapur, between November 2024 and March 2025. Hospital records of 30 patients aged ≥12 years with snakebites were reviewed. Data on demographics, symptoms, signs, bite characteristics, complications, treatments, and outcomes were collected. Statistical analysis was performed using SPSS version 28. Frequencies and proportions were calculated for categorical variables, and means with standard deviation for continuous variables. Significance was tested using Chi-square, Fisher's exact test, and unpaired t-test.

Results: Among the 30 patients, 73.3% were males, with a mean age of 35.5 years. The most common age group affected was 12–29 years (43.3%). Local pain and swelling (53.3%) were the most common symptoms, followed by ptosis and abdominal pain (33.3%). Vasculotoxic bites predominated (50%), with lower limbs being the most frequent site (56.7%). Time to

hospital admission was delayed in 70% of cases. Complications were seen in 69.6% patients, with thrombocytopenia (23.3%) and respiratory paralysis (16.7%) being the most common. ASV with adrenaline was administered to 83.3% of patients; mechanical ventilation was needed in 16.7%. Despite delays and complications, 93.3% recovered, while mortality was 6.7%, primarily due to systemic complications and late presentation.

Conclusion: Snakebite remains a critical yet neglected public health issue. Timely intervention, improved access to antivenom, and public awareness are essential to reduce complications and improve outcomes in rural India.

Keywords: Snakebite, Envenomation, Antivenom, Rural Health, Clinical Outcomes

Introduction

Snakebite envenomation is a critical public health issue, particularly in tropical and subtropical regions where agricultural activities bring humans into frequent contact with snakes. In India, a predominantly agrarian economy with rich biodiversity, snakebites account for significant morbidity and mortality, especially in rural areas[1]. The World Health Organization (WHO) has classified snakebite envenomation as a neglected tropical disease, highlighting the urgent need for improved medical interventions and public health strategies to mitigate its impact[2].

Globally, snakebites result in over 100,000 deaths annually, with an estimated 400,000 cases leading to permanent disability or disfigurement[3]. South Asia bears the highest burden, and India alone contributes to nearly 50% of global snakebite-related fatalities. States such as Maharashtra, Uttar Pradesh, Andhra Pradesh, and Tamil Nadu report the highest incidence, reflecting the intersection of dense rural populations, agricultural livelihoods, and abundant snake habitats[4]. The true incidence of snakebites in India is likely underestimated due to underreporting, with many victims succumbing before reaching healthcare facilities or opting for traditional remedies.

Snakebites can lead to a spectrum of clinical manifestations, ranging from localized symptoms to life-threatening systemic envenomation. The severity depends on factors such as the snake species, venom composition, bite site, and time to treatment. Venomous snakes in India primarily belong to the Viperidae (e.g., Russell's viper) and Elapidae (e.g., Indian cobra and common krait) families, each causing distinct envenomation syndromes[5].

Despite its prevalence, snakebite envenomation remains understudied in many parts of India, with most data derived from urban tertiary centers. This study aimed to bridge this gap by analyzing the clinical profile and outcomes of snakebite patients admitted at at CPR Hospital, Kolhapur. Assessing demographic patterns (age, gender, occupation)[6]. This study provides contemporary insights into snakebite management in rural Maharashtra, where agricultural work increases exposure to snakebites. By highlighting local trends in envenomation, complications, and healthcare barriers, the findings can inform targeted interventions.

Material and Methods

This retrospective study was conducted at CPR Hospital Kolhapur, between November 2024 and March 2025. The study aimed to evaluate the clinical presentation, complications, and outcomes of snakebite patients admitted to the hospital.

Study Design and Population

A total of 30 snakebite patients aged 12 years and above were included in the study. Data were collected from hospital records, including demographic details, clinical symptoms, signs, bite characteristics, complications, and treatment outcomes. Patients with incomplete records or those who left against medical advice were excluded.

Data Collection

Subjects were interviewed according to the Marathi or Hindi or English proforma or the language the patient best understands. The following parameters were analyzed like Demographics (Age, gender), Clinical Presentation (Symptoms (e.g., local pain, swelling, ptosis) and signs (e.g., ptosis, ophthalmoplegia), Bite Characteristics (Type -vasculotoxic, neurotoxic, asymptomatic, site (lower limb, upper limb, face), Complications (Thrombocytopenia, respiratory paralysis, acute kidney injury, etc), Treatment (Anti-snake venom -ASV, antibiotics, analgesics, neostigmine, mechanical ventilation, etc. and Outcome (Discharge or death).

Statistical Analysis

Data will be entered into Microsoft excel data sheet and was analyzed using SPSS 28 version software (IBM SPSS Statistics, Somers NY, USA). MS Excel and MS word were used to obtain various types of graphs such as bar diagram. Categorical data was represented in the form of Frequencies and proportions. Chi square test, Fisher Exact tests were used as test of significance for qualitative data continuous data was represented as mean and standard deviation. unpaired t test was used as test of significance to identify the mean difference between two quantitative variables for comparison.

P value (Probability that the result is true) of 0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Results

Table 1: Age and gender distribution of Cases

Symptoms and Signs		Frequency	Percentage
Age Group	12–29	13	43.3%
	30–49	11	36.7%
	≥50	6	20%
Gender	Male	22	73.3%
	Female	8	26.7%

In the present study, out of 30 patients, majority, 43.3%, were young patients belonging to age group 12 to 29 years followed by 36.7% from age group 30 to 49 years. Mean age of the patients was 35.5 ± 14.7 years, ranging from 13 to 70 years. 73.3% were males and 26.7% were females. Mae to female ratio was 2.75:1.

Table 2: Distribution of cases according to Presenting Symptoms and Signs:

Symptoms and Signs		Frequency	Percentage
Symptoms	Local pain	16	53.3%
	Local swelling	16	53.3%
	Ptosis	10	33.3%

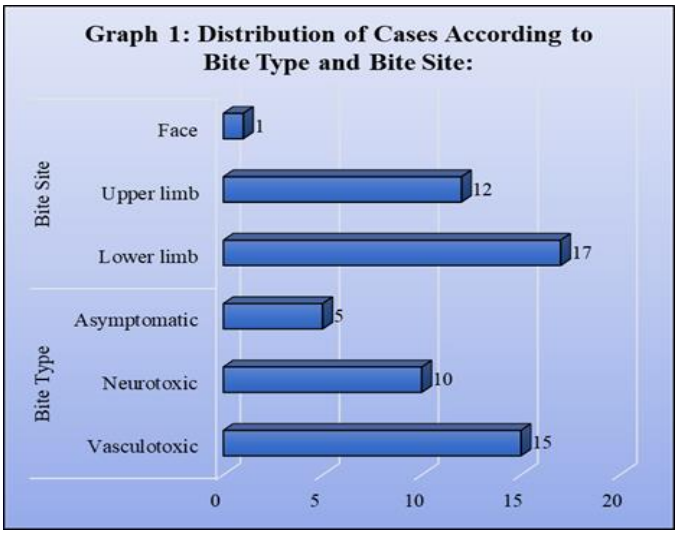
	Abdominal pain	10	33.3%
	Vomiting	10	33.3%
	Difficulty breathing	5	16.7%
	Dysphagia	3	10.0%
	Bleeding tendencies	2	6.7%
	Unconsciousness	1	3.3%
	Double vision	0	0.0%
Signs	Ptosis	10	33.3%
	Ophthalmoplegia	5	16.7%
	Palatal weakness	3	10.0%
	Blister and blebs	1	3.3%

Local pain was most common symptoms and present in 53.3% patients, Local swelling in 53.3%, Ptosis, Abdominal pain and Vomiting in 33.3% each. On examination, Ptosis was noted in 33.3% patients, Ophthalmoplegia in 16.7%, Palatal weakness in 10.0% and Blister and blebs in only patient.

Distribution of Cases According to Bite Type and Bite Site

Type of bite was Vasculotoxic in 50.0%, Neurotoxic in 33.3% and asymptomatic in 16.7%. Site of the bite shows that lower limb in 56.7%, upper limb in 40.0% and face in one patient only.

Graph 1:



Mean General Examination Findings

On general examination, mean pulse rate was 88.0 ± 16.1 per minute, mean SBP was 124.9± 23.4 mmHg, mean DBP was 81.9 ± 11.8 mmHg and mean SBC (count) was 22.4±8.7.

Time from Bite to Hospital Admission

Majority, 47% patients reported after >15 hours of snake bite, 23% reported after 10–15 hours, 17% after 5–10 hours and only 13# reported within 5 hours of snake bite.

Graph 2:

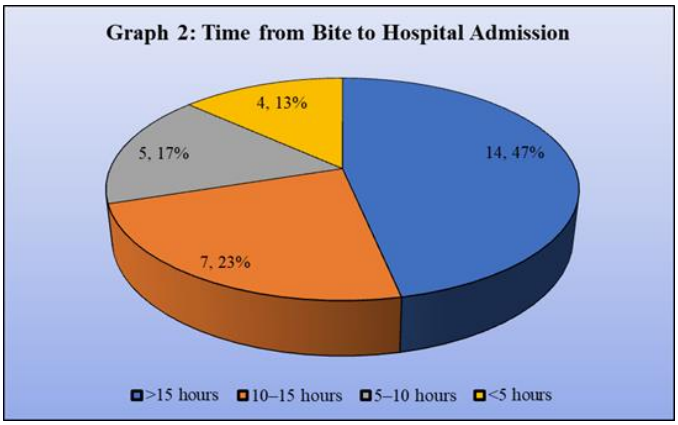


Table 3: Complications Observed:

Complications	Frequency	Percentage
Thrombocytopenia	7	23.3%

Respiratory paralysis	5	16.7%
ASV anaphylaxis	4	13.3%
Acute kidney injury	3	10.0%
Hematuria	1	3.3%
Hypotension	1	3.3%
Coma	1	3.3%
DIC	1	3.3%
No complications	7	30.4%
Total	30	100%

Complications were observed in 23 (69.6%) patients. Thrombocytopenia was observed in 23.3% patients, Respiratory paralysis in 16.7%, ASV anaphylaxis in 13.3% and acute kidney injury in 10.0% patients. Hematuria, Hypotension, Coma and DIC were observed in one patient each.

Table 4: Treatment Provided:

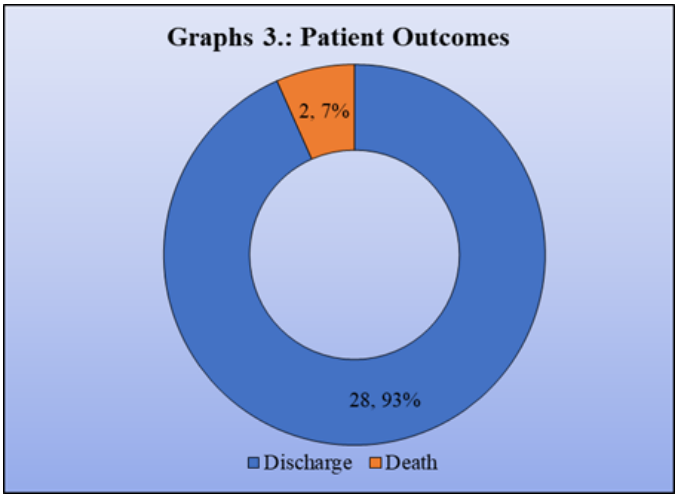
Treatment	Frequency	Percentage
ASV + Adrenaline	25	83.3%
Antibiotics	16	53.3%
Analgesics	16	53.3%
Neostigmine	10	33.3%
Mechanical ventilation	5	16.7%
Blood transfusion	4	13.3%
Haemodialysis	2	6.7%
Antihypertensives	1	3.3%
Inotropes	1	3.3%

83.3% were managed by ASV + Adrenaline, Antibiotics needed in 53.3%, Analgesics in 53.3% and Neostigmine in 33.3%. majority of the patients needed multimodal treatments. 16.7% patients needed mechanical ventilation, 13.3% needed blood transfusion and 2 patients needed haemodialysis.

Patient Outcomes

Out of 30 patients, 93.3% discharged with recovery and 6.7% died due to various systemic complications.

Graphs 3:



Discussion

Snakebite envenomation remains a significant public health challenge in rural India, particularly in agricultural communities where human-snake encounters are frequent. This retrospective study, conducted at CPR Hospital Kolhapur, analyzed 30 snakebite cases to evaluate clinical profiles, complications, and outcomes. Our findings align with previous studies while highlighting region-specific patterns and contemporary management challenges.

Demographic and Epidemiological Patterns

Our study found that the majority of snakebite victims (73.3%) belonged to the 20–40 age group, consistent with studies by Sawai and Honma[7] (70.28%) and Nigam et al[8]. (83.3%). This age group is most vulnerable due to occupational exposure during farming, plantation work, and outdoor activities. Contrary to studies from Bangladesh[9] and Malaysia[10], where children (<20 years) constituted a larger proportion, our data reflect the agrarian workforce's predominance in rural Maharashtra. Gender distribution was equal (50%

male and female), mirroring Rahman et al.'s [11] findings, but contrasting with male-dominated reports from other Indian studies[7,8]. This parity underscores the increasing participation of women in agricultural labor, necessitating gender-inclusive prevention strategies.

Clinical Presentation and Bite Characteristics

Local pain and swelling (53.3%) were the most common symptoms, corroborating studies by Kalantri et al[12]. (85%) and Bubalo et al[13]. (87%). These findings contrast with reports emphasizing systemic symptoms like abdominal pain (Singh et al.)[14] or bleeding (Harris et al.) [(15)], possibly due to variability in snake species or regional venom composition. Ptosis (33.3%) was the predominant sign, aligning with Sarangi et al[16]. (80%) and Nigam et al[8]. (85%), reinforcing its diagnostic value for neurotoxic envenomation.

Vasculotoxic bites (50%) outnumbered neurotoxic bites (33.3%), similar to South Asian regional data[17]. Lower limbs (56.7%) were the most frequent bite sites, consistent with global trends[18]. However, upper limb bites (40%) were higher than in some studies[12,13], likely due to manual handling of crops or firewood.

Time to Hospital Admission and Complications

Delayed presentation (>15 hours in 46.7% of cases) remains a critical issue, echoing Sloan et al.'s observations in South Africa[19]. Traditional healer consultations and poor transportation infrastructure contribute to delays, exacerbating complications like thrombocytopenia (23.3%) and respiratory paralysis (16.7%). The mortality rate (6.7%) was comparable to national averages[3], but higher than in centers with rapid ASV access, emphasizing the need for decentralized antivenom distribution and community awareness.

Treatment and Outcomes

ASV with adrenaline premedication (83.3%) was the cornerstone of management, yet ASV anaphylaxis (13.3%) persisted as a challenge, paralleling earlier reports[3]. Mechanical ventilation (16.7%) and neostigmine (33.3%) usage highlighted the burden of neurotoxicity, while thrombocytopenia-driven blood transfusions (13.3%) underscored hematotoxic effects. The 93.3% survival rate reflects improved hospital care but also signals gaps in pre-hospital care, as most deaths occurred in patients presenting late.

Comparative Analysis with Recent Studies

Recent studies from India (e.g., Warrell et al., 2013)[2] stress the role of species-specific antivenoms and point-of-care diagnostics. Our findings reinforce these recommendations, as clinical profiling alone may miss cryptic envenomation. Contrastingly, studies from Brazil (Lima et al., 2009) [(11)] report higher asymptomatic bites, while our asymptomatic cases were fewer (16.7%), possibly due to referral bias or species variation.

Public Health Implications

The persistence of traditional healer reliance (evidenced by delayed presentations) calls for community education programs. Mobile health units and ASV stocking in primary health centers could reduce mortality, as demonstrated in Tamil Nadu's successful model[2]. Additionally, training healthcare workers in ventilator management and ASV administration is crucial, given the high rates of respiratory paralysis and anaphylaxis.

Limitations

This study's single-center design and small sample size limit generalizability. Lack of snake species identification (due to retrospective reliance on clinical records) may bias envenomation profiles. Future

prospective studies with venom immunoassays could refine management protocols.

Conclusion

Our study reaffirms snakebite as an occupational hazard for rural populations, with demographics and clinical patterns mirroring national trends. While ASV and supportive care have improved outcomes, delays in hospital presentation and ASV-related complications remain hurdles. Multidisciplinary efforts—combining community education, healthcare worker training, and antivenom accessibility—are vital to reduce mortality. Policymakers must prioritize snakebite as a notifiable disease and integrate region-specific data into national health programs to mitigate this neglected tropical burden.

References

1. Varade SS, Shinare BR, Nandkishore SG, Shah P, Kunkulol R. Study of clinical presentation and outcome of patients with snake bites at tertiary care hospital in rural population. Pravara Med Rev; December 2021, 13(04): 62 – 68.
2. Warrell DA, Gutiérrez JM, Calvete JJ, et al. New approaches & technologies of venomics to meet the challenge of human envenoming by snakebites in India. Indian J Med Res. 2013;138:38-59.
3. Jones AL, Karalliedde L. Poisoning. In: Davidson's Principles and Practice of Medicine, Boon NA, Colledge NR, Walker BR (Eds.)., 20th edn. Philadelphia, PA: Churchill Livingstone Elsevier, 2006. pp. 203–26.
4. Warrell DA. Injuries, envenoming, poisoning and allergic reactions caused by animals. In: Oxford Textbook of Medicine, Warrel DA, Cox TM, Firth JD (Eds.)., 4th edn. vol. 1. New York: Oxford University Press, 2003. pp. 923–46.
5. Brunda G, Sashidhar RB. Epidemiological profile of snake-bite cases from Andhra Pradesh using immunoanalytical approach. Indian J Med Res 2007;125:661–8.
6. Chattopadhyay S, Sukul B. A profile of fatal snake bite cases in the Bankura district of West Bengal. Trans R Soc Trop Med Hyg 2011;18:18-20.
7. Sawai Y, Honma M. Snake bites in India. Snake 1975;7:1-16
8. Nigam P, Tandon VK, Rajendra Kumar, Thacore VR, Lal Narrottam. Snake bite. A clinical study. The Indian Journal of Medical Sciences 1973;27:697-704.
9. Rahman R, Faiz MA, Selim S, Rahman B, Basher A, Jones A et al. Annual incidence of snake bite in rural Bangladesh. PLoS Negl Trop Dis 2010;4(10):e860.
10. Chew KS, Khor HW, Ahmad R, Rahman NHNA. A five-year retrospective review of snakebite patients admitted to a tertiary university hospital in Malaysia. International Journal of Emergency Medicine 2011;4:41.
11. Lima ACSF, Campos CEC, Ribeiro JR. Epidemiological profile of snake poisoning accidents in the State of Amapa. Rev Soc Bras Med Trop 2009;42(3):329.
12. Kalantri S, Singh A, Joshi R, Malamba S, Ho C, Ezoua J et al. Clinical predictors of in hospital mortality in patients with snakebite: a retrospective study from a rural hospital in central India. Tropical Medicine and International health 2006;2(1):22-3
13. Bubalo P, Curic I, Fister K. Characteristics of venomous snakebites in Herzegovina. Croat Med J 2004;45:50.

14. Currie BJ. Snakebite in tropical Australia: a prospective study in the “Top End” of the Northern Territory. Med J Aust 1991;154:266- 8.
15. Singh J, Bhoi S, Gupta V, Goel A. Clinical profile of venomous snake bites in north Indian Military Hospital. J Emerg Trauma Shock 2008;1(2):78–80
16. Sarangi A, Jenal L, Sahoo H. A profile of snake bite poisoning with special reference to haematological, renal, renological and electrocardiographic abnormalities. JAPI 1977;25:555-560
17. DA Warrel. Animal toxins in Mansons tropical medicine 21st edition (Gordan Cook and Almuddin) 2003 Saunders.
18. Kulkarni ML. Anees S. Snake venom poisoning: expeirnece with 633 cases. Indian Pediatrics 1981;18:193-7.
19. Sloan DJ, Dedicoat MJ, Lalloo DG. Health care seeking behaviour and use of traditional healers after snakebite in Hlabisa sub-district, KwaZulu Natal. Trop Med Int Health 2007; 12(11): 1386-90.