Section: Anesthesiology

Original Research Article

A STUDY ON THE CLINICO-EPIDEMIOLOGICAL PROFILE OF SNAKE BITE CASES IN AN EMERGENCY DEPARTMENT OF A TERTIARY CARE HOSPITAL IN CHENNAI

Chilakala Pavankumar[1], Mahalakshmi Sivapackiam[2], Gomathi Karmegam[3], Janani J[4]

[1]Junior Resident, Department of Emergency Medicine, Government medical college, Omandurar Government estate, Tamilnadu, India
[2]Associate Professor in Anaesthesiology, Department of Emergency Medicine, Government Medical College, Omandurar Government estate, Tamilnadu, India
[3]Associate Professor in Anaesthesiology, Department of Emergency Medicine, Rajiv Gandhi Government General Hospital and Madras medical College, Tamilnadu, India
[4]Assistant Professor of Anesthesiology, Department of Emergency Medicine, Govt medical College, Omandurar Government estate, Tamilnadu, India

Received : 06/01/2023
Received in revised form : 15/02/2023
Accepted : 28/02/2023

Keywords:
Un-foreseen hazard, Viper, Cobra, Anti Snake venom, lower limb, renal failure, neurotoxic, hemotoxic.

Corresponding Author:
Dr. Janani J,
Email: jannuash@gmail.com

DOI: 10.47009/jamp.2023.5.4.65

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (4); 318-323

Abstract

Background: Snake bites are a common medical emergency and an occupational danger, considered a neglected illness, particularly in India. Data are scarce on the epidemiology of snake bites on the Indian subcontinent. The study aimed to investigate the clinico-epidemiological characteristics of snake bite victims who present to the emergency department, as well as to evaluate therapeutic choices in envenomed patients and to determine the outcome. **Materials and Methods:** This hospital-based descriptive research was conducted in the emergency department of Rajiv Gandhi government general hospital in Chennai between February 2020 and January 2021, with authorisation from the ethical committee. Data on demographic characteristics, clinical features, complications, treatment details, and the outcome of snake bite patients were documented and analysed. **Result:** Among 130 snake bite patients, cases had male predominance (67.7%). Students (20%) had the most snake bites. Although 86% of the patients were free of comorbidities, remaining hav Diabetes Mellitus and Hypertension. Maximum bites occurred between 4 and 8 PM (63%), with outdoor bites occurring more frequently (72.3%). While 34.6% of snakes were unidentified, Viper (24.6%) and Cobra (20.8%) were seen as the primary snake types involved. Higher number of cases were bitten in the lower limb (63.8%) and hospitalised with no tourniquet (65.4%), but with stable vitals (76.2%). Half of the patients had neurotoxic symptoms, 40% hemotoxic who were given ASV and bite-to-needle time was < 4 hours. Only 25% reported minor responses. Complications of snake bite included renal and respiratory failures. The mean hospital stay was six days, with a 4.6% mortality rate. **Conclusion:** Snake bite is an unanticipated risk among students, farmers, and even housewives in the tropics. Regular public health activities emphasising preventive, pre-hospital management (first aid), and the significance of early hospital transfer should be implemented.

INTRODUCTION

Snake bites are a common medical emergency and an occupational danger, particularly in tropical India, where farming is a key source of income. Snakebite is one of the neglected tropical illnesses targeted by the World Health Organisation (WHO).[1] However, it was left out of the WHO reports on neglected tropical diseases in 2010 and 2013. Even though snakebites' social and economic effect is widespread, public health officials, doctors, and policymakers have consistently ignored the issue.[2] Over 2,000 snake species are known globally, with approximately 400 being venomous. These snakes are members of the Elapidae, Viperidae, Hydrophiidae, and Colubridae families. Viper bites are more prevalent in humans than other dangerous snake bites. The Russell's viper is the most prevalent type in Southern Asian countries, and its bite is considered an occupational danger for the farming population.[3]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Globally, around 4.2 lakh cases of snakebite envenomation and 20,000 fatalities have been documented, although the true statistics may be significantly higher. Conservative estimates put the death rate at 0.297 per lakh population, ranging from 0.001 in North America to 2.434 in Oceania.[4] Snakebites are most common in South Asia, South East Asia, and Sub-Saharan Africa. Envenomation is predicted to be 81,000 annually in India, the most in the world, followed by Sri Lanka, Vietnam, and Brazil. In India, the worst impacted states are Uttar Pradesh, Andhra Pradesh, and Bihar, with the bulk of deaths reported in Andhra Pradesh.[5]

Every year, 50,000 Indians die due to snake bites, despite India not having the most poisonous snakes in the world, nor does it have a scarcity of anti-snake venom.[6] The primary reason for this "unacceptable incidence" of snake bite fatalities is that individuals initially try out various "bizarre remedies" instead of heading to the nearest hospital.[7] Because most snake bites occur in uneducated, rural populations who employ witchcraft and traditional healers, data on the epidemiology of snakebites from the Indian subcontinent are few. Only cases of snakebite with severe envenomation reach medical facilities.[2]

The shortage of anti-snake venoms, limited access, and low-quality healthcare services contribute to increased mortality and morbidity in tropical nations.[8] People in countries such as India choose traditional healers over qualified doctors, owing to ignorance and financial constraints. As a result, 77% of snakebite victims in rural regions die outside the healthcare system.[9] Snakebites can result in life-threatening consequences such as shock, systemic haemorrhage, respiratory muscle paralysis, acute renal failure, and tissue necrosis at the bite site. Snakes from the families Viperidae and Elapidae are thought to be more dangerous. Because snakebite problems develop quickly and irrevocably, medical intervention must be timely and appropriate.[10]

Even though snakebite deaths may be avoided, the fatality rate remains high due to a lack of awareness among doctors about snakebite care. This, combined with a delay in conventional treatment, a lack of anti-snake venom, and a lack of tracheal intubation and breathing via a bag-valve-mask in neuro-toxic cases, have all been key contributors to snakebites-related deaths.[11] It is difficult to be accurate about the real number of snake bite morbidity and fatality since these occurrences are not regularly documented in most countries, and only a few nations have a solid epidemiological reporting system. In 2007, India implemented a nationwide policy for snake bite care. This regimen advised providing anti-snake venom mostly within the first three hours. It has been stated that with the introduction of this new Indian strategy, both mortality and consumption of anti-snake venom have dropped. The World Health Organisation created and endorsed a similar guideline for treating snake bites in Southeast Asia.[12]

The current study aimed to explore the clinico-epidemiological features of snake bite victims who appear in the emergency department and assess and identify the outcome of therapy options in envenomed patients.

MATERIALS AND METHODS

The present hospital-based descriptive study was conducted after obtaining permission from an ethical committee between February 2020 and January 2021 at Rajiv Gandhi government general hospital, Madras medical college, Chennai.

Inclusion Criteria

Patients aged >13 and up who meet any of the following criteria: those who gave their consent or who presented with a history of snake bite with or without evidence of bite, patients with history and definitive evidence of snake bite in the form of local cellulitis, regional lymphadenitis, and prolonged clotting time, neurotoxic manifestations such as ptosis, dysphagia, external ophthalmoplegia, and respiratory failure, or patients with a history of snake bite with or without evidence of a bite.

Exclusion Criteria

Those under 13, those unwilling to engage in the study, and those with a history of scorpion bites or bee stings were excluded.

Methodology

Data were collected from patients who met the inclusion criteria after obtaining informed permission from the patient or caretaker (depending on the patient's clinical status). After describing the purpose of the study, all patients will provide written informed permission, which will be collected on arrival. This study imposes no additional financial burden on participants through treatments or investigations. Along with the demographics, the factors considered were the most prevalent snake species, gender, victim age, time and location of the bite, symptoms observed on hospital admission, therapy began, number of ASV utilised, and final result.

Statistical Analysis

The following descriptive and inferential statistical approaches were used to analyse the data (SPSS software): frequency, percentage, mean, and standard deviation (SD). A two-tailed $P< 0.05$ was deemed statistically significant.

RESULTS

The study involved 130 patients in total. The research individuals' ages varied from 18 to 65, with a mean age of 36.5 (SD=11.86) years. Two-thirds of them (67.7%) were men. Diabetes Mellitus affected 19 (14.6%) individuals, Hypertension affected 21 (16.2%), and Bronchial Asthma affected two. Regarding occupation, 20% of those bitten by snakes were students, 18.5% were hoe makers, and 13.1% were farmers [Table 1].

Nearly half (48.5%) of the bites were recorded between 4 and 8 p.m. Bites were recorded between 8

ISSN (O): 2687-5365; ISSN (P): 2753-6556

p.m. and midnight and between 4 and 8 a.m. Regarding 12-hour intervals, 59.2% of the bites happened during the day (8 AM to 8 PM), while the remainder (40.8%) occurred between 8 PM and 8 AM.

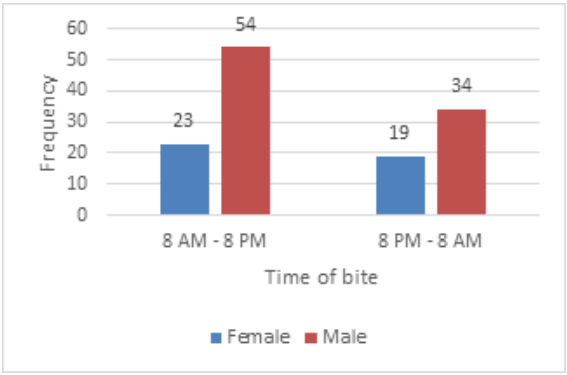

Figure 1: Time of bite comparison between genders

There was no difference in the proportion of females bitten at night compared to males (45.2% v/s 38.6%, p=0.474) (Figure 1). One-fourth (27.7%) of the bites happened indoors. Males had a much greater chance of being bitten outdoors than females (57.1% v/s 79.5%, p=0.008). The snakes could not be recognised in more than one-third (34.6%) of the bite cases. Most snake bites were from Viper, followed by Cobra and Krait. Non-poisonous snakes were responsible for 15.3% of the bites.

Among identified snakes, viper was observed to have caused the highest number of bites in 8 am-8 pm (65.6%) and cobra in 8 pm-8 am. Regarding the place of bite, cobras contributed to the highest number of bites indoors and vipers to outdoor bites [Table 2]. However, we found no statistical correlation relating the type of snake to the time and place of bite (p>0.05).

Nearly two-thirds (63.8%) of the subjects got bitten in the lower limb, while 27.7% got bitten in the upper limb. Most (65.4%) of the patients reported to the hospital with no tourniquet. Tourniquet was applied by 45 (34.6%). Two subjects had punctured the bite site, and one had also applied a tourniquet [Figure 2].

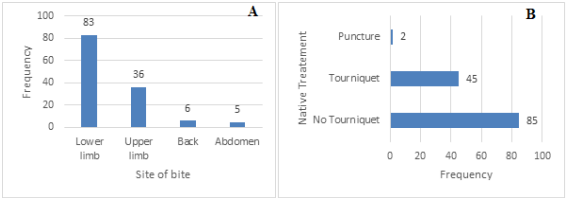

Figure 2: A) Site of bite and B) Native treatment rates for patients

Symptomology traits indicated higher rates of neurotoxicity and hemotoxicity (Table 3). About half the patients had neurotoxic signs, while 40% had hemotoxic signs. Cellulitis was seen in 8.5%, while 12.3% had local oedema. 11.5% had these symptoms in various combinations. Two had no symptoms of toxicity. Over three-fourths of the patients were stable on arrival (76.2%). At least half the patients had a bite-to-needle time of < 4 hours, while about one-third had a bite-to-needle time between 4 to 6 hours [Table 3].

Among 130 patients, 14 did not require ASV. In the remaining, the median dosage of ASV needed was ten vials (Table 3). Of the 116 who got ASV, 25% had mild reactions, while 5.2% had moderate reactions. Also, the majority of patients were detected to have normal clotting time (64.6%), renal function (90.8%), platelets (93.8%) and no deposits of albumin or myoglobin (88.5%). All of their X-rays and ECGs were normal.

Length of hospital stay ranged from 2 to 16 days with a median of 6 days (IQR = 4.75-8). Nine (6.9%) had renal failure, 8 (6.2%) had respiratory failure, and one each had DIC and gangrene (Figure 3). Eight (6.2%) each required ventilator support and dialysis, while 6 (4.6%) required blood transfusion. Two required fasciotomy, of whom one also needed dialysis. Of the 130 people, six (4.6%) died. Five deaths occurred following a viper bite, while one was due to a krait bite.

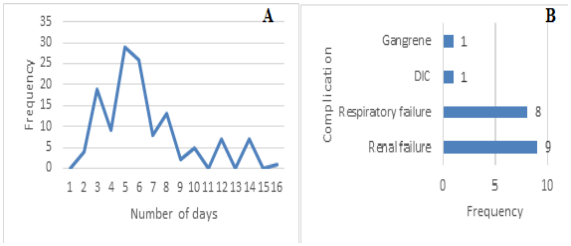

Figure 3: Details of patients' A) hospital stay and B) complications

One of those who died was Hypertensive, while one was diabetic. The remaining four had no comorbidities. Three deaths occurred due to bites in the daytime, while three occurred following nighttime bites (p=0.673). Two deaths occurred due to indoor bites, while four occurred following outdoor bites (p=0.752). Four deaths occurred following bites in the lower limb, while one each happened due to upper limb and abdomen bites.

Two deaths occurred in those who applied tourniquets, and the remaining four were those who did not puncture the bite site. The probability of death was similar in both groups (4.3% v/s 4.8%, p=0.914). Three died of unstable vitals on arrival, while three were stable (p=0.127) [Table 4]. Five deaths occurred in those with a bite-to-needle time of less than 4 hours; three reached within 2 hours, while two had a bite-to-needle time of 2-4 hours. One person who died had a bite-to-needle time of more than 12 hours. All six persons who died were administered Anti snake venom.

Three of them received 14 vials of ASV, while one person each received 8, 10 and 12 vials of ASV. Three of those who died had reported mild reactions to ASV. One had a moderate reaction, while two reported no reaction to ASV. Two patients died within two days of admission, while five had a length

ISSN (O): 2687-5365; ISSN (P): 2753-6556

of hospital stay ranging from 10 to 16 days. All except one of the patients who died had renal failure as a complication; they had to undergo dialysis [Table 4].

Table 1: Demographics of snake bite patients

Parameter	Number	Frequency
Gender		
Male	88	67.7
Female	42	32.2
Occupation		
Agriculture	17	13.1
Business	9	6.9
Clerk	1	0.8
Daily labour	14	10.8
Driver	1	0.8
Govt employee	11	8.5
Homemaker	24	18.5
Private	15	11.5
Sanitary worker	2	1.5
Software	4	3.1
Student	26	20.0
Sweeper	3	2.3
Teacher	2	1.5
Trading	1	0.8

Table 2: Correlation of snake type with time and place of bite

Parameter	Snake identified	Parameters compared		Total	P value
Time of bite		8 AM - 8 PM	8 PM - 8 AM		
	Cobra	15 (55.6%)	12 (44.4%)	27	0.922
	Krait	8 (61.5%)	5 (38.5%)	13	
	Viper	21 (65.6%)	11 (34.4%)	32	
	Non-poisonous	7 (53.8%)	6 (46.2%)	13	
	Not identified	26 (57.8%)	19 (42.2%)	45	
	Total	77	53	130	
Place of bite		Indoor	Outdoor		
	Cobra	8 (29.6%)	19 (70.4%)	27	0.819
	Krait	4 (30.8%)	9 (69.2%)	13	
	Viper	9 (28.1%)	23 (71.9%)	32	
	Non-poisonous	5 (38.5%)	8 (61.5%)	13	
	Not identified	10 (22.2%)	35 (77.8%)	45	
	Total	36	94	130	

Table 3: Symptomology and hospital admission - treatment parameters

Parameters		Frequency	Percentage
Symptomology (n=130)	Neurotoxic	53	40.8
	Hemotoxic	39	30.0
	Both Neurotoxic & Hemotoxic	9	6.9
	Hemotoxic & cellulitis	4	3.1
	Neurotoxicity & cellulitis	2	1.5
	Local cellulitis	5	3.8
	Local oedema	16	12.3
	No symptoms	2	1.5
Vitals on arrival PR; BP; SPO2 (n=130)	Stable	99	76.2
	Unstable	31	23.8
Bite to needle time (n=130)	<2hrs	26	20.0
	2-4 hrs	39	30.0
	4-6 hrs	44	33.8
	6-8 hrs	11	8.5
	8-10 hrs	6	4.6
	>12hrs	4	3.1
ASV dosage (n= 116)	6	3	2.6
	8	38	32.8
	10	58	50.0
	12	6	5.2
	14	11	9.5
Reactions to ASV (n= 116)	Mild	29	25.0
	Moderate	6	5.2
	Nil	81	69.8

Table 4: Mortality patient parameters

Parameter	Frequency	Percentage
Bite Time		

ISSN (O): 2687-5365; ISSN (P): 2753-6556

4-8 AM	2	33.3
4-8 PM	3	50.0
8-12 PM	1	16.7
Bite place		
Indoor	2	33.3
Outdoor	4	66.7
Tourniquet		
Tourniquet applied	2	33.3
No tourniquet	4	66.7
Vitals on arrival		
Stable	3	50.0
Unstable	3	50.0
Bite-to-needle time		
0-2 hrs	3	50.0
2-4 hrs	2	33.3
> 12 hrs	1	16.7
Total	6	100.0
ASV dosage		
8	1	16.7
10	1	16.7
12	1	16.7
14	3	50.0
Hospital stay		
2	2	33.3
10	1	16.7
14	2	33.3
16	1	16.7
Renal failure	3	50.0
Respiratory failure & renal failure	1	16.7
Gangrene & renal failure	1	16.7
Nil	1	16.7

DISCUSSION

Snakebite is one of the tropical developing nations' most prevalent medical crises. It mostly affects the working-age population. Because of under-reporting, the true pattern of illness and death remains largely unclear.[6] Over 12 months, prospective research was conducted on 130 patients with snake bites who reported to the emergency room at Rajiv Gandhi government general hospital. The 130 patients' ages ranged from 18 to 65, with a mean age of 36.5 and a male predominance among victims. A parallel investigation revealed a probable comparable mean age and drop in the occurrence of patients >50 years of age and male preponderance among patients, which was consistent with our findings.[13] The predominance of male patients might be attributed to increased outdoor activities and, therefore, higher exposure to snakes.[14]

Lower limbs were the most prevalent biting location in 83 instances, accounting for 63.8%. The lower-to-upper-limb ratio is 2:1. According to several studies, 80% of bites occurred in the lower limbs and 20% in the upper limbs.[7,15,16]

The most prevalent occupational categories participating are students (20%), followed by housewives (18.5%). Contrary to research undertaken by other hospitals, the current study found that the prevalence of snakebite poisoning was higher among those working in agriculture (30%) compared to other occupations.[17,18] With a frequency of 48.5%, over half of the bites were recorded between 4 and 8 p.m. Regarding 12-hour intervals, 59.2% of bites happened during the day (8 am-8 pm). Rest from 8 p.m. to 8 a.m. (40.8%). Comparative research by Sawai et al. discovered a peak in snake bites between 6 PM and midnight.[19] Of 130 cases, 94 were bitten outside, accounting for 72.3%. In which males had a much higher chance of being bitten outside than females. Bites during the day are 67% more likely to occur indoors, whereas bites at night are 61.1% more likely to occur outside. Snakes could not be detected in 45 130 patients, or 34.6% of the total. Viper bites accounted for the most detected snake bites, accounting for 24.6%, followed by cobra bites (20.8%) and krait bites (10%). Around 10% of instances involved non-poisonous snakes. A similar study also substantiates viper snake, the most recurrent species, cobra, and krait.[20]

Most patients reported to the hospital, around 65.4% (84), are without a tourniquet. Comparative research undertaken in Nepal and Nigeria also reports patient visits to hospitals without receiving first aid. This may also be accounted for by the lack of adequate primary health care centres in rural areas where snake bites are more common.[18,21] Approximately 43% of the 130 individuals exhibited neurotoxic symptoms, whereas 30% had hemotoxic symptoms. This was consistent with the findings of Halesha et al., who observed that neuroparalytic characteristics, characteristic of cobra and krait bites, were seen in 72 instances (40%). Haematotoxic signs were related to viper bites in 108 cases (60%).17 It was also observed that among 130 patients who attended to the emergency room with snake bites, 35.5 percent had extended whole blood clotting time, a significant condition also reported by Dsilva et al.[22]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Since ASV was the primary treatment modality, about 116 individuals required ASV treatment, with a median dosage of ASV requiring ten vials. Anti-snake venom was not needed for 14 patients. A comparable treatment module was also used, with similar trials reporting effective outcomes.[23,24] Out of 116 persons who received ASV, 25% (29) had mild responses, while 5.2% had significant reactions such as rash, nausea, vomiting, fever, chills, itching, and hypotension. Intramuscular adrenaline, steroids, and antihistamines were used to effectively moderate these symptoms, as also reported and treated by Amin et al.[25] The length of stay in the hospital ranged from 2 to 16 days, with a median of 6 days. In our study, the most prevalent complication was renal failure, which occurred in 6.9% of patients, followed by respiratory failure in 6.2%. Previous research has also found a return of renal and pulmonary failure.[26,27] This complication was treated with ventilator support in 8 (6.2%) patients, blood transfusion in 6 (4.6%) patients, dialysis in 5 patients, and fasciotomy in 1 patient.

Our study found an extremely low (4.6%) death rate. Viper bites were the most common cause of death, with bite timing, location, and first aid insignificantly associated with mortality. The time from bite to needle did not affect patient mortality. Only one patient developed renal failure and refused dialysis. However, probable research claims no fatal outcome was documented among patients admitted within 24 hours of the snake bite, emphasising the significance of early treatment.[17] According to them, the most common consequence is respiratory paralysis, followed by acute renal failure, bite gangrene, and DIC, similar to our study.

CONCLUSION

Although snakebite is preventable, it is one of the most prevalent emergencies in the emergency room. In the current research, adult snakebite patients with envenomation reported to the emergency department of a tertiary care centre in Chennai were primarily males. The most common location of the bite was the lower limb, and most cases were documented in the evenings and early night hours. Among all toxicities, neurotoxicity is the most common, followed by pure haemotoxicity, suggesting the recurrence of Viper bites. More problems and patient deaths were caused by respiratory and renal failures, which may have been averted with earlier hospital visits.

REFERENCES

1. Rathi R, Vardhan V, Jain MJ, Yadav V, Walke R, Bhakaney P, et al. Positive outcomes of inpatient rehabilitation in a snake bite patient with pulmonary complications: A case report. J Pharm Res Int 2021:2540–3.
2. Chincholikar SV, Bandana P, Swati R. Awareness of Snake bite and its first aid management in rural areas of Maharashtra. Indian J Community Health 2014;26:311–5.
3. Harrison RA, Hargreaves A, Wagstaff SC, Faragher B, Lalloo DG. Snake envenoming: a disease of poverty. PLoS Negl Trop Dis 2009;3:e569.
4. Banik KK. Risk factors of snake bite and health-seeking behaviour of the people on north 24 Parganas district, West Bengal, India, 2008.
5. Vaiyapuri S, Vaiyapuri R, Ashokan R, Ramasamy K, Nattamaisundar K, Jeyaraj A, et al. Snakebite and its socio-economic impact on the rural population of Tamil Nadu, India. PLoS One 2013;8:e80090.
6. Menon JC, Joseph JK, Whitaker RE. Venomous snake bite in India - why do 50,000 Indians die every year? J Assoc Physicians India 2017;65:78–81.
7. Halesha BR, Harshavardhan L, Channaveerappa PK, Venkatesh KB. A study on the clinico-epidemiological profile and the outcome of snake bite victims in a tertiary care centre in southern India. J Clin Diagn Res 2013;7:122–6.
8. Mohapatra B, Warrell DA, Suraweera W, Bhatia P, Dhingra N, Jotkar RM, et al. Snakebite mortality in India: a nationally representative mortality survey. PLoS Negl Trop Dis 2011;5:e1018.
9. Bawaskar HS, Bawaskar PH. Snakebite: prevention and management in rural Indian settings. Lancet Glob Health. 2019;7:e1178.
10. Yousefkhani SS, Yousefi M, Khani A, Pouyani ER. Snake fauna of Shirahmad wildlife refuge and Parvand protected area, Khorasan Razavi Province, Iran. Hepetology Notes. 2014;7:75-82.
11. Alirol E, Sharma SK, Bawaskar HS, Kuch U, Chappuis F. Snake bite in South Asia: a review. PLoS Negl Trop Dis 2010;4:e603.
12. Sharma N, Chauhan S, Faruqi S, Bhat P, Varma S. Snake envenomation in a north Indian hospital. Emerg Med J 2005;22:118–20.
13. Banerjee I, Tripathi SK, Roy AS. Clinico-epidemiological profile of poisoned patients in the emergency department: A two and half year's single hospital experience. Int J Crit Illn Inj Sci 2014;4:14–7.
14. Ghosh R, Mana K, Gantait K, Sarkhel S. A retrospective study of the clinico-epidemiological profile of snakebite-related deaths at a Tertiary care hospital in Midnapore, West Bengal, India. Toxicol Rep 2018;5:1–5.
15. Bhat RN. Viperine snake bite poisoning in Jammu. J Indian Med Assoc 1974;63:383–92.
16. Paul J, Dasgupta S. Early prediction of acute kidney injury by clinical features of snakebite patients at the time of hospital admission. N Am J Med Sci 2012;4:216–20.
17. Halesha BR, Harshavardhan L, Channaveerappa PK, Venkatesh KB. A study on the clinico-epidemiological profile and the outcome of snake bite victims in a tertiary care centre in southern India. J Clin Diag Res: JCDR. 2013;7:122.
18. Sharma SK, Chappuis F, Jha N, Bovier PA, Loutan L, Koirala S. Impact of snake bites and determinants of fatal outcomes in southeastern Nepal. Am J Trop Med Hyg 2004;71:234–8.
19. Sawai Y. Vaccination against snake bite poisoning. Snake venoms. 1979:881-97.
20. Harshavardhan L, Lokesh AJ, Tejeshwari HL, Halesha BR, Metri SS. A study on the acute kidney injury in snake bite victims in a tertiary care centre. J Clin Diag Res: JCDR. 2013;7:853.
21. Michael GC, Thacher TD, Shehu MIL. The effect of pre-hospital care for venomous snake bite on outcome in Nigeria. Trans R Soc Trop Med Hyg 2011;105:95–101.
22. Dsilva AA, Basheer A, Thomas K. Snake envenomation: is the 20 min whole blood clotting test (WBCT20) the optimum test for management? QJM: Int J Med. 2019;112:575-9.
23. Daswani BR, Chandanwale AS, Kadam DB, Ghongane BB, Ghorpade VS, Manu HC. Comparison of different dosing protocols of Anti-Snake Venom (ASV) in snake bite cases. J Clin Diagn Res 2017;11:FC17–21.
24. Dutta T, Sarin K, Vinod KV. Clinical profile & complications of neurotoxic snake bite & comparison of two regimens of polyvalent anti-snake venom in its treatment. Indian J Med Res 2017;145:58.
25. Amin MR, Mamun SMH, Rashid R, Rahman M, Ghose A, Sharmin S, et al. Anti-snake venom: use and adverse reaction in a snake bite study clinic in Bangladesh. J Venom Anim Toxins Incl Trop Dis 2008;14:660–72.
26. Bhalla G, Mhaskar D, Agarwal A. A study of clinical profile of snake bite at a tertiary care centre. Toxicol Int 2014;21:203–8.
27. Punde DP. Management of snakebite in rural Maharashtra: a 10-year experience. Natl Med J India 2005;18:71–5.

ISSN (O): 2687-5365; ISSN (P): 2753-6556