



## Original Research Article

# TO STUDY THE CLINICAL PROFILE, TREATMENT AND OUTCOME OF ENVENOMOUS SNAKE BITES IN MC GANN HOSPITAL (A TERTIARY CARE CENTRE).

GN Ravikumar Patel<sup>1</sup>, Muralidhara N<sup>2</sup>, Indumathi S<sup>3</sup>, Mithun K Jayan<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Nephrology, SIMS, SHIMOGA, Karnataka, India.

<sup>2</sup>Assistant Professor, Department of General Medicine, SIMS, SHIMOGA, Karnataka, India.

<sup>3</sup>Assistant Professor, Department of General Medicine, SIMS, SHIMOGA, Karnataka, India.

<sup>4</sup>Postgraduate Student, Department of General Medicine, SIMS, SHIMOGA, Karnataka, India.

Received : 30/11/2023  
Received in revised form : 05/02/2024  
Accepted : 22/02/2024

**Corresponding Author:**

**Dr. Mithun K Jayan**

Postgraduate Student, Department of General Medicine, SIMS, SHIMOGA, Karnataka, India.  
Email: drmithunjayan@gmail.com.

DOI: 10.5530/ijmedph.2024.1.97

Source of Support: Nil,

Conflict of Interest: Nonedeclared

Int J Med Pub Health

2024; 14 (1); 526-533

## ABSTRACT

**Background:** Snakebite is a serious medical emergency that needs quick attention. There are over 2500 different species of snakes in the world, however not all of them are poisonous. Poisonous snakes lead to complications like Cellulitis, bleeding, neurological manifestations, AKI (mostly requiring hemodialysis), Respiratory failure, and sometimes even death. Our study aims to study the various presentations, the treatment given and the outcomes of these bites admitted in our hospital.

**Materials and Methods:** The present study was a descriptive cross-sectional study. This Study was conducted from January 2021 to July 2022 at McGann teaching district hospital, Department of general medicine, shimoga institute of medical sciences (SIMS), Shimoga. Total 560 patients were included in this study.

**Results:** We have found that, majority number of patients had [299 (53.3%)] Cellulitis and a smaller number of patients had [105 (18.7%)] Bleeding manifestations. All of patients had received ASV as the treatment and some had received extra treatment in the form of Haemodialysis, blood and blood products, ventilator support and treatment for Cellulitis. Our study done in Malnad region showed that, higher numbers of patients were able to find complete recovery 53%, and very less mortality rate of 0.2% due to timely treatment and interventions, but few developed complications due to late presentations and severity of the snake bite.

**Conclusion:** It was found that many patients were found to present to hospital lately due to traditional medicines which is famous in the locality. The awareness about the first aid measures and the need to present to hospital at the earliest has to be emphasised to the community.

**Keywords:** Cellulitis, Hypersensitivity, Bleeding manifestations and Snakebite.

## INTRODUCTION

Snakebite is a serious medical emergency that needs quick attention. There are over 2500 different species of snakes in the world, however not all of them are poisonous. Families include Elapidae, Hydrophidae, Crotalidae, Colubridae, and Viperidae contain several venomous species. Except for the Arctic,

New Zealand, and Ireland, snakes are found all across the world. They are more common in temperate and tropical regions. Only 52 of India's 236 species are toxic, despite this. In India, 200,000 people are thought to be bitten by snakes each year, with 35,000 to 50,000 of them dying as a result.<sup>[1]</sup>

Snakebite has been identified by the World Health Organization (WHO) as one of the most overlooked

but critical public health hazards, particularly in rural parts of tropical and subtropical countries in Asia, Africa, Oceania, and Latin America.

In rural and urban settings, particularly in nations like India, snake bite is a health risk due to the environment, the workplace, and the climate. According to the World Health Organization (WHO), up to 2.7 million envenomings arise from an estimated 5 million snake bites each year. The majority of snakebites and consequent deaths worldwide occur in India. Socioeconomic status and farming contribute to a rise in snake-human interaction, which primarily affects rural, underdeveloped areas in Asia and Africa.<sup>[2]</sup>

Due to its large agricultural areas, numerous venomous snake species, and ineffective snake bite prevention initiatives, South Asia is a worryingly afflicted region.<sup>[3]</sup>

In modern India, particularly in rural India, snakebite continues to be an underappreciated cause of accidental mortality. Even more underappreciated is the fact that many people succumb to a small number of quacks who practise conventional treatment techniques instead of seeking out contemporary therapy. Analysis of bite marks and prompt or incorrect identification of the snake species also affects the course of treatment. The age, size, type, number, and location of the bites, as well as the amount and toxicity of the venom, all affect the clinical presentation of snakebite victims.<sup>[4]</sup> They can be classified as neurotoxic, hemotoxic, or locally toxic depending on their level of toxicity.

Acute kidney damage (AKI) is a serious after effect of snake bites and a leading cause of death. According to reports, 10 to 32% of snakebites result in renal involvement.<sup>[5]</sup> In their country, there is insufficient information on the exact number of snake bites that cause AKI, require HD, and have complications. In Russell's Viper bite instances, renal damage can appear very early, and even by the time the patient gets to the hospital immediately after the bite, the harm may already be done. According to studies, even when ASV is given within 1-2 hours of the bite, it is unable to prevent ARF. After administering antivenom, good supportive treatment is crucial for a better outcome. While most patients with acute tubular necrosis recover within a few weeks, perhaps requiring haemodialysis, those who develop cortical necrosis require long-term renal replacement treatment. In this study, the clinical profile of the snake bites in this locality following will be examined.

## MATERIAL AND METHODS

**Source of Data:** Envenomous snake bite cases admitted in department of general medicine, MC GANN hospital

**Method of Collection of Data**

**Place of Study:** McGann teaching district hospital, Department of general medicine, Shimoga Institute of Medical Sciences (SIMS), Shimoga

**Duration of Study:** 18 months

**Study Design:** Descriptive cross-sectional study

**Period of Study:** January 2021 to July 2022

**Sample Size:** Since it is a time bound study, all the patients admitted with symptoms and/or signs of envenomous snake bites after satisfying the inclusion and exclusion criteria from January 2021 to July 2022 are considered for this study. A total of 560 patients were studied.

**Inclusion Criteria**

- AGE GROUP  $\geq 18$  YEARS
- Patients presenting within 24 hours
- All snake bites with features of envenomation

**Exclusion Criteria**

- Age group  $< 18$  years
- Non venomous snake bites

**Data Analysis**

After obtaining institutional ethical committee clearance and written informed consent patient with known envenomous snake bites and fulfilling inclusion and exclusion criteria was included in this study. Data was analysed through a semi structured questionnaire, clinical examination and investigations. It will express in terms of percentages and bar diagrams.

**Statistical Analysis**

For statistical analysis data were entered into a Microsoft excel spreadsheet and then analysed by SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism version. It will express in terms of percentages and bar diagrams. Data will be compared from our study to a reference study.

## RESULTS

In above table showed that the mean Age (mean $\pm$ s.d.) of patients was 40.0018 $\pm$  7.8584.

In our study, 84 (15.0%) patients were  $\leq 30$  years of age, 203 (36.3%) patients were 31-40 years of age, 209 (37.3%) patients were 41-50 years of age, and 63 (11.3%) patients were  $\geq 51$  years of age. [Table 1]

In our study, 232 (41.4%) patients were Farmers,162 (28.9%) patients were House Wives, 118(21%) patients were Coolie, 20 (3.6%) patients were Drivers, 12 (2.1%) patients were Students,8 (1.4%) patients were Carpenters,4 (0.7%) patients were Painters,3 (0.6%) patients were Business man,1 (0.2%) patient was an Engineer. [Table 3]

In our study majority of patients had presented to hospital beyond 6 hours of bite i.e., around 65% of patients, while only 35 % had presented within or on 6 hours of bite This may be due to the traditional medicine and native medicine which is famous among the locals in shimoga district. [Table 4]

In our study,214 (38.2%) patients had been bitten in field(e.g., paddy, corn, maize, sugar cane, pineapple field),176 (31.4%) patients had been bitten in farm (stable,cattle house, recent farm.etc),121 (21.6%) patients had been bitten in house, 49 (8.8%) patients had been bitten in the backyard. [Table 5]

In our study,454(81.1%) patients had been bitten in the lower limb and 106(18.9%) patients had upper limb bites. [Table 6]

In our study, 350 (62.5%) patients had Unknown snake bites (meaning the species of the snake could not be recognised by the patient or the attendants), 175 (31.3%) patients had Russell’s viper snake bite ,31 (5.5%) patients had Indian cobra bite, 4 (0.7%) patients had krait snake bite. [Table 7]

In our study majority of patients had local Cellulitis as the clinical feature, which was present in 299 patients (53.3), 182(32.45%) patients had coagulopathy which was further subdivided into coagulopathy with bleeding manifestations which had 18.7% and coagulopathy without bleeding manifestations comprising 13.75 %,9% of total patients had Acute Kidney Injury(AKI), 8.2 % of total patients had neurological manifestations. [Table 8]

For easy understanding, the 105 patients with bleeding manifestations were further charted. Gum bleed was in majority with 51.4%, bite site bleed was seen in 47.6%, hematuria was seen in 3 %, epistaxis was seen in 2.8%, ecchymosis was seen in 0.9%. [Table 9]

For easy understanding, neurological manifestations also were further subdivided. Ptosis predominated in neurological manifestations seen in 98%, double vision in 8.5%, dysphagia was seen in 4.2%, breathlessness was seen in 4.2%, neck muscle weakness was seen in 2.12 %, numbness was seen in 2.12%. [Table 10]

In our study, all patients had received anti-snake venom, antibiotics and iv fluids, depending on the clinical profile, extra treatments had been provided. 53.3% had received Cellulitis treatment, 33.3% had received blood and blood products like packed red blood cells and fresh frozen plasma, 10.7% received anaphylaxis treatment due the anaphylaxis caused by Anti-snake venom, 6.9 % patients received haemodialysis, only one patient (0.17%) needed ventilator support secondary to a cobra bite. Although 9% had got AKI, only 6.9 % had undergone haemodialysis. The rest was treated conservatively by IV fluids, vitals monitoring and input and output monitoring. [Table 11]

In our study, 263(47.0%) patients were completely recovered, 248(44.3%) patients were recovered with Cellulitis. 48(8.6%) patients were recovered with AKI and 1(0.2%) patient died. Cause of death was sepsis and MODS after 8 days. Patients were followed up from admission to the discharge/death in hospital. [Table 12]

In our study, 60(10.7%) patients had Hypersensitivity to ASV, out of which 20 of them had chills, rigors, itching and rashes while rest 40 had only chills and rigors. [Table 13]

**Table 1: Distribution of Age in group**

Age in group	Frequency	Percent
≤30	84	15.00%
31-40	204	36.30%
41-50	209	37.30%
≥51	63	11.30%
Total	560	100.00%

**Table 2: Distribution of SEX**

Sex	Frequency	Percent
Male	398	71.1%
Female	162	28.9%
Total	560	100.0%

**Table 3: Distribution of occupation**

Occupation	Frequency	Percent
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Farmer	232	41.4%
House Wife	162	28.9%
Coolie	118	21%
Driver	20	3.6%
Student	12	2.1%
Carpenter	8	1.4%
Painter	4	0.7%
Business	3	0.6%
Engineer	1	0.2%
Total	560	100.0%

**Table 4: Distribution of time lag in presentation to our hospital**

	FREQUENCY	PERCENTAGE
≤6 hours of bite	196	35
>6 hours of bite	364	65

**Table 5: Distribution of place of bite**

POB	Frequency	Percent
Field	214	38.2%
Farm	176	31.4%
House	121	21.6%
Backyard	49	8.8%
Total	560	100.0%

**Table 6: Distribution of site of bite**

Site of bite	Frequency	Percent
Lower limb	454	81.1%
Upper limb	106	18.9%
Total	560	100.0%

**Table 7: Distribution of type of snake**

Type of snake	Frequency	Percent
Unknown	350	62.5%
Russell's viper	175	31.3%
Indian cobra	31	5.5%
krait	4	0.7%
Total	560	100.0%

**Table 8: Distribution of Clinical features and complications**

	Frequency	Percentage
Local Cellulitis	299	53.3
Coagulopathy (with bleeding)	105	18.7
Coagulopathy (without bleeding)	77	13.75
AKI	51	9
Neurological	46	8.2

**Table 9: Distribution of bleeding manifestations**

	Frequency	percentage
Gum bleed	54	51.4
Bite site bleed	50	47.6
Haematuria	3	3
Epistaxis	3	2.8
Ecchymosis	1	0.9

**Table 10: Distribution of neurological manifestations**

	Frequency	percentage
Ptosis	46	98
Double vision	4	8.5
Dysphagia	2	4.2
Breathlessness	2	4.2

Neck muscle weakness	1	2.12
Numbness	1	2.12

**Table 11: Distribution of treatment modality**

Treatment modality	Frequency	percentage
Cellulitis treatment (in the form of glycerine and magnesium sulphate dressing and anti-oedema measures)	299	53.3
Blood and blood products	187	33.3
Anaphylaxis treatment	60	10.7
Haemodialysis	39	6.9
Ventilator support	1	0.17

**Table 12: Distribution of outcome**

Outcome	Frequency	Percent
Complete recovery	263	47.0%
Recovery with Cellulitis	248	44.3%
Recovery with AKI	48	8.6%
Death	1	0.2%
Total	560	100.0%

**Table 13: Distribution of Hypersensitivity to ASV**

Hypersensitivity to ASV	Frequency	Percent
No	500	89.3%
Yes	60	10.7%
Total	560	100.0%

## DISCUSSION

The present study was a descriptive cross-sectional study. This Study was conducted from January 2021 to July 2022 at McGann teaching district hospital, Department of General medicine, shimoga institute of medical sciences (SIMS), Shimoga. Total 560 patients were included in this study.

In our study out of 560 patients, most patients were [209 (37.3%)] 41-50 years of age where similar study was found by Lar-Ndam N et al,<sup>[7]</sup> (2013) showed that the age range was 1 to 80 years, with mean age of 24.7 years. Patients under the age of 40 years had the highest frequency of snake bites (88.2%), and while our study had 51.3 % under age of 40 years, the results were not comparable. The mean and median age of our study showed age of 40 years while that of Lar-Ndam N et al,<sup>[7]</sup> (2013) showed age of mean age of 24.7 years. This age group are responsible for more snake bites as they are more involved in work outside the home, in the farm and field as in rural areas. Raina S et al,<sup>[8]</sup> (2014) 142 (71%) patients were young (age group of 16-45 years)

In our study majority of patients bitten were male [398 (71.1%)] while it was [162(28.9%)] in the female population which was comparable to other studies. KS K, Ganesh J. et al<sup>(9)</sup> also found that males have a higher incidence of snake bites i.e., Male 72% Female 28%. This may be due to more outside work done by males of rural population than

the female. Raina S et al,<sup>[8]</sup> (2014) found that the people who have been bitten by snakes in rural Himachal Pradesh's Shivalik and Lower Himalayan regions were 118 (59%) male and 82 (41%) female patients. Sambyal V et al,<sup>[10]</sup> (2017) found that there were 57 (57%) male patients and 43 (43%) female patients while Kaushik M et al,<sup>[11]</sup> (2018) showed in his study male to female ratio of 1:1.6, that's a reverse male to female ratio.

In our study we showed that farmers are the most bitten by snake. A total of 232 farmers were bitten in our study comprising a 41.4 % of patients followed by house wives of 28.9%. Krishnappa R et al,<sup>[12]</sup> (2016) found that Snake bites are a significant rural occupational health risk for farmers in the tri-state area and the study showed that 37% of the bitten patients were farmers, followed by labour workers of 8.3 %, which is comparable to our study.

In our study majority of patients had bites on the lower limb, i.e., 81% out of which majority on the right leg, only 19 % had upper limb bites. The study done by Kaushik M et al,<sup>[11]</sup> (2018) showed that the most common site of bite seen in patients was in foot (44.88%) and was closely followed by hand (43.59%). This may be attributed to the exposure of the place of the bite to the snake mostly which are crawlers on the ground.

Coming to the type of snake bites, our study showed that majority were unknown bites(62.5%), followed by Rusell's Viper bite(31.3%) and followed by Cobra bite(5.5%), very few had Krait bites(0.7%).



Even though majority of the bites were unrecognised by the patients or the bystanders, it was treated based on the clinical presentation and the complications. The majority of the unknown bites had presentation similar to viper bite in our study. Kumar KS et al,<sup>[13]</sup> (2018) found that the most frequent type of Snake bite was Viper bite that is, 25% by Hump Nose Pit Viper and 70% by Russell's Viper. Common krait bites dominated the neurotoxic bites in their study. The Russell's viper was responsible for the greatest percentage of bites (58.04%) and fatality (15.66%) as studied by Chakraborty S et al,<sup>[14]</sup> (2020).

In a study conducted by KS K, Ganesh J et al,<sup>[9]</sup> found out that only 30 % of patients had presented to the hospital within 6 hours while the remaining patients presented later i.e., 66 % presented from 6 hours to 24 hours and 4% had presented beyond 24 hours. This was comparable to our study where we had 35% presenting within 6 hours and the rest presented beyond 6 hours. Patients presenting beyond 24 hours were not included in our study. This is solely because of the native medicine and traditional practices which is popular among the local people in Shimoga which they use in the initial period causing delay in hospital presentation and causing complications.

Discussing about the clinical features and complications, most patients had Cellulitis of the bitten limb (53.3%), coagulopathy with bleeding (18.7%), coagulopathy without bleeding (13.75%), AKI (9%) and only 8.2% had neurological manifestations [out of which majority had ptosis as the feature-this was comparable to a study by Seifert SA et al,<sup>[15]</sup> (2022) where they also found ptosis in 69% of neurological bites]. The most common complication observed in the study was persistence of coagulopathy and was seen in 51.02% of patients as in Kaushik M et al,<sup>[11]</sup> (2018). KS K et al,<sup>[9]</sup> (2016) found that in the majority of envenomations, 80% of which were hemotoxic, 11% of which were neurotoxic. Patil HV et al,<sup>[16]</sup> (2011) found that Venomous snake bites in rural Maharashtra, India, total of 88 (85.43%) patients had a vasculo-toxic snake bite. A total of 15 (14.56%) patients had neuroparalytic snakebite. Out of 88 patients with vasculotoxic snakebite, 35 (39.77%) developed local Cellulitis requiring fasciotomy and/or debridement, and,<sup>[17]</sup> (19.31%) showed clinical and biochemical data supporting Disseminate Intravascular Coagulation. AKI affected 12 (13.63%) of the patients, and in our study 9 % had AKI which is comparable.

Redewad N et al,<sup>[17]</sup> (2014) study had Cellulitis (90.6% of cases), while in our study had only 53.3

%. In Patil TB et al,<sup>[18]</sup> (2012) study AKI was present in 20.48% of snake bite cases, Local Cellulitis (100%), haematuria (29.8%), bleeding symptoms (22.8%) were common clinical signs. AKI is a significant cause of morbidity and mortality in patients with snake bites, while our study had only 9% with AKI. Gupta BD et al,<sup>[19]</sup> (2022) found that Cellulitis was the most frequent clinical symptom (29.5%), followed by neurological symptoms (26.1%). We observed in our study that, lower number of patients had [46 (8.2%)] Neurological manifestations

All our patients received Anti snake venom because only patients bitten with snake bites having features of envenomation only were taken into our study, prophylactic antibiotic treatment and IV fluids were given for all patients. Patients with hematotoxic features like coagulopathy was treated with FFP and prbc was given for severe bleeding manifestations. Since Cellulitis was the major clinical feature, these patients were treated with Cellulitis measures in the form of Glycerine Magnesium Sulphate dressing, limb immobilisation and elevation.

In Bhusanpatnaik B et al,<sup>[20]</sup> (2019) study 6.5% of patients required renal replacement therapy as comparable to our study where 6.9 % underwent haemodialysis for AKI, 11% needed blood or blood products while in our study 33.3% patients needed blood or blood products. In Bhattacharya P et al,<sup>[21]</sup> (2007) study of the 27 patients, 5 needed ventilator support since their snake bites were neurotoxic. In our study only one patient (0.17%) needed ventilator support and stayed for 7 days in hospital and completely recovered.

In our study 47 % patients had recovered completely, 44.3 % recovered with Cellulitis, 8.6% recovered with AKI, while only one patient died (0.2%) during the study. The same patient was having AKI and coagulopathy and was haemodialyzed 4 times. In Kumar KS et al,<sup>[13]</sup> (2018) study Mortality was 8.8% overall. Dharod MV et al,<sup>[22]</sup> (2013) found that of the 127 patients, 119 (93.7%) made a full recovery while 8 (6.3%) passed away in the hospital. Meenakshi B et al 23 (2017) found that. At discharge, 54% of patients had fully healed, 44% had some type of morbidity, and mortality was 2%. Our study, patients recovered with minimum complications and very low mortality rate may be attributed to the timely treatment and interventions done by the medical fraternity in our hospital.

Meenakshi B et al,<sup>[23]</sup> (2017) found that 9.6% of the 136 patients who received anti-snake venom (ASV) experienced adverse drug reactions. Itching and

hypotension were the most frequent Adverse Drug Reactions, followed by rigidity, shortness of breath, and edema of the lips and eyes. In our study 10.5 % patients had hypersensitivity to ASV in the form of chills, itching and rashes.

## CONCLUSION

The incidence of snakebite is significantly high especially in rural population for whom this can be called an occupational hazard. Though there seems to be an increasing awareness amongst the rural population about the first aid measures, the importance of early hospitalization and the usefulness of anti-snake venom in the management, is much more to be emphasised

Considering the common sites of bite, suitable protective measures are to be taken to protect these areas. Nocturnal bites can be avoided by suitable lighting. Regarding the management, simple, cheap procedures like estimation of bleeding time, and clotting time are adequate indicator of haematotoxicity of snakebite. But costlier and time-consuming procedures like prothrombin time, activated thromboplastin time, thrombin time and are more sensitive and wherever possible these can be used.

Anti-snake venom is of immense importance in the management of snakebites. A suitable dose and regimen is to be selected depending on the severity of envenomation whether mild, moderate or severe. Though administration of antsnake venom earlier is the better, antsnake venom should be continued till the sign and symptoms of envenomation are brought under control. Though anaphylaxis is a potentially dangerous complication, the incidence of this seems to be low and can be managed with steroids and anti-histaminics. Blood transfusion helps to combat bleeding manifestation by providing clotting factor. Renal failure seen in cases of snakebites can be managed with dialysis for a brief period. Prevention is better than cure. So protective measures should be taken to prevent the snakebite itself instead of killing the snake which alters the ecological balance.

**Conflict of Interest:** None

**Funding Support:**None.

## REFERENCES

1. Singh J, Bhoi S, Gupta V, Goel A. Clinical profile of venomous snake bites in north Indian Military Hospital. *J Emerg Trauma Shock*. 2008 Jul;1(2):78-80. doi: 10.4103/0974-2700.43184, PMID 19561985.
2. Harrison RA, Hargreaves A, Wagstaff SC, Faragher B, Lalloo DG. Snake envenoming: a disease of poverty. *PLOS Negl Trop Dis*. 2009 Dec 22;3(12): e569. doi: 10.1371/journal.pntd.0000569, PMID 20027216.
3. Alirol E, Sharma SK, Bawaskar HS, Kuch U, Chappuis F. Snake bite in South Asia: a review. *PLOS Negl Trop Dis*. 2010 Jan 26;4(1): e603. doi: 10.1371/journal.pntd.0000603, PMID 20126271.
4. Ahmed SM, Ahmed M, Nadeem A, Mahajan J, Choudhary A, Pal J. Emergency treatment of a snake bite: pearls from literature. *J Emerg Trauma Shock*. 2008 Jul;1(2):97-105. doi: 10.4103/0974-2700.43190, PMID 19561988.
5. Kanjanabuch T, Sitprija V. Snakebite nephrotoxicity in Asia. *Semin Nephrol*. 2008 Jul;28(4):363-72. doi: 10.1016/j.semnephrol.2008.04.005, PMID 18620959.
6. Vikrant S, Jaryal A, Parashar A. Clinicopathological spectrum of snake bite-induced acute kidney injury from India. *World J Nephrol*. 2017 May 6;6(3):150-61. doi: 10.5527/wjn. v6. i3.150, PMID 28540205, PMCID PMC5424437.
7. Lar-Ndam N, Pitmang SL, Madaki JK. An audit of the clinical profile of snake bites among female patients seen at comprehensive health centre, Zamko. *J Med Tropics*. 2013 May 8;15(1):40-3.
8. Raina S, Jaryal A, Raina S, Kaul R, Chander V. Snakebite profile from a medical college in rural setting in the hills of Himachal Pradesh, India. *Indian Journal of Critical Care Medicine*. 2014 Mar;18(3):134-8. doi: 10.4103/0972-5229.128702.
9. KS K, Ganesh J. A study on the clinical profile of children with snake envenomation in a tertiary referral centre at Dharmapuri, Tamil Nadu, India. *Int J Res Med Sci*. 2016 Jun;4(6):2142.
10. Sambyal V, Bharti D, Mahajan A. Clinical profile of snake bite at A tertiary care centre-one-year study. *JK Sci*. 2017 Oct 1;19(4):206-9.
11. Kaushik M, Banyal V, Sondhi S, Thakur MK, Kaushik A. Clinical profile of snake bite patients in tertiary care hospital in Himachal Pradesh: a prospective study. *Int J Res Med Sci*. 2018 Jul;6(7):2444. doi: 10.18203/2320-6012.ijrms20182833.
12. Krishnappa R, G C, Gowda RM, Babu P, Banala R. A study on demographical and clinical profile and the outcome of snake bite victims in a tristate tertiary care center. *Int J Med Sci Public Health*. 2016 Sep 1;5(9):1818-23. doi: 10.5455/ijmsph.2016.16122015338.
13. Kumar KS, Narayanan S, Udayabhaskaran V, Thulaseedharan NK. Clinical and epidemiologic profile and predictors of outcome of poisonous snake bites—an analysis of 1,500 cases from a tertiary care center in Malabar, North Kerala, India. *Int J Gen Med*. 2018; 11:209-16. doi: 10.2147/IJGM.S136153, PMID 29892202.
14. Chakraborty S, Banerjee P, Hazra R, Maity S, Banerjee S, Sarkar N. A retrospective study on snakebite and its outcome from a referral-cum-teaching hospital of Kolkata, India. *Saudi J Health Sci*. 2020 May 1;9(2):130. doi: 10.4103/sjhs.sjhs\_81\_20.
15. Seifert SA, Armitage JO, Sanchez EE. Snake envenomation. *N Engl J Med*. 2022 Jan 6;386(1):68-78. doi: 10.1056/NEJMra2105228, PMID 34986287.
16. Patil V, Patil H, Patil A, Agrawal V. Clinical Profile and outcome of venomous snake-bite at tertiary care centre in western Maharashtra. *Int J Med Public Health*. 2011;1(4):28-38. doi: 10.5530/ijmedph.4.2011.7.
17. Redewad N, Bhaisare SD, Bansod YV, Hire R. Management and outcome study of snake bite cases in central India. *Appl Sci*. 2014;2(1D):435-1. Sch J.

18. Patil TB, Bansod YV, Patil MB. Snake bite induced acute renal failure: A study of clinical profile and predictors of poor outcome. *World J Nephrol Urol.* 2012 Jun 28;1(2-3):59-65. doi: 10.4021/wjnu13w.
19. Gupta BD, Shah VN. Clinical profiles, treatment and complications of snake bites: a one-year retrospective study. *J Indian Acad Forensic Med.* 2006;28(3):102-4.
20. Bhusanpatnaik B, Varma BS, Sujatha NV, Satyasree TJ, Sreya A, Priyanka V. Clinical profile and outcome of snake bite in children. *Pediatr Rev Int J Paediatr Res.* 2019;6(3):107-12.
21. Bhattacharya P, Chakraborty A. Neurotoxic snake bite with respiratory failure. *Indian J Crit Care Med.* 2007 Jul 1;11(3):161-4. doi: 10.4103/0972-5229.35627.
22. Dharod MV, Patil TB, Deshpande AS, Gulhane RV, Patil MB, Bansod YV. Clinical predictors of acute kidney injury following snake bite envenomation. *North Am J Med Sci.* 2013 Oct 1;5(10):594-9. doi: 10.4103/1947-2714.120795, PMID 24350071.
23. B. M, K. S, M. I, Mohan AS. Clinical profile and outcomes of snake bite poisoning in a tertiary care centre in South TamilNadu. *Int J Basic ClinPharmacol.* 2017;6(2):418-21. doi: 10.18203/2319-2003.ijbcp20170341.