

Demographic, Epidemiologic And Clinical Profile Of Snake Bites At A Tertiary Care Centre In Assam- A Retrospective Cross-Sectional Study.

Dr Priya Dutta,

Post Graduate Trainee, Department Of Medicine, Tezpur Medical College And Hospital, Tezpur.

Dr Dwijen Das,

Prof. & Hod, Department Of Medicine, Tezpur Medical College And Hospital, Tezpur.

Abstract

Background:

Snake bite is a common health care emergency encountered in day-to-day practice. North-East India like other parts of the country is majorly rural and agrarian which makes snake bites a major health problem. Assam owing to its unique biodiversity comprises of wide variation in snake population compared to other parts of the country. However, a detailed studies regarding the clinical profile, management approaches and outcome of snake bites is still lacking and hence is the need of the hour.

Objectives:

- To assess the demographic and epidemiologic profile in cases of snake bite.
- To evaluate the clinical profile of snake bites.
- To analyse the various management approaches and overall outcome of snake bite envenomation.

Methods And Methodology:

Study design: Retrospective cross-sectional and descriptive study.

Place of study: Department of Medicine, Tezpur Medical College and Hospital, Tezpur.

Study period: The Study was conducted for a period of 2 years from 1st January 2022 to 31st December, 2023.

Study Criteria:

Inclusion criteria:

- All cases with history of snake bites of age more than 12 years with or without evidence admitted in wards or ICU were taken up for study.
- Cases with evidences of envenomation were considered under venomous group.

Exclusion criteria:

- Bite from animals or unrecognised sources.

Results And Analysis:

A total number of 208 cases were recorded. Most of the cases belonged to age group 35-45 years with male preponderance. Maximum numbers were recorded during Monsoon season (May-August), with more number of bites during nighttime. Out of 208 cases, 26 cases (12.5%) had symptoms of envenomation. Neurotoxic manifestations were more common (42.3%), followed by local effects (30.7%) and Vasculotoxic symptoms (27%). ASV therapy was administered in all cases of envenomation along other symptomatic management. No mortality was recorded.

Probable Hypothesis And Conclusion:

Early recognition of danger signs and symptoms of snake bite with the variation in comparison to other parts of the country. Proper analysis of management approaches that can lead to favourable outcome of this common medical emergency.

Keywords: Snake Bite, Tezpur, Assam, Envenomation.

Date of Submission: 05-08-2024

Date of Acceptance: 15-08-2024

I. Introduction

Snake bite is a common health care emergency in many of the tropical and subtropical countries mainly Asia, Africa and Latin America.^[1] An estimated 1.8 to 2.7 million cases of envenomation occur annually in the world from snake bites, affecting 5.4 million individuals. Snake bites cause between 81,410 and 137,880 deaths annually, as well as around three times as many amputations and other permanent impairments.^[1]

An estimated 46,000 deaths each year, or more than a third of all deaths worldwide, are thought to occur in India.^[2] North-East India like other parts of the country is majorly rural and agrarian and snake bites is a major health problem.

In India, around 90% of venomous snakebites are caused by the 'big four' among the crawlers - *Daboia russelii* (Russell's viper), *Naja naja* (Common Indian Cobra), *Bungarus caeruleus* (Common krait), and *Echis carinatus* (Saw-scaled viper).^[3] Here, an interesting study in Assam found that the species more commonly implicated in this region are Viperidae (green pit viper and Salazar's pit viper) and Elapidae (Indian monocled Cobra, banded krait, and greater/lesser black krait).^[4] This finding is of utmost importance as the current anti-snake venom available act against the 'Big four' crawlers. So, the treating physicians should have an in-depth knowledge regarding the locally prevalent snake species and the treatment plan should be designed based on 'Syndromic Approach' i.e., clinical manifestations and blood parameters help in forming the treatment strategy.^[5]

The World Health Organization (WHO) added snake bite envenomation in priority list of neglected tropical diseases (NTDs) in June 2017 and unveiled a roadmap earlier in 2019 with the goal of halving the number of snakebite-related deaths and disabilities worldwide by 2030.^[5] Achieving this goal in Indian scenario, will require significant progress in health care and awareness in community level. Unfortunately, reliable data regarding snake bite related mortality and morbidity in India specially North-Eastern states is very scarce.

II. Aims And Objectives

- To assess the demographic and epidemiologic profile in cases of snake bite.
- To evaluate the clinical profile of snake bites.
- To analyse the various management approaches and overall outcome of snake bite envenomation.

III. Materials And Methods

The study is a hospital-based retrospective cross-sectional study conducted in the Department of Medicine of Tezpur Medical College and Hospital where data were collected and compiled from the record - keeping register maintained by Emergency ward, General Wards, ICU and the central record - keeping section. Confidentiality of the patients was ensured by not mentioning the name, registration number, and date of birth of the patient. A total of 208 patients (who fitted the inclusion criteria) with snake bites during a period of 2 years from 1st January 2022 to 31st December 2023 were included. Based on the data, detailed evaluation of the demographical profile, clinical manifestations, the common practices, in hospital patient management, ASV administration and side effects were done. Additional investigation reports and pertinent blood reports were also assessed. Pie charts and tabular forms were used to statistically examine the data and outcomes.

IV. Results And Observations

A total of 208 cases of snake bite were admitted during the study period which included 110 males and 98 females with the maximum patients in the 35-45 years age group. Around 147 cases were recorded from rural areas in vicinity of the hospital while around 126 patients were found to be related to agriculture or tea plantation work. Most of the snake bite incidence were recorded between May to August.

Table 1: Age wise prevalence of snake bite

| Age Group(years) | Nos. of poisonous bites | Percentage |
|------------------|-------------------------|------------|
| 12-25 | 42 | 20.1% |
| 25-35 | 58 | 27.9% |
| 35-45 | 75 | 36.1% |
| >45 | 33 | 15.9% |

Table 2: Prevalence of snake bites among different sex:

| Sex | Nos. of bites | Percentage |
|---------|---------------|------------|
| Males | 110 | 52.8% |
| Females | 98 | 47.2% |

Figure 1: Pie chart showing Time of bite

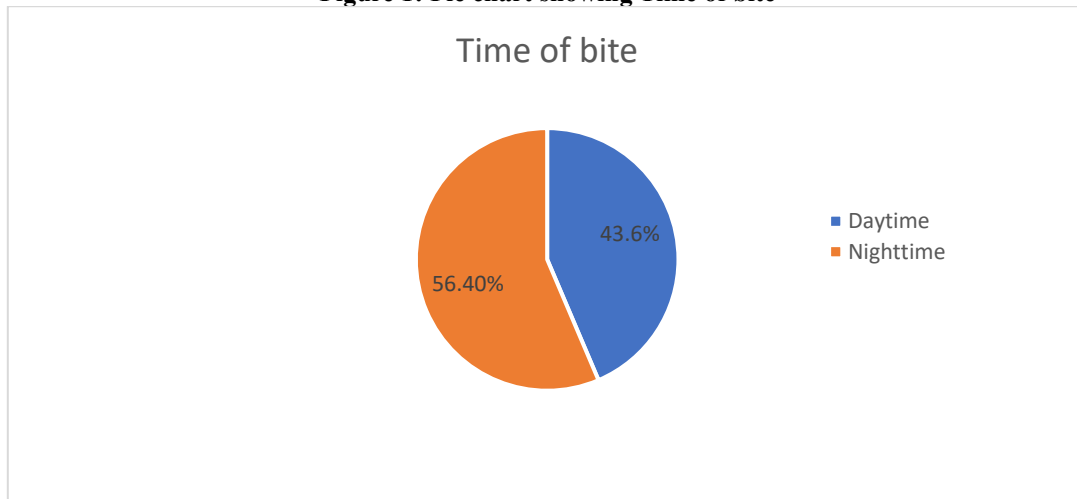


Table 3: Comparison of site of bites over the body

| Site | Nos. of poisonous bites | Nos of non poisonous bites. |
|-----------------|-------------------------|-----------------------------|
| Upper extremity | 10 | 62 |
| Lower extremity | 16 | 120 |
| Trunk | 0 | 0 |

Figure 2: Pie chart showing seasonal distribution of bite

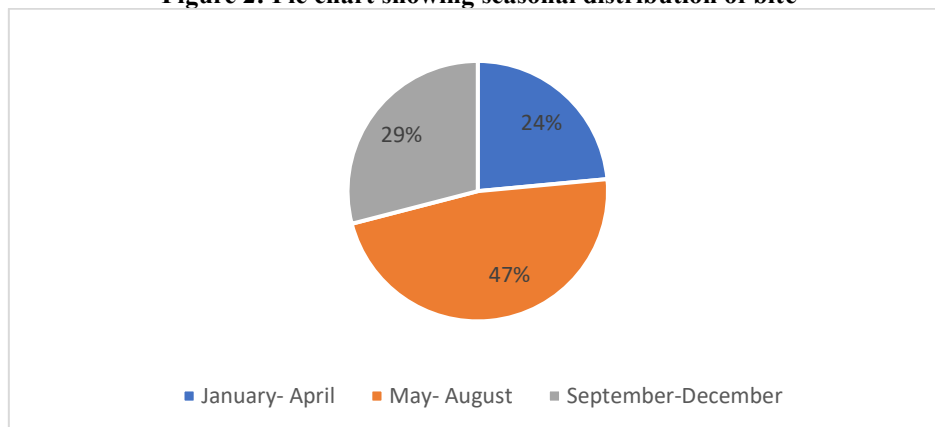


Figure 3: Pie chart showing distribution of area of residence of the cases

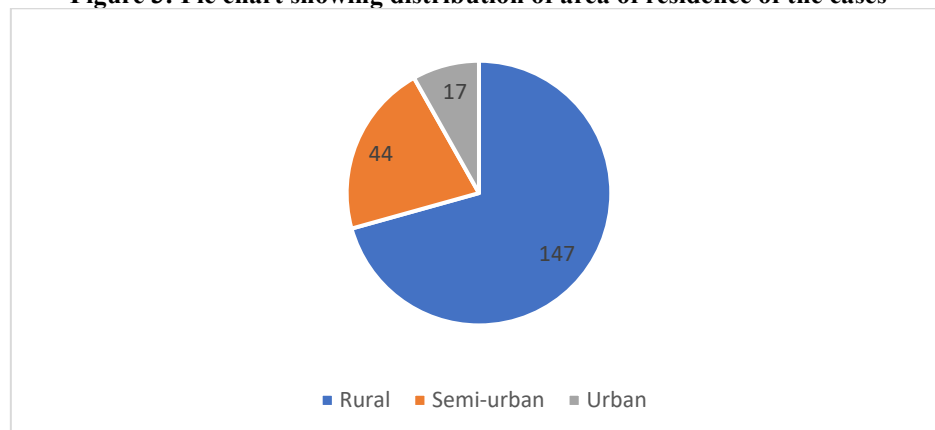
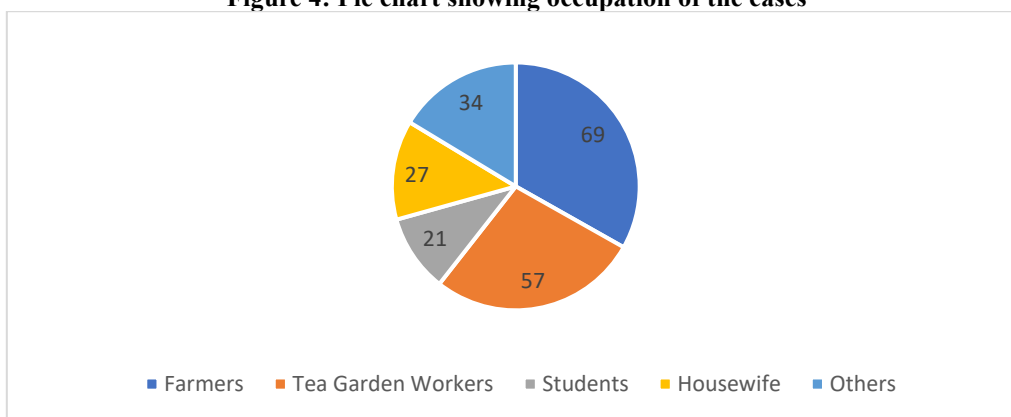


Figure 4: Pie chart showing occupation of the cases



Out of 208 cases, 26 patients (12.5%) had signs of envenomation and were treated with ASV and other standard of care therapy. 18 patients presented with systemic effects i.e., 11 cases (42.3%) with neurotoxic and 7 cases (27%) with vasculotoxic while 8 patients (30.7%) presented with local effects. Detailed data regarding the distribution of snakes species was not available may be to inability to identify or lack of sufficient knowledge among the public.

Figure 5: Pie chart showing number of venomous and non-venomous bites

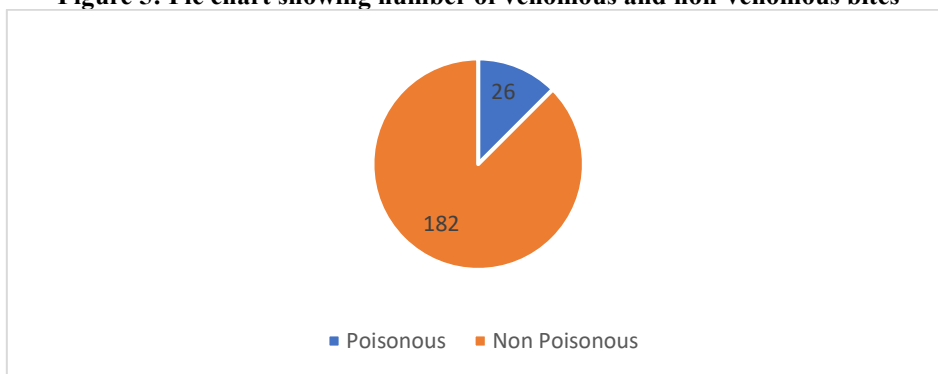


Figure 6: Pie chart showing clinical manifestations in Venomous group

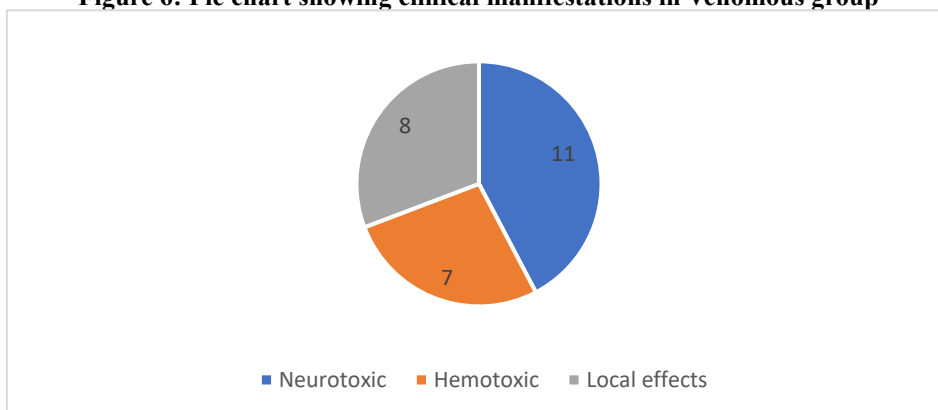


Table 4: Various neuroparalytic symptoms reported in poisonous snake bites:

| Symptoms | Total nos. |
|-----------------|------------|
| Ptosis | 11(100%) |
| Ophthalmoplegia | 5(45.5%) |
| Paraesthesia | 7(63.6%) |
| Dysphagia | 3(27.2%) |

| | |
|------------------------|----------|
| Flaccid limb paralysis | 2(18.2%) |
| Respiratory paralysis | 2(18.2%) |

Table 5: Various vasculotoxic symptoms in poisonous snake bites:

| Symptoms | Total nos. |
|-------------|------------|
| Local bleed | 5(71.4%) |
| Gum bleed | 2(28.6%) |
| Haematuria | 1(14.2%) |
| Ecchymosis | 1(14.2%) |

Table 6: Various Local symptoms reported in poisonous snake bites:

| Symptoms | Total nos. |
|------------|------------|
| Pain | 8(100%) |
| Bullae | 5(62.5%) |
| Cellulitis | 2(25%) |
| Gangrene | 0 |

No cases of mortality have been reported. 2 cases required ICU care due to respiratory paralysis with 1 cases presenting as early morning neuromuscular syndrome(EMNS).

Figure 7: Various traditional practices commonly seen among snake bite patients:

| Local Aid | Cases | Percentage |
|-----------------------------|-------|------------|
| Tourniquet | 167 | 80.2% |
| Herbal Medication | 8 | 3.8% |
| Washing with Soap and water | 24 | 11.5% |
| Incision | 3 | 1.4% |
| No local remedies | 42 | 20.1% |

V. Discussion

In our study extending over 2 years, a total of 208 cases of snake bites were admitted under our department of general medicine. It is found that 52.8% cases were males while 47.2% were females. This male preponderance was also found in other studies.^[6,7,8,9,10,11] Maximum number of victims were between the age group of 35-45 years(36.1%) followed by 25-35 years(27.9%). The finding was similar to other studies such as Kumar et al^[6](age group-21-40years), Stephen S et al^[10](age group-17-45 years), Baruah C et al^[11](age group 20-39 years). Maximum incidences of bites were during the late evening and nighttime(56.4%) which is similar to the study by Bhalla G et al^[9] while in contrast to the study by Patel S et al^[13].

Bites were predominantly confined to the peripheral sites involving the lower limbs in 136 cases(65.4%) followed by upper limb in 72 cases(34.6%). None of the bites were in the trunk or face. Findings were similar to other studies.^[6,7,8,9,10] Majority of the bites(47%) occurred during the month of May to August. Similarly, maximum incidences of bite during the monsoon season in other studies^[6,8,11,13], in contrast bites were maximum in Summer in study by Bhalla et al^[6].

A total of 26 cases(12.5%) showed signs of venomous snake bite while 182 cases(87.5%) had no symptoms suggestive of envenomation. This finding is similar to the finding of Baruah C et al^[11] while contrasting results were found in other studies^[6,7,8,9,10] from different parts of the country where the percentage of venomous snake bites was significantly higher. Out of these, 11 cases(42.3%) showed neurotoxic manifestations, 7 cases(27%) showed hemotoxic signs while 8 cases(30.3%) had local effects. This finding was similar to the study of Ahmed SM^[14] in Northern India where neuromuscular manifestations were predominant. However, other studies from Eastern India^[10], Southern India^[6] or even in the context of Assam^[4,11] showed Vasculotoxic or local effects to be maximum, thus signifying the variation of distribution of snake species in different regions. Among the neurotoxic snake bites, most common manifestation was ptosis(100%) followed by paraesthesia(63.6%) and ophthalmoplegia (45.5%) while 2 patients presented with respiratory paralysis with flaccid limb paralysis, the

findings being similar to that of systematic review of neurotoxic manifestations by Pandit K et al.^[15] One case of an early morning neuroparalytic syndrome(EMNS) was reported in a young patient following Krait bite, with symptoms similar to study by Madhusudan S et al^[16], who required urgent mechanical ventilation and meticulous resuscitative management.

The local effects most commonly seen was pain(100%) over the bite site followed by bullae formation. However, none of the cases developed gangrene. The hemotoxic effects were mainly seen as local bleed(71.4%) with associated prolonged whole blood clotting time.

However, serious complications like Disseminated intravascular coagulopathy, pulmonary edema, intracerebral hemorrhage, etc. was not seen.

All the patients with venomous snake bite were treated with Anti-snake Venom (commonly 10 vials, with 20 vials in case of some hemotoxic cases, or severe manifestations). The whole blood clotting time was monitored at presentation and serially thereafter. Early reactions were seen in 7 cases(26.9%) as itching, mild febrile reactions, etc. improved with medications. Other treatment modalities include administration of Acetylcholinesterase inhibitors such as neostigmine, glycopyrronium, etc for symptomatic management. Local infection was managed with broad spectrum antibiotics. Blisters were left undisturbed. antiseptic dressing done for skin ulcers.9 patients required ICU care with 2 patients required ICU care with mechanical ventilation and airway management. No history of blood transfusion present.

Also, study on the various traditional practices prevalent showed the use of tourniquet in maximum number (80.2%) while less than 10% patients resorted to herbal medications or incision. Such practices are common in different parts of the country as highlighted in other study.^[5]

VI. Conclusion

Assam owing to its unique biodiversity comprises of wide variation in snake population compared to other parts of the country which may be the reason for difference in clinical presentations seen in snake bite patients. Maximum number of cases were non-poisonous snake bites. Neurotoxic envenomation is the commonest form of snake bites while local effects and hemotoxic effects were not rare.

Although a grave emergency condition, timely intervention and management with anti-snake venom provides excellent results. However, significant hurdles in the proper management of envenomation includes traditional practices, lack of knowledge among general public, poor transportation services,etc. Hence, public awareness is of utmost necessity. Lack of sufficient data necessitates study on this public health emergency.

Since the affected population comprises of rural population with seasonal increase in cases, preventive measures and protective garments can be helpful in decreasing the incidence of snake bites.

Financial Support And Sponsorship

Nil

Conflict Of Interest

None.

References:

- [1] World Health Organization (WHO) Snakebite Envenoming. [August 1, 2019];WHO Press. 2019a <https://www.who.int/news-room/fact-sheets/detail/snakebite-envenoming> [Ref List]
- [2] Mohapatra B, Warrell DA, Suraweera W, Et Al.: Snakebite Mortality In India: A Nationally Representative Mortality Survey. *Plos Negl Trop Dis*. 2011;5(4):E1018. 10.1371/Journal.Pntd.0001018 [PMC Free Article] [Pubmed] [Crossref] [Google Scholar]
- [3] Mukherjee, Ashis. (2021). The 'Big Four' Snakes Of India: Venom Composition, Pharmacological Properties And Treatment Of Envenomation. 10.1007/978-981-16-2896-2.
- [4] Kakati H, Giri S, Patra A, Taye SJ, Agarwalla D, Boruah H, Choudhary G, Kalita B, Mukherjee AK. A Retrospective Analysis Of Epidemiology, Clinical Features Of Envenomation, And In-Patient Management Of Snakebites In A Model Secondary Hospital Of Assam, North-East India. *Toxicon*. 2023 Jul 1;230:107175.
- [5] Chakma JK, Menon JC, Dhaliwal Rsindian Council Of Medical Research#. . White Paper On Venomous Snakebite In India *Indian J Med Res*. 2020;152:568–74
- [6] KG Sajeeth Kumar, Santhosh Narayanan, V Udayabhaskaran & NK Thulaseedharan (2018) 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, *International Journal Of General Medicine*, , 209-216, DOI: 10.2147/IJGM.S136153 To Link To This Article: <https://doi.org/10.2147/IJGM.S13615>
- [7] Satyanarayan B, Panda SK, Sunder A, Kumari S. Clinical And Epidemiological Profile Of Snakebite Cases - A Study From An Industrial Teaching Hospital At Jamshedpur, Jharkhand, India. *J Family Med Prim Care*. 2022 Dec;11(12):7652-7656. Doi: 10.4103/Jfmpe.Jfmpe_890_22. Epub 2023 Jan 17. PMID: 36994007; PMCID: PMC10041039.
- [8] Kshirsagar VY, Ahmed M, Colaco SM. Clinical Profile Of Snake Bite In Children In Rural India. *Iran J Pediatr*. 2013 Dec;23(6):632-6. PMID: 24910739; PMCID: PMC4025118.
- [9] Bhalla G, Mhaskar D, Agarwal A. A Study Of Clinical Profile Of Snake Bite At A Tertiary Care Centre. *Toxicol Int*. 2014 May;21(2):203-8. Doi: 10.4103/0971-6580.139811. PMID: 25253932; PMCID: PMC4170564.

- [10] Stephen S, Mohanty CR, Radhakrishnan RV, Et Al. Clinico-Epidemiological Profile, Trends, And Health-Related Outcomes Of Snakebite Victims: A One-Year Prospective Study From Eastern India. *Wilderness & Environmental Medicine*. 2024;35(2):155-165. Doi:10.1177/10806032241239628
- [11] Baruah, Chitralkha; Baruah, Bhaskar; Bhattacharjee, Subhadeep; Hazarika, Karuna. A Study Of Clinical Profile Of Patients With Snake Bite Attending A Tertiary Care Hospital In The North Bank Of The Brahmaputra: A Hospital Based Cross Sectional Study. *Assam Journal Of Internal Medicine* 13(1):P 3-7, Jan–Jun 2023. | DOI: 10.4103/Ajoim.Ajoim_22_22
- [12] Teron M, Shinde SA, Sharma M, Baruah C, Baruah SK. Snake Bite Assam *J Intern Med*. 2011;1:35–37
- [13] Patel S, Patel A, Ganjiwale J, Patel D, Nimbalkar S. The Study Of Clinical Profile And Outcome Of Patients With Snakebite In A Rural Community. *J Family Med Prim Care*. 2021 Apr;10(4):1661-1665. Doi: 10.4103/Jfmpc.Jfmpc_1976_20. Epub 2021 Apr 29. PMID: 34123909; PMCID: PMC8144800.
- [14] Ahmed SM, Nadeem A, Islam MS, Agarwal S, Singh L. Retrospective Analysis Of Snake Victims In Northern India Admitted In A Tertiary Level Institute. *J Anaesthesiol Clin Pharmacol*. 2012 Jan;28(1):45-50. Doi: 10.4103/0970-9185.92434. PMID: 22345945; PMCID: PMC3275971.
- [15] Pandit K, Rawal A, Maskey HMS, Nepal G. Neurological And Neuro-Ophthalmological Manifestations Of Snake Bite: A Systematic Review. *Ann Med Surg (Lond)*. 2023 Nov 22;86(1):392-400. Doi: 10.1097/MS9.0000000000001523. PMID: 38222724; PMCID: PMC10783398.
- [16] Madhusudan Samprathi, Vipul Gupta, Muralidharan Jayashree, Arun Bansal, Arun Baranwal, Karthi Nallasamy, Epidemiology And Outcomes Of Early Morning Neuroparalytic Syndrome Following Snake Bite—A Retrospective Study, *Journal Of Tropical Pediatrics*, Volume 66, Issue 4, August 2020, Pages 435–440, <https://doi.org/10.1093/Tropej/Fmz084>