

ORIGINAL ARTICLE

Ophitoxaemia: Study of Snake Bites in Western Vidarbha Region

Sachin Janbaji Gadge¹, Chaitanya Shriram Kulkarni², A. K. Pillai³

How to cite this article:

Sachin Janbaji Gadge, Chaitanya Shriram Kulkarni, A.K. Pillai. Ophitoxaemia: Study of Snake Bites in Western Vidarbha Region. Indian J Forensic Med Pathol. 2025; 18(2): 95-100.

ABSTRACT

Introduction: Snakebite envenoming is many times fatal. Venomous snake bites can cause huge morbidity and medical problems from trivial hospitalization to death or amputation. They help in maintaining rodents population and thus boon for farmer's yield.

Materials and method: Prospective cross-sectional study was carried out at Government Medical College and Hospital, Akola, Maharashtra for all the cases who were autopsied with snakebite envenomation from May 2022 to April 2024. Total 76 cases of snake bite were brought for autopsy to our tertiary care hospital

Observations and results: Most cases were in 41 to 50 years age group whereas tapering on both the extremes. Mostly residence of rural area 63 (82.89%) whereas predominant occupation of the cases was agricultural 49 (64.47%). Site of incidence of snakebite were at fields 59 (77.63%) followed by residence 13 (17.11%). Rainy season bears the maximum load of snakebite 49 (64.47%) cases.

Conclusions: Strong policy for the Anti Snake Venom (ASV) procurement and its inclusion in essential drugs list is the need of the hour.

KEYWORDS

• Snakebite • Ophitoxaemia • Envenomation • Snake-human encounter

AUTHOR'S AFFILIATION:

¹ Associate Professor and Head, Department of Forensic Medicine and Toxicology, Government Medical College, Akola, Maharashtra, India.

² Assistant Professor, Department of Forensic Medicine and Toxicology, Government Medical College, Akola, Maharashtra, India.

³ Junior Resident, Department of Forensic Medicine and Toxicology, Government Medical College, Akola, Maharashtra, India.

CORRESPONDING AUTHOR:

Sachin Janbaji Gadge, Associate Professor and Head, Department of Forensic Medicine and Toxicology, Government Medical College, Akola, Maharashtra, India.

E-mail: sachinbgadge2004@gmail.com

➤ Received: 25-03-2025 ➤ Accepted: 31-05-2025



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>) which permits non-Commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the Red Flower Publication and Open Access pages (<https://www.rfppl.co.in>)

INTRODUCTION

More than 3500 species of snakes are documented in the literature, but out of them about 250 are venomous. India also witnessed about 216 species, out of which 52 are poisonous. As per WHO more than 2.5 million human snake encounters in the world every year, more than 1,25,000 are fatal. In India only five dangerously venomous snakes are king cobra common cobra, common krait, Russell's viper and saw-scaled viper. The most common poisonous snake is common krait.¹

Snakes are reptiles with flexible skull, no eyelids, no external ears, forked tongue, carnivorous diet, scaly skin. But some are venomous and most are non-venomous. They habitat almost everywhere which can be deserts, forests, oceans, streams and lakes except part of land which are frozen throughout the year like the polar region or at snowy mountains. They are the main predator in the ecosystem and are good indicator for the healthy ecosystem. They help in maintaining population of rodents which are a curse for a farmer's yield.²

Venomous snakes are capable of producing venom through their modified parotid salivary glands on either sides of the head behind the eyes. So, it is the toxic saliva of the snake. This venom helps them to kill prey, for defense and to digest their food. The mortality and morbidity are high due to the lack of training workers at the first encounter, policy and treatment irregularities, transport delays and incompetent of healthcare services.³

India is hugely populated country, having biodiversity among people and climate and customs. Agriculture is the main source to gain the livelihood. Poverty and callous or ignorant farming techniques and no safety precautions, causes the exposes the human and animals contacts. Snake bites cause countable amount of mortality and morbidity.⁴

Fangs of the venomous snakes are pair of teeth like hypodermic needle that inject venom in subcutaneous or intramuscular tissues of the victim or human. This is the health emergency in developing countries like India. Hence, the World Health Organization (WHO) mentioned snakebite management as one of its priorities.⁵

Our Maharashtra state reports about 70 bites per lakh population and a fatality of 2.4 per lakh people each year. Indian states with high

incidence of snakebites cases are Tamil Nadu, West Bengal, Maharashtra, Uttar Pradesh, and Kerala.⁶ The present study aims to illustrate various factors associated with snakebite in our region and hopes to serve as a guide for similar studies in coming days.

MATERIAL AND METHODS

Prospective cross-sectional study was carried out at Government Medical College and Hospital, Akola, Maharashtra for all the cases who were autopsied with snakebite envenomation from May 2022 to April 2024. In the present study findings were prepared which include detailed preliminary information, Autopsy findings, inquest, spot panchanama, statements of the relatives and hospital records. All the patients who were brought for autopsy to our health care facility with snakebite were included in the study. The snake envenomation was confirmed by either presence of bite mark(s), signs and symptoms, the treatments given for snake bite, surgical interventions (including fasciotomy), and complications of snake envenomation. All cases which on further investigation and Autopsy proved to be the case of death other than Snake bite were excluded from the study. The data was analyzed with SPSS software version 2015, Minitab 17, GraphPad prism 8.0.0.

OBSERVATION AND RESULTS

Total 76 cases of snake bite were brought for autopsy to our tertiary care hospital. Amongst it 43 (56.58%) were male and 33 (44.42%) were female and the male to female ratio was 1.3:1. Most cases were in 41 to 50 years age group whereas tapering on both the extremes. Meanage of the patients was 34.8±11.3 S. D. (range: 9 to 72) years.

Most cases were the residence of rural area 63 (82.89%) whereas predominant occupation of the cases was agricultural 49 (64.47%). Cases mostly reported the site of incidence of snakebite to be fields 59 (77.63%) followed by residence 13 (17.11%). Half cases 38 were reported during evening time (4 pm to 8 pm) followed by night time 18 (23.68%). Rainy season bears the maximum load of snakebite 49 (64.47%) cases.

Lower limb 44 (57.89%) followed by upper limb 23 (30.26%) was the most common site

of snakebite. Typically, the snake could not be identified 49 (64.47%) cases. Majority cases have one set of bite mark 31 (40.79%) followed by multiple sets 25 (32.89%) cases. The latency i.e., snakebite to admission time was typically 1 to 2 hours in 26 (34.21%) cases followed by 2 to 4 hours in 19 (25.00%) cases. Almost 59 (77.63%) cases expired within 12 hours of envenomization whereas only 3 cases survived for more than 7 days of bite (3.95%).

Table 1: Incidence of snakebite according to age

Age (years)	Number (n = 76)	Percentage
0-10	1	1.32
11-20	12	15.79
21-30	13	17.11
31-40	15	19.74
41-50	19	25.00
51-60	10	13.16
>60	6	7.89
Total	76	100

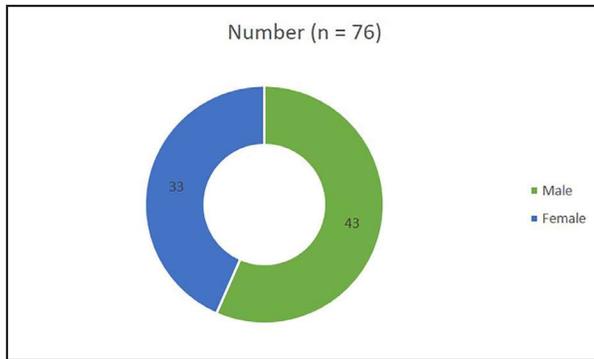


Figure 1: Frequency of Snakebite in Male: Female cases

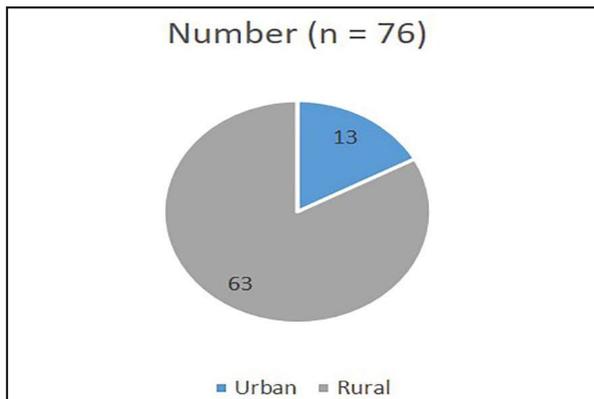


Figure 2: Frequency of Snakebite in Urban: Rural cases.

Table 2: Incidence of snakebite as per occupation

Occupation	Number (n = 76)	Percentage
Agriculturist	49	64.47
House wife	5	6.58
Students	9	11.84
Others	13	17.11
Total	76	100

Table 3: Incidence of snakebite as per place of incidence

Place of the incident	Number (n = 76)	Percentage
Fields	59	77.63
Residence	13	17.11
Others	4	5.26
Total	76	100

Table 4: Incidence of snakebite as per time of incident

Time of incident	Number (n = 76)	Percentage
4 am - 8 am	6	7.89
8 am - 12 noon	1	1.32
12 noon - 4 pm	2	2.63
4 pm - 8 pm	38	50.00
8 pm - 12 midnight	18	23.68
12 midnight - 4 am	11	14.47
Total	76	100

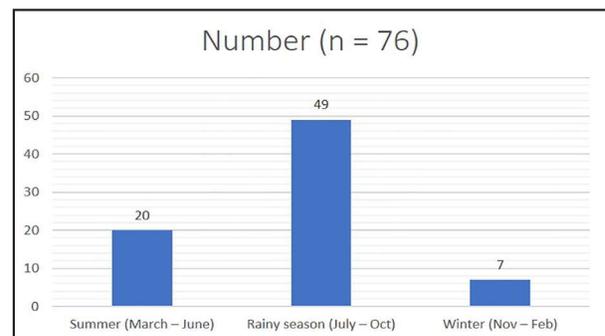


Figure 3: Frequency of Snakebite and seasonal trends.

Table 5: Incidence of snakebite as per site of bite

Bite site	Number (n = 76)	Percentage
Upper limbs	23	30.26
Lower limbs	44	57.89
Others	9	11.84
Total	76	100

Table 6: Incidence of snakebite as per identification of snake

Snake identification	Number (n = 76)	Percentage
Cobra like	12	15.79
Viper like	15	19.74
Unidentified	49	64.47
Total	76	100

Table 7: Incidence of snakebite as per fang marks

Fang marks	Number (n = 76)	Percentage
Solitary	12	15.79
One set	31	40.79
Multiple sets	25	32.89
Absent	8	10.53
Total	76	100

Table 8: Incidence of snakebite as per bite-admission time or latency

Bite-admission time/ Latency	Number (n = 76)	Percentage
< 1 hour	9	11.84
1-2 hour	26	34.21
2-4 hour	19	25.00
4-12 hour	7	9.21
>12 hour	15	19.74
Total	76	100

Table 9: Incidence of snakebite as per duration of survival

Duration of survival	Number (n = 76)	Percentage
< 1 hour	10	13.16
1-3 hour	15	19.74
3-6 hour	14	18.42
6-12 hour	20	26.32
12-24 hour	4	5.26
1-2 days	5	6.58
2-7 days	4	5.26
>7 days	3	3.95
Total	76	100

DISCUSSION

Fatality following venomous Snakebite is a neglected health emergency in our India. Snakebites are usually accidental. Envenoming following snakebite is a huge public health problem. Venomous snake bites can cause huge morbidity and medical problems from trivial hospitalization to death or amputation.¹⁰

In this study more than half of the cases were from 21 to 50 age group. It is similar to the findings of Shetty AK *et al*, Rao CP *et al* and Brunda G *et al*. It might be due to the reason that this is the most productive group.

In our study male victims outnumbered the female victims. This is consistent to the findings of Shetty AK *et al*, Kashif Ali *et al*, Rao CP *et al*, Nejadrahim R *et al*, Jarwani B *et al*, Brunda G *et al*, Logaraj M *et al*, Ebrahimi V *et al* and Nagaraju K *et al*. The reason for this might be due to more involvement of male in outdoor activities which make them more prone for encounter.

Our study shows that most cases were from rural area. This is similar to the results of Shetty AK *et al*, Ali K *et al*, Rao CP *et al*, Nejadrahim R *et al*, Jarwani B *et al*, Ebrahimi V *et al* and Nagaraju K *et al*. The justification for it is the rodents are attracted to eat the spillover grains and take shelter in the crevices and holes in mud walls of the rural houses; these in turn attract snakes to such places and they often enter them in search of food (rodents) this increasing the chances of snake human contacts.

We found that more than half of the cases were associated with agriculture occupation and in fields. It is at par with the results of Shetty AK *et al*, Ali K *et al*, Rao CP *et al*, Brunda G *et al*, Logaraj M *et al* and Nagaraju K *et al*. As agriculture and working in the field are main source of income and occupation of the people in our region.

We noted that almost all snakebite were during the evening time and night. It is identical to the findings of Ali K *et al*, Ochola FO *et al*, Jarwani B *et al*, Logaraj M *et al*, Ebrahimi V and Nagaraju K *et al*, whereas it differs from the findings of Nejadrahim R *et al*. The possible reason could be thenocturnal habits of venomous snakes and poor visibility of humans in the dark.

We found that more than half of the cases of snakebite were during the rainy season. This

resembles the results of Shetty AK *et al*, Ali K *et al*, Rao CP *et al*, Brunda G *et al* and Nagaraju K *et al*. The possible reason for this is that flooding of dwelling places of the animals by the rain water causes snake and human encounter.

Our study shows more than half of the cases have bite mark over lower limb. It is confirmed in the study by Shetty AK *et al*, Ali K *et al*, Rao CP *et al*, Nejadrahim R *et al*, Ahmed SM *et al*, Jarwani B *et al*, Logaraj M *et al* and Nagaraju K *et al*. It is because accidental bite of snake to lower limbs and legs are due to proximity and lack of protective gears such as shoes during walking or working in farms might be the possible reason.

We noticed that more than half of the cases reported with unknown bite. This is supported by findings of Rao CP *et al* and Logaraj M *et al*. It can be due to the victims' report with an unknown bite or bite from an unidentified species, this could be due to ignorance of the patient or accompanying persons or bad visibility.

It was observed that about half of the cases reported to the hospital within two hours of the incidence (bite). It is also the same in the findings of Ochola FO *et al*, Jarwani B *et al* and Logaraj M *et al*. This is due to the culture of the people in our area. Traditional healers are consulted first before victims visit the hospital.

In our study most cases have solitary bite mark and more than three fourth cases expired within 12 hours of envenomization. Identical findings are noted by Rao CP *et al*. This proves that the snakebite is always accidental unless proved otherwise.

CONCLUSIONS

Ministry of Health and Family Welfare of Government of India had issued the protocol for health care workers in the year 2009 and further in 2016 regarding the guidelines to be followed in Snakebite cases. It includes manpower, infrastructure, referral and treatment of such cases. It also mandates to include the Anti Snake Venom (ASV) in essential drugs list. The method of procuring such drugs is brought in National Free Drug Initiative under National Health Mission. Majority of states have already started their movement in this direction. Procurement of

such drugs are also decent realized through the State drug procurement department.¹⁰

REFERENCES

1. Reddy K.S.N., Murty O.P. The Essentials of Forensic Medicine and Toxicology. 34th Edition, Hyderabad, Jaypee Brothers Medical Publishers, 2017. ISBN 9789352701032.
2. Shetty A.K, Jirli S.P. Incidence of Snake Bites in Belgaum. J Indian Acad Forensic. Med. 2010; 32(3): 139-41.
3. Ali K., Pathak I., Sehrawat S. Pattern of snakebite cases evaluated at a tertiary care hospital. Indian J Forensic Community Med. 2018; 5(4): 215-217.
4. Rao, C.P., Shivappa, P., & Mothi, V.R. (2013). Fatal snake bites - sociodemography, latency pattern of injuries. Journal of Occupational Medicine and Toxicology, 8(1), 7. <https://doi.org/10.1186/1745-6673-8-7>.
5. Nejadrahim R., Sahranavard M., Aminizadeh A., Delirrad M. Snake Envenomation in North-West Iran: A Three-Year Clinical Study. International Journal of Medical Toxicology and Forensic Medicine. 2019; 9(1): 31-38. [https://doi.org/10.22037/ijmtfm.v9i1\(Winter\).24072](https://doi.org/10.22037/ijmtfm.v9i1(Winter).24072).
6. Ahmed S.M., 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. <https://doi:10.4103/0974-2700.43190>.
7. Ochola F.O., Okumu M.O., Muchemi G.M., Mbaria J.M., Gikunju J.K. Epidemiology of snake bites in selected areas of Kenya. Pan Afr Med J. 2018 Apr 20; 29: 217. <https://doi:10.11604/pamj.2018.29.217.15366>.
8. Raveendran S., Vidanapathirana M. Snake bite: Medico-legal significance. December 2016; Medico-Legal Journal of Sri Lanka 4(1):25. <https://doi:10.4038/mlj.v4i1.7333>.
9. Guidelines for the management of snakebites. 2nd ed. WHO Regional Office for South East Asia; 2018. Available online: <https://iris.who.int/bitstream/handle/10665/249547/9789290225300-eng.pdf?sequence=14>
10. The National Action Plan for Prevention and Control of Snakebite Envenoming (NAPSE).
11. <https://ncdc.mohfw.gov.in/wp-content/uploads/2024/07/National-Action-Plan-for-Prevention-and-Control-of-Snakebite-Envenoming-Napse.pdf>

12. Jarwani B., Jadav P., Madaiya M. Demographic, epidemiologic and clinical profile of snake bite cases, presented to Emergency Medicine department, Ahmedabad, Gujarat. *J Emerg Trauma Shock*. 2013 Jul; 6(3): 199-202. <https://doi:10.4103/0974-2700.115343>
13. Brunda G., Sashidhar R.B. Epidemiological profile of snake-bite cases from Andhra Pradesh using immunoanalytical approach. *Indian J Med Res*. 2007 May; 125(5): 661-8.
14. Logaraj M., Thirumavalavan R., Gopalakrishnan S. Epidemiology of snakebite reported in a Medical College Hospital in Tamil Nadu. *Int J Health Allied Sci* 2013; 2: 53-55.
15. Ebrahimi V., Hamdami E., Khademian M., MoemenbellahFard M., Vazirianzadeh B. Epidemiologic prediction of snake bites in tropical south Iran: Using seasonal time series methods. *Clinical Epidemiology and Global Health*. 2018; 6(4): 208-15. [DOI:10.1016/j.cegh.2018.06.005]
16. Nagaraju K., Kannappan N., Gopinath K. Survey on Pattern of snake bite cases admitted in South Indian tertiary care Hospital. *Int J Pharm Sci Res*. 2015; 6(10): 4362-4367.