

## Assessment of Snakebite among Children: A Clinical-Epidemiological Study

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### Abstract

**Aim:** The aim of the present study was to assess the clinical-epidemiological study of snakebite among children.

**Methods:** This is a hospital based retrospective study, in which all the case records of patients admitted to the Pediatrics department of Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India from November 2018 to October 2019 were scrutinized. Patients ≤12 years of age with definitive history of snake bite were included and those with diagnosed bleeding/coagulation disorder, non-probability purposive sampling method was used and the sample size was 103. Duration of study was one year.

**Results:** There were male predominance and most of the patients belonged to 5-8 years. The mean time taken to reach Hospital following snakebite was 8.3 hours and mean time of administration of ASV following snakebite was 12.7 hours. Out of 103 cases of snakebites, fang marks were present in 72 (70%) of cases, however only 60 cases developed features of envenoming and required ASV. 43(42%) cases were dry bites or due to non-poisonous snakebites. The 20 minute Whole Blood Clotting Test was done in 82 cases. It was not done in cases where there were already obvious bleeding manifestations. It was positive in only 28 cases (47.6%) of poisonous snakebites and in 63.6% of vascular toxic snakebites (28/44). ASV was used in all poisonous cases. Most recovered with 10 vials.

**Conclusion:** Snakebite is an important cause of mortality. ASV, the only definitive treatment of envenoming should be started as early as possible for the best outcome. Awareness among the common people to bring the victims to hospital is therefore the need of the hour.

**Keywords:** snake bite, epidemiology, hemostatic profile, death

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### Introduction

Snake bite is a common medical emergency and an occupational hazard, more so in tropical India, where farming is a major source of employment. Over 2,000 species of snakes are known worldwide, of which around 400 are poisonous. These snakes belong to the families Elapidae, Viperidae, Hydrophilidae and Colubridae. [1] Viper bites are more common than other poisonous snakebites in human beings. [2,3] Of the different varieties of vipers, the Russell's viper (*Vipera russelli*) commonly inhabits the Southern Asian countries, and the Russell's viper's bite is regarded as an occupational hazard for the farming community.

Every year, 50,000 Indians die in 2, 50,000 incidents of snake bite, despite the fact that India is not home for the largest number of venomous snakes in the world, nor is there a shortage of anti-snake venom in the country. [4] The main cause of this

“unacceptable incidence” of snake bite fatalities is that people try out all kinds of “bizarre remedies” initially, instead of going to the nearest hospital. The available data on the epidemiology of snakebite from the Indian subcontinent are sparse, because most of the snake bites occur in illiterate, rural people who use witchcraft and traditional healers. Only the cases of snakebite with severe envenomation reach the healthcare centres.

The aim of the present study was to assess the clinico-epidemiological study of snakebite among children.

### Materials and Methods

This is a hospital based retrospective study, in which all the case records of patients admitted to the Pediatrics department of Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga,

Bihar, India from. November 2018 to October 2019 to were scrutinized. Patients ≤12 years of age with definitive history of snake bite were included and those with diagnosed bleeding/coagulation disorder, Non- probability purposive sampling method was used and the sample size was 103 Duration of study was one year.

The case records of snakebites were separated and studied in details. According to the protocol of the institution, all the snakebite cases had been thoroughly examined for clinical features, detailed history examined from the register. Different

laboratory investigations such as complete blood count, bleeding time, clotting time, renal function test, urine for hematuria, 20 minute Whole Blood Clotting Test had been carried out. The cases of snakebites which had clinical features of toxicity or had positive 20 minute Whole Blood Clotting Test Positive, had been started with ASV (Anti-Snake Venom). The follow up notes were also studied for the development of any complications and for the final outcome. The epidemiological details were noted down and the data were tabulated.

**Results**

**Table 1: Demographic Characteristics**

Total number of cases (103)	Sex Distribution		Age Distribution (Years)			Urban- Rural Distribution		Seasonal Distribution		
	Male	Female	<5	5-8	>8	Urban	Rural	Monsoon (July to October)	Winter (November to February)	Summer (March to June)
No of Cases	63	40	21	40	42	8	95	57	3	43
Percentage	62%	38%	20%	39%	41%	7%	93%	55%	3%	42%

There were male predominance and most of the patients belonged to 5-8 years.

**Table 2: Time Taken to Reach Hospital and Receive ASV after Snakebite**

Time Interval	Hospital Time (N=103)	Percentage	ASV Time (N=60)	ASV Time (N=60)
<6 hours	14	13.6%	5	8.3%
6-12 hours	66	64%	45	75%
>12 hours	23	22.4%	10	16.7%
Mean	8.3hours		12.7hours	

The mean time taken to reach Hospital following snakebite was 8.3 hours and mean time of administration of ASV following snakebite was 12.7 hours.

**Table 3: Clinical Manifestations of Snakebite Cases**

Characteristics (Total No. Of cases 103)	Fang Marks Present	No Clinical Features (Non-Poisonous/Dry bites)	Clinical Manifestations in Poisonous Bites (N=60)				
			Local Swelling	Local Necrosis	Vasculotoxic Features	Neurotoxic Features	Mixed Features
No of Cases	72	43	56	5	44	16	3
Percentage	70%	42%	93.3%	8.3%	73%	36%	5%

Out of 103 cases of snakebites, fang marks were present in 72 (70%) of cases, however only 60 cases developed features of envenoming and required ASV. 43(42%) cases were dry bites or due to non- poisonous snakebites.

**Table 4: WBCT20 test**

<b>Total No of Cases</b>	<b>103</b>
Cases where Test was Done	82 (80%)
Positive	28 (34%)
Negative	54 (66%)
Positive in Poisonous Snakebites	28/60 (47.6%)
Positive in Vasculotoxic Snakebites	28/44 (63.6%)

The 20 minute Whole Blood Clotting Test was done in 82 cases. It was not done in cases where there were already obvious bleeding manifestations. It was positive in only 28 cases (47.6%) of poisonous snakebites and in 63.6% of vasculotoxic snakebites (28/44).

**Table 5: Uses of ASV**

Dosage	10 Vials	20 Vials	30 Vials
No of Cases	37	22	1
Percentage	62%	37%	1%

ASV was used in all poisonous cases. Most recovered with 10 vials.

### Discussion

Venomous snakes are found throughout most part of the world, except for a few Islands, frozen environments, and high altitudes. According to World Health Organization (WHO), about 5.4 million cases of snakebites occur every year with about 2.7 million envenoming. Around 100,000 people die each year and many more are permanently disabled because of snake bites. Most snake bite cases occur in the developing countries of Sub-Saharan Africa, South Asia and South East Asia. [5] Snakebite cases often go under-reported in developing countries like India, because of poorly developed health system as well as belief in traditional healers. A community based study reported around 50,000 deaths due to snakebites in India, which is 30 times higher than the official report. [6] Snakebite envenoming has been added recently to the WHO's list of Neglected Tropical Diseases. It is truly a neglected cause of preventable deaths, which needs more attention than it receives right now. [7]

There were male predominance and most of the patients belonged to 5-8 years. The mean time taken to reach Hospital following snakebite was 8.3 hours and mean time of administration of ASV following snakebite was 12.7 hours. Halesha et al. found mortality to be 3.8% in another study from a Karnataka Medical College. They have also noted that most mortality occurred when the victim was brought to hospital late. [7] A retrospective study at Ghatal Sub-divisional Hospital, West Bengal found the Mortality to be 1.5%. [8] Another similar study from Pashim Medinipur District reports the mortality to be 1.04%. [9] The above two studies were from district hospitals and involved cases of all age groups. The high mortality found in our study may be due the fact that our study involved pediatric age group only and was in a tertiary center.

Most of the human snakebites occur during the monsoon season, because of the flooding of the habitats of the snakes and their prey. It is the life cycle of the natural prey of these reptiles that govern their contact with humans. The breeding habits of frogs closely follow the monsoons and rats and mice are always in close proximity to human dwellings. In our study, there was a higher incidence of snakebites during the monsoon season (July to September). In another Southern Indian study, snakebites were found to abound during the months from May to July (67%) and from October to

December (33%). [10] Out of 103 cases of snakebites, fang marks were present in 72 (70%) of cases, however only 60 cases developed features of envenoming and required ASV. 43(42%) cases were dry bites or due to non- poisonous snakebites. The 20 minute Whole Blood Clotting Test was done in 82 cases. It was not done in cases where there were already obvious bleeding manifestations. It was positive in only 28 cases (47.6%) of poisonous snakebites and in 63.6% of vasculotoxic snakebites (28/44). ASV was used in all poisonous cases. Most recovered with 10 vials. ASV is the only effective and specific treatment which is available for snakebite envenomation. The anti-snake venoms may be species specific (monovalent/monospecific) or they may be effective against several species (polyvalent/polysemic). As per the recommendations of the WHO, the most effective treatment for snake bite is the administration of monospecific ASV; however, this therapy is not always available for the snakebite victims because of its high cost, the frequent lack of its availability, and the difficulty in correctly identifying the snake. As snakes inject the same amount of venom into children and adults, children should also receive the same dose of antivenom as the adults. [11] A proportion of the patients, usually more than 10%, develop a reaction either early (within a few hours) or late (five days or more) after being given the antivenom. The risk of the reactions is doserelated, except in rare cases in which there had been sensitization (IgE-mediated Type I hypersensitivity) by a previous exposure to the animal serum, for example, to the equine antivenom, the tetanus-immune globulin or the rabies-immune globulin. In our study, we noticed that 12.7% of the patients had developed allergic reactions to ASV. The incorrect assessment of the risk versus benefit can lead to the unnecessary use of antivenom in patients with milder or even no envenoming, and in those who are bitten by snakes, whose venoms are not neutralized by the available antivenoms. [12]

### Conclusion

Snakebite is an important cause of mortality. ASV, the only definitive treatment of envenoming should be started as early as possible for the best outcome. Awareness among the common people to bring the victims to hospital is therefore the need of the hour.

### References

1. Al-Homrany M. Acute renal failure following snake bite: case report and review. Saudi J Kidney Dis Transpl. 1996 Jul-Sep;7(3):309-12.

2. Basu J, Majumdar G, Dutta A, Sengupta SK, Kundu B, Dass S, Neelakantan C, Sinha S, Mukherjee A, Saha SC, Chhetri MK. Acute renal failure following snake bite (viper). *J Assoc Physicians India*. 1977 Dec;25(12):883-90.
3. Bhat RN. Viperine snake bite poisoning in Jammu. *J Indian Med Assoc*. 1974 Dec 16;63(12):383-92.
4. Simpson ID, Norris RL. Snakes of medical importance in India: is the concept of the "Big 4" still relevant and useful? *Wilderness Environ Med*. 2007 Spring;18(1):2-9.
5. Snakebite Envenoming. World Health Organisation.
6. Mohapatra B, Warrell D, Suraweera W, Bhatia P, Dhingra N, Jotkar R. et al. Snakebite Mortality in India: A Nationally Representative Mortality Survey. *PLoS Neglected Tropical Diseases*. 2011;5(4):e1018.
7. Kiran Nagaraju, Nagappan Kannappan, Gopinath K. Survey on pattern of Snake bite cases admitted in South Indian Tertiary Care Hospitals. *International Journal of Pharmaceutical Science and Research*. 2015; 6(10):4362-4367.
8. Halesha BR, Harshvardhan 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. *Journal of Clinical and Diagnostic Research*. 2013; 7(1):122-126
9. Kaushik Manaa, Rituparna Ghoshb, Kripasindhu Gantaita, Kanchan Sahaa, Poulami.
10. Kulkarni ML, Anees S. Snake venom poisoning: experience with 633 cases. *Indian Pediatr*. 1994 Oct;31(10):1239-43.
11. Howarth DM, Southee AE, Whyte IM. Lymphatic flow rates and first-aid in simulated peripheral snake or spider envenomation. *Med J Aust*. 1994 Dec 5-19;161(11-12):695-700.
12. Ariaratnam CA, Sheriff MH, Arambepola C, Theakston RD, Warrell DA. Syndromic approach to treatment of snake bite in Sri Lanka based on results of a prospective national hospital-based survey of patients envenomed by identified snakes. *Am J Trop Med Hyg*. 2009 Oct;81(4):725-31.