

# HOSPITAL-BASED PROSPECTIVE OBSERVATIONAL STUDY OF COMPLICATIONS IN CHILDREN WITH SNAKE BITE IN A TERTIARY CARE CENTER.

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## Abstract.

### Objective:

We attempted to study the complications of snake bites so that early recognition and institution of proper treatment can save the lives of many children.

### Methods:

This Hospital based prospective observational study was conducted in Srirama Chandra Bhanj Medical College and Hospital, Cuttack from December 2020 to November 2022 among children aged 1-14 years with a history of snake bites admitted to our ward, through the outpatient department and emergency department.

### Results:

Our study showed, that snake bite cases were predominantly seen in 8 -11 years of age with a male: female ratio of 2.9:1, as these age group children are actively engaged in outdoor games like playing near riverside and bushy areas in playgrounds. Acute markers as depicted by serum LDH, D-Dimer, Fibrinogen, and Ferritin were significantly high among haematotoxic cases due to secondary infection and correlated with cellulitis and necrotic ulcers which accounted for 57.1%.

### Conclusion:

Healthcare providers should be made aware that a history of circumstantial evidence such as sleeping on the floor at night with sudden onset of pain abdomen, vomiting, and inability to keep the eyes open should prompt neurotoxic snake bite and ASV as well as Atropine, Neostigmine should be started.

### Recommendation:

We recommend spreading more awareness, people should be counseled to use toilets more, to use mosquito nets while sleeping, avoid sleeping on the floor.

**Keywords:** Snakebite, Neurotoxic, Elapidae, Viperidae, Submitted: 2023-08-26 Accepted: 2023-08-30

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## 1. INTRODUCTION.

Since antiquity envenomation due to snake venom is known to man.[1] India is an agricultural country, hence snake bites are a common occupational hazard accounting for the highest number

of deaths in the world.[2] In 2011 India recorded 1,19,368 envenomation cases and 1559 deaths per year with a case fatality rate of 2-10%. [3]

236 species of snakes have been reported from India out of which 70 are poisonous.[4] The most common poisonous snakes referred to as "Big Four" are the Krait, Common Cobra, Saw scaled viper, and Russell's viper. Our state is a natural habitat for the Common Indian Cobra, Monoclate

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Cobra, Krait, and Russell's viper.

Odisha is the 4th most snake bite-prone area. According to the latest annual report on natural calamities (2020 & 2021) published by the revenue and disaster management department of the Odisha Government, over 1000 deaths were attributed to snake bites across 30 districts of Odisha. The coastal region along with a hot and humid tropical climate throughout the year makes Odisha a favorable habitat for snakes and scorpions, with a maximum number of cases being reported during monsoon season.[5]

People living in densely populated low-altitude areas in the states of Bihar, Jharkhand, Madhya Pradesh, Odisha, Andhra Pradesh, and Gujarat suffer from poisonous snake bites. Hospital records of snake bites are only the tip of the iceberg as majority of the snake bite deaths go unreported. Since complications of snake bites develop rapidly and irreversibly, medical treatment must be prompt. Children are also a victim of snake bites and present with complications similar to adults, sometimes only subtle symptoms like acute onset pain abdomen, early morning vomiting, and ptosis may point towards snake bite. They experience more severe signs, symptoms, and complications than an adult due to their smaller body mass.

As the prevalence of different snakes varies across different geographical areas in India, there are diversities of clinical presentation and dilemma in recognition of its complications with little available literature in this part of our country. We attempted to study the complications of snake bites so that early recognition and institution of proper treatment can save the lives of many children.

### 1.1. Aims & Objectives.

- To determine the different complications of snake bite.
- To find the cause of morbidity and mortality following snake bite.

## 2. MATERIALS AND METHODS.

### 2.1. Study Design.

Hospital-based prospective observational study.

### 2.2. Place of study.

Srirama Chandra Bhanj Medical College and Hospital, Cuttack.

### 2.3. Study Period.

December 2020 – November 2022

### 2.4. Study Population.

Children aged 1-14 years with a history of snake bites admitted to our ward throughout the patient department and emergency department.

### 2.5. Inclusion Criteria.

Children aged 1-14 years, with a history of snake bite having features of envenomation.

### 2.6. Exclusion Criteria.

Children with no features of envenomation, having preexisting coagulopathy, on anticoagulants or antiplatelet drugs, and chronic kidney disease.

This study was done after taking IEC clearance. The admitted patients (all children with symptoms of snake bite and less than 14 years old) were enrolled. A total of 140 cases were selected based on the inclusion criteria and those who agreed to sign the informed consent. Complete demographic data comprising of age, sex, site of the bite, duration between bite and hospitalization, and clinical manifestations were noted down. A detailed clinical examination was done. The patients were categorized into neurotoxic and haematotoxic bite based on clinical manifestations as well as a 20-minute whole blood clotting time test (20 mins WBCT). Based on the result of the test Anti Snake Venom (ASV) was administered, and relevant investigations were conducted. The number of ASV vials given, and complications along with management of complications were taken into account, the admitted patients were followed up daily for complications arising due to snake bites, and the outcome was recorded.

## 2.7. Statistical Analysis.

The information collected was recorded in an Excel sheet. Data Analysis was done with the help of the Epidemiological Information Package developed by the Centre for Disease Control and Prevention (CDC), Atlanta for the World Health Organization (WHO). Using the SPSS 27.1 version percentages, means, standard deviations, and 'p' values were calculated. A 'p-value less than 0.05 was taken to be significant.

## 3. RESULTS.

Of 140 enrolled cases, 40% were in the age group 4-7 years, 50% were between 8 -11 years and 10% belonged to 12 - 14 years with a mean age of 8.33 and range of 4 -13 years, gender distribution showed 10% females(F):30% males(M) in 4-7 years age group, 12.9% F:12. M37.1% in 8-11 years category and 2.9% F: 7.1% M in 12- 14 Years with an overall ratio of female: male as 2.9: 1.

Haematotoxic cases constituted 72.9% and neurotoxic snake bite cases were 27.1%. Age categories of haematotoxic groups are 4-7 years 40(28.5%),8-11 yrs 50 (35.8%),12-14 yrs 12 (8.6%), and neurotoxic groups are 4-7 yrs 16 (11.4%),8-11 yrs 18 (12.8%), 12- 14 yrs 4 (2.9%).

Fang marks were present in 90 cases (64.3%) in 50 cases (35.7%), seasonal distribution showed most of the cases 84 out of 140 (60.2%) occurred between July to September i.e. rainy season. Interval between bite and hospitalization revealed 18 (12.8%) arrived within 4 hours,70 (50.2%) arrived between 4 - 12 hrs and 26 (37%) were admitted after 12 hrs.

Haematological profile of patients in both groups were statistically non significant (p 0.20). Coagulation profile comprising of Bleeding time (BT), Clotting time (CT),Prothrombin time (PT) , Activated Plasma Thromboplastin time (APTT) values were found to be insignificant.

However, in haematotoxic and neurotoxic snake bite cases serum Lactate Dehydrogenase was 652.39 (+-481.61) Vs 309.11 (+-128.72) p value 0.003, D-Dimer of 454.57 (+-180.34) Vs 315.79(+ -107.72) pvalue 0.002, Fibrinogen 494.22 with mean

Standard Deviation (SD) of(+ -235.51) along with 355.11(+ -145.64) p value is 0.019 , Ferritin 670 .99 (+-356.53) Vs 404.84 (+-242.97)p value 0.019 were found to be statistically significant .

Complications observed in the study population showed cellulitis followed by necrotic ulcer in 80 cases i.e(57.1%), which was succeeded by Acute Kidney Injury in 66 cases accounting for 47.2%,ptosis in 36 patients i.e 25.7%,Respiratory failure was also noted in 36 patients i.e 25.7%,Encephalopathy in 22 cases constituting 15.7%.

## 4. DISCUSSION.

Our study showed that snake bite cases were predominantly seen in 8 -11 years of age with a male: female ratio of 2.9:1, as these age group children are actively engaged in outdoor games like playing near the riverside and bushy areas in playgrounds. However, two studies carried out in India by Sharma et al [6] and Bharadwaj et al [7] showed more male predominance with an M: F ratio of 4.25:1 where the children belonged to the preschool age we found fang marks in 64.3% of cases whereas study done by Bawaskar [8] found the same in only 29% of cases only with development of serious complications.

Significant seasonal variation of snake bite cases was found in studies done in different regions of India. Vinayak Y Kshirsagar et al showed a greater number of cases in June (51.85%) as the children play outside during summer. Ahuja P et al [9] found 70% of cases in the still warmer month of May. Lal et al [10] got 40 % of cases between September to November. In contrast to all the above-cited studies, we found 60.2% of cases during the rainy season i.e. from July to September as our region is predominantly dependent on agriculture and still people use rivers and ponds for bathing. So, when monsoon starts rivers swell and venomous snakes come out of their hideout.

In our study, acute markers as depicted by serum LDH, D- Dimer, Fibrinogen, and Ferritin were significantly high among haematotoxic cases due to secondary infection and correlated with cellulitis and necrotic ulcers which accounted for 57.1%. This was due to the microorganisms in-

**Table 1: Demographic characteristics.**

AGE (years)	CASES (n =140)	PERCENT-AGE (%)	Gender (n=140)	
			Male (n=104)	Female (n=36)
1-3	0	0	0	0
4-7	56	40	42(30%)	14(10%)
8-11	70	50	52(37.1%)	18(12.9%)
12-14	14	10	10(7.1%)	4(2.9%)

**Table 2: Haematotoxic cases**

TOTAL CASES = 140 nos				
AGE GROUP	HAEMATOTOXIC (n = 102)		NEUROTOXIC(n = 38)	
	CASES	(%) of total	CASES	(%) of total
1-3	0	0	0	0
4-7	40	28.5	16	11.4
8-11	50	35.8	18	12.8
12-14	12	8.6	4	2.9

**Table 3: The haematological profile of the patients.**

FANG MARK	CASES	PERCENTAGE(%)
ABSENT	50	35.7
PRESENT	90	64.3
TOTAL	140	100
SEASONAL VARIATION		
JAN-MARCH	10	7.1
APR –JUN	34	24.2
JULY –SEP	84	60.2
OCT -DEC	12	8.5

**Table 4: Haematotoxic and Neutotoxic snake bite cases.**

HAEMATOTOXIC(n=102) PARAMETERS	MEAN	STANDARD DEVIATION	NEUROTOXIC (n = 38)		
			MEAN	STANDARD DEVIATION	VALUE
PT	21.18	6.54	20.84	6.23	0.85
INR	1.34	0.36	1.19	0.22	0.096
APTT	21.45	5.95	20.37	4.94	0.48
S.FIBRINOGEN	494.22	235.51	355.11	145.64	0.019
S.D DIMER	454.57	180.34	315.79	107.22	0.002
S.FERRITIN	617.9	356.53	404.84	242.97	0.019
S.LDH	652.39	481.61	309.11	128.72	0.003

Table 5: **Complications observed in the Study population.**

Complications	Cases (n=140)	%
Cellulitis, Necrotic Ulcer	80	57.1
AKI	66	47.2
Ptosis	36	25.7
Respiratory Failure	36	25.7
Encephalopathy	22	15.7

jected into the bloodstream from the teeth and mouth of the snake. However the study carried out by M Khan et al(25%), Adhisivam et al [11](52%), and Suchitra et al [12](25%) revealed acute renal failure as the most common complication.

## 5. CONCLUSION.

Snake bites are still a major public health problem in our country as well as our region. Haematotoxic snake bites are more common than Neurotoxic snake bites in school-going children i.e. 8-11 years. The morbidities were also more in the haematotoxic group and were attributed to local symptoms and signs of cellulitis, and necrotic ulcers as mortality was found to be higher in Neurotoxic bites due to respiratory paralysis.

## 6. LIMITATIONS.

Long-term follow-up of cases has not been done. This study is done in a tertiary care Hospital hence the data doesn't correlate with the data at the community level. Clinically dry bites by poisonous and non-poisonous snakes have not been categorized separately. Only clear snake bite cases with envenomation are studied.

## 7. RECOMMENDATION.

Hence, we recommend spreading more awareness, people should be counselled to use toilets more, to use mosquito nets while sleeping, and to avoid sleeping on the floor, in case a snake bites then they should follow Do It Right instead of going for local treatments and beliefs. ASV should be readily available in the peripheral hospitals.

Health care providers should be made aware that a history of circumstantial evidence such as sleeping on the floor at night with sudden onset of pain abdomen, vomiting, and inability to keep the eyes open should prompt neurotoxic snake bite and ASV as well as Atropine, Neostigmine should be started in recommended doses in to order to prevent complications such as respiratory paralysis and coagulopathy.

## 8. LIST OF ABBREVIATIONS.

LDH- lactate dehydrogenase test

ASV- anti-snake venom

WBCT- whole blood clotting time

CDC- center for disease control and prevention

SPSS- statistical program for social science

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