

Original Research Article

Snake bite, a neglected menace: a prospective observational study in a tertiary care pediatric intensive care unit

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Received: 26 February 2020

Accepted: 30 March 2020

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ABSTRACT

Background: Snake bite is a neglected and underestimated public health problem in tropical and subtropical region. Snake envenomation is a well-known cause of morbidity and mortality in India. In 2009, WHO declared snake bite a neglected disease. Ophitoxaemia is an exotic term characterising the clinical spectrum of snake bite. Objective of this study was to know the outcome in paediatric snake bite cases in a tertiary care PICU (Paediatric Intensive Care Unit) with special reference to envenomation time and also to evaluate and analyse few atypical presentations of snake envenomation by proper history taking, physical examination and help start early intervention to prevent morbidity and mortality.

Methods: A prospective observational study was done in Paediatric Intensive care unit of the hospital from June 2017 to June 2019.

Results: Around 56.8% of 109 cases were non-poisonous snake-bites. Out of 47 cases admitted to PICU, 68.08% developed cellulitis at the site of bite with *Staphylococcus aureus* being the commonest organism isolated (56.25%). Anaerobes (bacteroides and clostridium) were also isolated in few cases. Edema at site of bite (hematotoxic) and ptosis(neurotoxic) were most common initial presentation. 36.17% of patients received ASV (Anti- Snake Venom) and first aid within 6 hours of snake bite. The morbidity and mortality were significantly less ($p<0.05$) as compared to those who didn't receive ASV. 12.76% of cases with normal CRT (Clot Retraction Time) presented with features of coagulopathy. DIC (58.33% of hematotoxic bites) and respiratory paralysis 68 (75% of neurotoxic bites) were the commonest complications. Renal replacement therapy was required in 6.38%, transfusion in 10.63% cases and case-fatality-rate was 12.7%. There were a few atypical presentations of snake bite mimicking Gullain-Barre syndrome, acute onset encephalitis with absent brainstem and pupillary reflexes, intracerebral hemorrhage and cortical blindness.

Conclusions: Most snake bites are non-poisonous. Early first aid and ASV administration has better outcome. Fibrinogen levels are more reliable than CRT to diagnose coagulopathy. Acute presentations i.e., altered sensorium, paralysis, blindness and stroke like features should always be evaluated for snake envenomation in suspected cases to prevent morbidity and mortality.

Keywords: Anti- snake venom, Envenomation, Snake bite, Tertiary care

INTRODUCTION

The World Health Organization aims to eradicate snakebite which is considered to be one of the neglected tropical diseases in the world.¹ However, in the year 2010 and 2013 snake bite was excluded from the WHO report

on neglected tropical diseases. But it was re-introduced again in the year 2017 along with other neglected non-tropical diseases such as strongyloidiasis, scabies, mycetoma, etc.^{2,3} Snakes are found all over the world except in Arctic, New Zealand and Ireland, and are more commonly distributed in temperate and tropical

countries.⁴ There are about 52 species known to be poisonous out of a total 216 species of snakes that are identifiable in India. The major families of poisonous snakes in India are Elapidae which includes common cobra (*Naja naja*), King Cobra and Common Krait (*Bungarus Caerulus*), Viperidae includes Russell's Viper, *Echiscarinatus* (Saw Scaled or Carpet Viper) and Pit Viper and Hydrophidae (Sea Snakes). In Odisha, common poisonous snakes are Cobra, Russell viper, Saw Scaled Viper and Krait.

South Asia, South East Asia and sub Saharan Africa are the regions most commonly affected by snake bite.¹ Envenomation in India is estimated to be at 81000/year, which is highest in the year in the world, followed by Sri Lanka, Vietnam and Brazil.¹ In India Uttar Pradesh, Andhra Pradesh and Bihar are the worst affected states with the majority of deaths being reported in Andhra Pradesh.³⁻⁶

The increased mortality and morbidity in tropical countries is attributed to scarcity of anti-snake venoms, minimum access and poor quality of health care services.⁵ Traditional healers rather than trained doctors are preferred in countries like India, mainly because of ignorance and monetary issues as a result of which 77% of snakes bite victims in rural areas die outside the health care setup.⁶ Since complications of snakebite develop rapidly and irreversibly, medical interventions must be prompt and appropriate.⁷

Unlike the other public health problems, which have received a lot of attention from both the policy makers and health care providers, snake bite has been grossly neglected by many. Hence, the current study was conducted with the objective of assessing the clinical and epidemiological profile of snake bite victims admitted to a tertiary care hospital in Odisha, India.

Objective of this study was to study clinical profile, complications and outcome in paediatric cases of snake bite with special reference to envenomation time and to highlight the atypical presentations of snake bite.

METHODS

The series of snake bite cases were studied retrospectively at IMS and SUM Hospital, Bhubaneswar. The study was conducted over a span of 2 years from June 2017 to June 2019. Sample size is 47 patients between the age group of 1 month to 14 year admitted to our PICU during the time frame. Study place was Paediatric Intensive Critical Unit (PICU) of IMS and SUM hospital, Bhubaneswar, Odisha, India.

Inclusion criteria

All children between the age group of 1 month to 14 year admitted to our PICU were included in the study.

Exclusion criteria

All bites due to other poisonous creatures and doubtful cases of snake bite with no definite history or acute onset sign and symptoms of envenomation

The site of the snakebite was examined for any local tissue reaction, such as swelling, erythema, and necrosis. A detailed examination of central nervous system, cardiovascular system, and respiratory rate and per abdomen was carried out in all the cases. Routine and specific investigations were done. These included hemoglobin estimation, total leucocyte count, differential count, platelet count, peripheral smear- for signs of hemolysis, RFT(renal function test):serum urea, serum creatinine, urine examination (protein, red blood cells, hemoglobin, myoglobin), BT (bleeding time)/CT(clotting time), 20 min wholeblood clotting time.

Specific Investigation includes serum electrolyte, serum fibrinogen levels, ECG (electrocardiogram). All patients were treated as per WHO protocol.⁸ All patients were studied for complications during hospital study. Blood transfusion, ventilator support and dialysis were carried out as and when indicated. Patients who developed cellulites received appropriate antibiotics and anti-inflammatory agents and were referred to surgeons for necessary treatment. Conditions at the time of discharge were noted.

Statistical analysis

Comparisons of categorical data were carried out using Pearson's chi square test. p value less than 0.05 was taken statistically significant.

RESULTS

The general characteristics feature of these patients of snake bite was shown in Table 1.

Table 1: Demographic profile of snake bite patients.

Variables	N=47	Percentage (%)
Age in years	0-5	29.7
	5-10	59.5
	>10	10.6
Residence	Rural	68.08
	Urban	31.9
Time of bite	Day	42.6
	Night	57.4

Commonest age group affected was 5-10 years (59.57%) and male to female ratio was 1.61:19 (Figure1). Maximum snake bites occurred in the rainy season (70.21%) (Figure 2). 68.08% of patients belonged to rural area as compared to 31.9% who belonged to urban area.

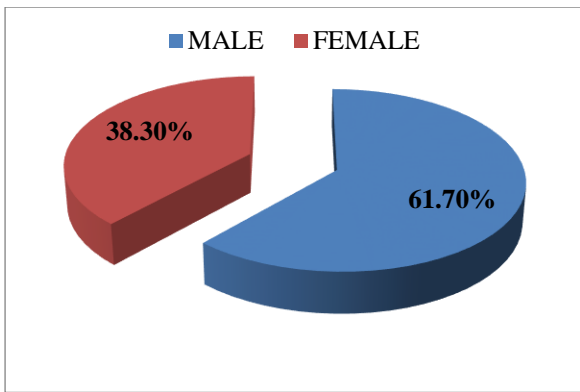


Figure 1: Sex incidence of snake bites.

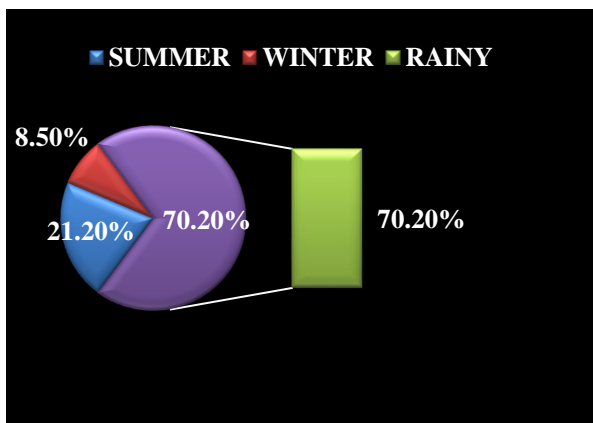


Figure 2: Seasonal incidence of snake bite.

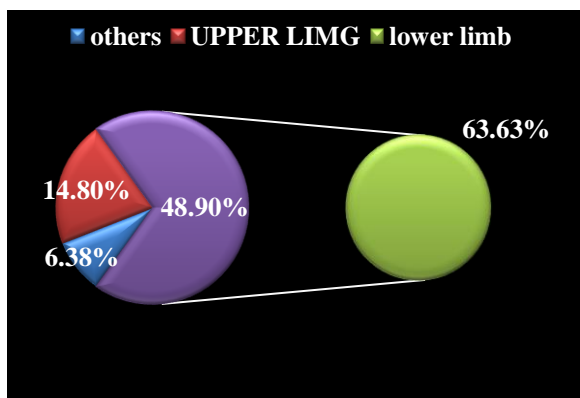


Figure 3: Site of bite.

The results of study of snake bite in the patients were shown in Table 2. All bites were nonprovocative and most occurred at night (57.4%). Bite mark was present in 70.2% of cases and lower limb (23 out of 33 bite marks-63.63%) was the commonest site of bites followed by upper limb (21.21%) and 3 unusual snake bite sites in the trunk were observed (Figure 3). 59.57% patient were primarily treated by medical personnel, 26.70% by paramedical people but 12.7% of patients resorted to tantric practice as their primary treatment provider. 36.17% (17) of patients received ASV and first aid within 6 hours of snake bite.

Table 2: Clinical profile of patients with snake bite.

Variables	Patients	Percentage (%)
Bite±		
Present	33 (n=47)	70.2
Absent	14 (n=47)	29.7
Primary care provider		
Medical personnel	28 (N=47)	59.57
Paramedical	13 (N=47)	26.70
Tantrik	6 (N=47)	12.7
Time of ASV administration		
<6 hours of bite	17 (N=47)	36.17
6-24 hours	24 (N=47)	51.06
>24 hours of bite	6 (N=47)	12.7
Ventilator required		
Yes	16 (N=47)	34.04
No	31 (N=47)	65.9
Days of ventilator required		
<3 days	4 (N=16)	25
4-7 days	11 (N=16)	68.75
>7 days	1 (N=16)	6.2
Duration of hospital stay		
<3 days	12 (N=47)	25.5
4-7 days	34 (N=47)	72.3
>7 days	8 (N=47)	17.02

Out of the various initial presentation, local oedema and swelling were the most common finding (72.3%). 23.4% of patients presented with ptosis, 36.1% with vomiting, 19.1% with respiratory distress, and 23.4% with altered sensorium. Cellulitis was the most common complication (65.9%) followed by hypotension (48.9%).

Table 3: Complications due to snake bite in relationship to ASV administration.

Complications	Time between ASV administration and snake bite		
	<6 Hours (N=17)	6-24 Hours (N=24)	>24 Hours (N=6)
Cellulitis	7 (46.6%)	20 (76.9%)	4 (66.7%)
Hypotension	4 (26.7%)	14 (53.8%)	5 (83.3%)
ARF	1 (6%)	3 (11.5%)	3 (50%)
Coagulopathy	3 (20%)	12 (46.15%)	5 (83.3%)
Respiratory paralysis	3 (20%)	9 (34.61%)	4 (66.7%)
Death	0	2 (4.2%)	4 (66.7%)

Respiratory paralysis (34%), acute renal failure (14.89%), coagulation failure (42.5%) were few other complications (Table 3). Fibrinogen level was found to be more reliable than clot retraction time to diagnose coagulation failure and the data was found to be statistically significant (p value-0.00056). It was observed that the patients who received ASV in adequate doses within 6 hours of snake bite faced lesser complications. Renal replacement therapy was required in 6.38% and blood transfusion in 10.63% cases. There were 6 deaths due to snake bite with a case-fatality-rate of 12.7% which occurred in subjects who reported to hospital more than 6 hours after snakebite and was primarily treated by tantric and most of the cases died within 24 hours hospitalization.

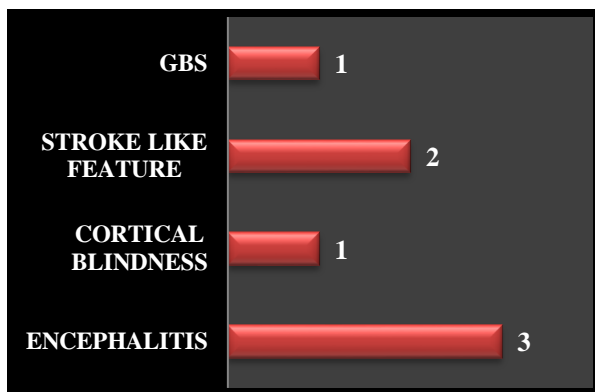


Figure 4: Atypical initial presentations in snake bite cases.

There were a few atypical presentations of snake bite: - one patient presented as a case of Gullain-Barr syndrome, three presented as acute onset encephalitis with absent brainstem and pupillary reflexes, two were diagnosed as acute onset stroke with intracerebral haemorrhage and interestingly one diagnosed as cortical blindness (Figure 4). Only after appropriate history and detailed examination for bite marks, patients were diagnosed as snake bite victims and were treated with ASV. There was dramatic improvement after ASV treatment.

DISCUSSION

Snake bite is an environmental hazard and life-threatening emergency associated with significant morbidity and mortality in children. It was recently included in the WHO list of neglected diseases in the world. The most vulnerable age group for snake bites included children between the age group of 5-10 years (59.57%).

The youngest patient was 7 months of age who was bitten at home. Similar types of age distribution were reported by Kumaravel KS et al, Chandrashekar C et al, Krishana VM et al.⁹⁻¹¹ Boys were found to outnumber girls with the ratio being 1.61:1. This is in accordance with other studies where high incidence is reported in male children which may be attributed to their propensity to play more

outdoor games.¹²⁻¹⁴ In this study, 68.08% patients were from rural area, maybe due to the fact that most of the homes in rural area do not have toilet facility. We observed 57.4% snake bite occurred at night and all were nonprovocative. Majority (70.2%) of snake bites in our study occurred in the rainy season, because during monsoon, the holes and burrows occupied by snakes and rats are filled with water and thus the snakes have no shelter. Similar types of observations were reported in previous studies.^{14,15}

Most common site of bite is the lower limb in this study (63.63%). Similar observations are reported in Indian and world literature.^{16,17} In present study, 59.57% patients were primarily treated by medical personnel, 26.70% by paramedical people and 12.70% by tantric. Death of 6 patients in our study was due to delay in seeking primary treatment as these cases resorted to tantric measures or paramedical people for their treatment leading to delay in hospitalization. The most common complication was cellulitis followed by hypotension and DIC. Many other Studies have similar findings.^{18,19}

In the present study 5 cases had atypical presentations. 1 presented as a case of GBS, 2 with sudden onset stroke like feature with intracerebral bleeds, 1 with cortical blindness and 3 presented as acute encephalitis with absent brainstem and pupillary reflexes. Only after thorough examination and detailed history they were stamped as cases of snake bite and treated as per the WHO protocol.

CONCLUSION

Snakebite still remains an important and systematically underestimated cause of accidental death in India. Awareness should be promoted among the high-risk people and areas through mass media like radio, television, social medias and newspaper regarding first aid and early hospitalization for appropriate intervention after snake bite rather than to traditional unhygienic tantric treatment. Early first aid and ASV administration has better outcome. Fibrinogen levels are more reliable than CRT to diagnose coagulopathy.

Even today prevalence of tantric treatment as first modality of snake bite management is a matter of concern. Atypical presentation of snake bite like acute onset altered sensorium, paralysis, blindness and stroke like features should always be evaluated for snake envenomation in suspected cases to prevent morbidity and mortality. A neglected snake bite case can be as catastrophic as any other life-threatening disease in the emergency department. So, awareness and vigilance on the part of the doctor as well as the victim can help prevent many deaths due to snake bite.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Giri S, Bisoi SK, Dash DK, Mohanty MD, Parida SK. Snake bite, a neglected menace: a prospective observational study in a tertiary care Pediatric Intensive Care Unit. *Int J Contemp Pediatr* 2020;7:1096-1100.