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Original Research Article

Clinico-epidemiological profile of snake bite in children in a tertiary care centre: a hospital based study

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ABSTRACT

Background: Snake bite remains major public health problem worldwide, particularly in rural areas with unexpected morbidity and mortality. This study was conducted to evaluate the clinico-epidemiological profile and complications of snake bite in children at our institute.
Methods: This was a retrospective case record based study with records between January 2011 and December 2016 studied. The clinico-epidemiological features and complications were recorded and analysed.
Results: Total of 242 snake bite children were admitted during the study period out of 17512 admissions constituting to 1.38% of admissions. There was male predominance with ratio of 2:1. About 43% of children were in the age group of 7-12 years, followed by 13-18 years. About 43% of bites occurred between March and June months. About 2/3rd of cases were from rural areas, 50% of cases were bitten outdoor. About 3/4th of cases had bite in the lower extremity. In this study 3/4th of children presented to hospital within 6 hours of bite. The major symptoms were pain and swelling at the site of bite. 10% of children had neurotoxic symptoms. Major complications noted were compartment syndrome, DIC, AKI and respiratory paralysis. Four (1.7%) children died, 3 had DIC and 1 died due to uremic encephalopathy.
Conclusions: Snake bite remains a major health problem in children causing significant morbidity and mortality. Children are particularly vulnerable because of their active and explorative nature and they also spend considerable time outdoors particularly male children. Simple preventive measures to be taken and people should be educated about avoiding traditional first aid methods and early presentation to hospital.

Keywords: Children, Envenomation, Epidemiology, Snake bite

INTRODUCTION

Snake bite remains major public health problem worldwide with unexpected morbidity and mortality. Over 2,000 species of snakes are known worldwide, of which around 400 are poisonous. These snakes belong to the families Elapidae, Viperidae, Hydrophiidae and Colubridae. Viper bites are more common than other poisonous snakebites in human beings.[1-3] Out of 216 Indian snake species, 52 are poisonous.[4] There are approximately 5.4 million victims per year, with 4 million in Asia, 1 million in Africa.[5] Two lakh snake bites are reported annually, of which 35,000-50,000 people die.[6] In India, Maharashtra has the highest incidence and in Karnataka, about 500 people die of poisonous snakebite every year.[7]

While snake bite is observed in all age groups, the majority (90%) are in males aged 11-50 years. Most patients are unable to identify the snake species. A large

number of bites occur in fields, most individuals are unable to spot the snake Most snake bites are accidental and unprovoked with maximal bites in lower extremities.[8,9]

The mortality rate is higher in children. Morbidity and mortality of victims depends on various factors like type of snake, type of toxicity, time interval between bite and ASV administration etc.[10,11]

This study is conducted to evaluate the clinico-epidemiological profile and complications of snake bite in children at our institute.

METHODS

This was a retrospective single centre observational study, conducted at the Department of Pediatrics in a tertiary care government hospital. Our hospital serves as a referral centre for surrounding districts as well as border districts of Tamil Nadu and Andhra Pradesh.

This study was a case record based study and data was retrieved from case records from the hospital Medical Records Department. Data was collected for all the snake bite children admitted during the period between January 2011 and December 2016. Data was collected and entered on a structured proforma and then analysed.

The data was collected for various details like demographic factors, clinical features, complications, treatment details and outcome of the snake bite child.

Statistical analysis

Data was entered in Microsoft excel spread sheet and imported into epi info 7.2.0.1 software and analyzed. Proportions of qualitative variables, mean and standard deviation of quantitative variables were calculated. Difference between proportions was estimated using chi square test, difference between means was calculated using independent t test at 95% confidence levels. A line diagram was constructed to study time trends of snake bite over the year. A pie diagram was constructed to depict the final outcome of snake bite.

RESULTS

Total number of admissions during the study period was 17,512 patients and there were 242 snake bite children, constituting to 1.38% of admissions.

The demographic factors of the patients in study are depicted in Table 1. The male to female ratio was 2:1. 42.97% of patients were in the age group of 7-12 years. Majority of bites with 106 (43.8%) were between March to June and least number of bites were during months of October and November. The seasonal distribution is depicted in Figure 1. About 67.76% of children were from rural area. 50% of bites were outdoor with 65% of bites in the lower limb. Three fourth of patients in the study presented to hospital within 6 hours of bite.

Table 1: Demographic characteristics in the study.

Characteristics	No. of patients	%
Gender		
Male	160	66.11
Female	82	33.88
Age		
0-6 years	59	24.38
7-12 years	104	42.97
13-18 years	79	32.64
Seasonal variation		
December to February	49	20.24
March to June	106	43.80
July to September	55	22.72
October to November	32	13.22
Locality		
Rural	164	67.76
Urban	78	32.24
Location of bite		
Indoor	79	32.64
Around house	44	18.18
Outdoor	119	49.17
Site of bite		
Upper limb distal part	65	26.85
Upper limb proximal part	5	2.06
Lower limb distal part	113	46.69
Lower limb proximal part	48	19.83
Back	3	1.23
Not documented	8	3.30
Time lapse from bite to presentation to hospital		
<6 hours	178	73.55
>6 hours	62	25.61
Not documented	2	0.82
Tourniquet tied/not		
No	201	83.05
Yes	41	16.94

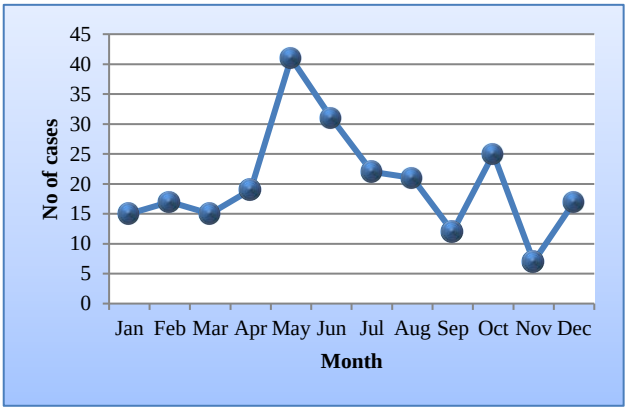

Figure 1: Seasonal distribution of cases in the present study.

The clinical signs and symptoms are as shown in Table 2. History of snake bite, pain at site of bite and local swelling were the major presenting symptoms, 24 patients presented with neurological symptoms as shown in Table 2.

Local swelling was present in about half of the patients. Fang marks were present in 69% of patients. Ptosis was seen in 17 out of 24 neurotoxic bites. Whole blood clotting time was >20 minutes in 30% of patients.

Table 2: Symptoms and signs in the study.

Characteristics	No. of patients	%
Symptoms		
H/o bite only	83	34.29
Pain	61	25.20
Swelling	64	26.44
Bleed from bite site	44	18.18
Vomiting	31	12.80
Abdominal pain	10	2.47
Neurological symptoms*	24	9.91
Signs		
Local swelling	129	53.30
Discoloration	13	5.37
Gangrene	4	1.64
Fang marks present	167	69
Ptosis	17	7.02
WBCT** >20 minutes	73	30.16
WBCT <20 minutes	112	46.28

*Unable to open eyes (10); breathing difficulty (5); difficulty in speaking (2); blurring of vision (4); weakness (3); **WBCT: Whole blood clotting time

The traditional first aid methods used before arriving to hospital are given as in Table 3. About 80% of children in our study did not receive any first aid treatment. Total of 41 patients in the study had tourniquet applied to the bitten limb and 17 patients had history of incision at bite site.

Table 3: First aid treatment.

Type of first aid	No. of pts received	%
Nil	192	79.33
Tourniquet	29	11.98
Tourniquet + incision	10	04.13
Incision	07	02.89
Local application of herbs	02	00.82
Tourniquet + herbs	02	00.82

The complications of snake bite in the present study are as in Table 4. Compartment syndrome, disseminated intravascular coagulation (DIC), acute kidney injury (AKI) and respiratory paralysis were the major complications seen in the present study.

Table 4: Complications.

Complications	Number	%
Compartment syndrome	35	14.46
DIC*	11	04.54
AKI**	16	06.65
Respiratory paralysis	08	03.30

*Disseminated intravascular coagulation; **Acute kidney injury

14.46% of snake bite children had compartment syndrome. The various treatment modalities required are as in Table 5. The mean duration of hospital stay was 4.95±4.49 days and the mean dose of ASV was 10.83±10.22 vials.

Table 5: Details of treatment in the study.

Mode of treatment	Number	%
ASV*	162	66.94
Mechanical ventilation	10	04.13
Fasciotomy	33	13.63
Dialysis	04	01.65
Duration of hospital stay		
1-5 days	131	
6-10 days	051	
>10 days	025	

*ASV- Anti snake venom

The mean duration of hospital stays in those who presented to hospital within 6 hours of bite was 4.32±3.71 days and 6.68±5.82 days, in those who presented 6 hours after bite. There was significant association between time of bite to hospitalization to hospital stay with p value of <0.001as shown in Table 7. Thirty-three (13.63%) children required fasciotomy, 10 (4.13%) patients required mechanical ventilation and 4 children in the present study required dialysis.

Table 6: Type of envenomation in the present study.

Type of envenomation	Number	%
No envenomation	80	33.05
Local envenomation only	69	28.51
Local + hemotoxic	58	23.96
Local + neurotoxic	10	04.13
Hemotoxic only	12	04.95
Neurotoxic only	11	04.54
Local + hemotoxic + neurotoxic	02	00.82
Neurotoxic+hemotoxic	01	00.41

The envenomation pattern in the present study is as shown in Table 6. About 1/3 of patients had no envenomation. Total of 139 patients had local envenomation with 69 patients having only local envenomation. Total of 73 patients and 24 patients in the study had hemotoxicity and neurotoxicity respectively.

Table 7: Showing relation between time to hospitalisation and duration of hospital stay.

	Transit time*	Number	Mean**	Standard Deviation	t test	P value
Hospital stay	<6 hours	178	4.32	3.71	-3.7	<0.001
	>6 hours	64	6.68	5.82		

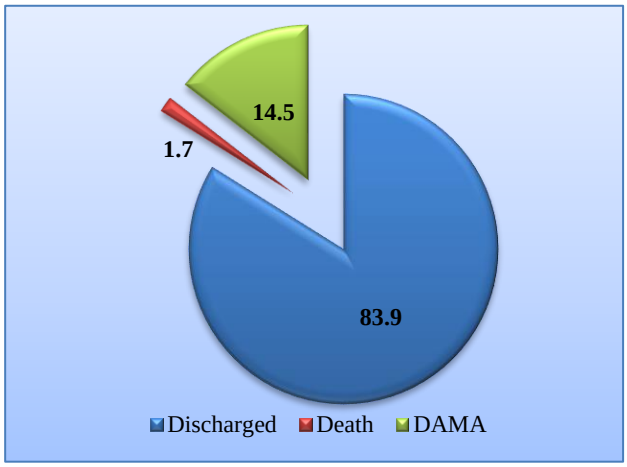

Figure 2: Final outcome in the study (in percentage).

The final outcome (%) of the children in the present study is shown in Figure 2. Four (1.7%) children in the present study died, 35 (14.5%) patients were taken against medical advice and the rest 203 (83.9%) children were discharged.

DISCUSSION

In the present study about two thirds of the cases were males and 43% of cases were in the age group of 7-12 years. This could be explained as boys spend majority of their time in outdoor activities and children in this age group are very active and explorative. Similar findings were seen in few of the previous studies.[12,13]

In the present study about 2/3rd of the bites were from rural areas and the rest were from urban areas. The number of bites from urban areas is also increasing due to ever increasing urbanization and construction activities. As seen in other studies, majority of bites were outdoor, when children were playing or in the farms, 1/3rd of bites were indoor and remaining were in the immediate surroundings of the house, either infront or backyard of the house, highlighting the importance of keeping the surroundings clean.[13-15]

Season wise, maximum bites were in the month of March to June during the summer and monsoon seasons. This is common as snakes come out of their burrows during summer and also added by the fact that children spend most of the time outdoors playing during this period as they have holidays. About 60% of children had bite during day time and rest during night, which was similar to study by kulkarni.[16]

Around 2/3rd of the bites were in the lower limb, particularly below knee and 1/4th of bites in the upper limb. This is very obvious by the fact that children play in the fields barefooted and also try to explore in the dark areas with bare hands. Similar predominance of bite in lower limbs has been documented in other studies.[14,17]

Around 25% of cases presented to the hospital after 6 hours of bite. In a study by Lingayat, 16.6 % of children presented after 6 hours of bite.[18] Among the complications, there was statistically significant difference only with respect to duration of hospital stay and AKI with these being more in those who presented to hospital after 6 hours of bite. Significant association between delay in hospitalization and duration of hospital stay shown in Table 7 and similar association was also seen in study by Krishna et al.[14] In the present study 5 patients presented after 48 hours of bite and one case who came on 6th day of bite and was on native medications presented with uremic encephalopathy and expired.

Only 20% of children in our study received any kind of traditional 1st aid methods and there was no correlation with local complications like compartment syndrome.

The envenomation pattern in the present study is as shown in Table 6. About 1/3rd of cases were non-venomous, which was similar to a study by punde.[19] 30% of children had their WBCT >20 minutes, 10% had neurotoxic bite and 10 out of the 24 cases required mechanical ventilation.

The complication profile in our study is shown in Table 4. Compartment syndrome, AKI, DIC and respiratory paralysis were the major complications seen in the present study. The complications were less when compared to a study in JIPMER.[20] Various treatment modalities required are as shown in Table 5. The mean dose of ASV required was 10 vials, which was similar in the above study. 4 out of the 242 (1.7%). children in the present study died due to complications. Three children had DIC and 1 child came in late stage uremic encephalopathy. Whereas in the above said study in JIPMER, mortality rate was 18%.

This was a case record based study and as in any retrospective study, some of the data may be missing.

CONCLUSION

Snake bite remains a major health problem in children causing significant morbidity and mortality. Children are particularly vulnerable because of their active and explorative nature and they also spend considerable time outdoors particularly male children. To some extent, it can be prevented by simple measures like keeping the surroundings clean, avoid going out in the dark, wearing shoes while playing and working in the farms. Also, it is important for the government to provide basic measures like regular power supply, sanitary latrines so that few of these cases can be prevented. Also, it is important to educate people about avoiding harmful traditional first aid methods and early hospitalization as it has bearing on the severity of complications and duration of hospital stay.

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