

## Clinical profile and outcome of snake bite in children at a tertiary care centre in South India

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*Sri Lanka Journal of Child Health*, 2021; 50(4): 704-708

DOI: <http://doi.org/10.4038/sljch.v50i4.9891>

### Abstract

**Introduction:** Snake bite is an important public health problem in the rural tropics, resulting in envenomation and death.

**Objectives:** To study the clinical profile of snake bite at a tertiary care centre in South India, estimate its case fatality rate and estimate the prevalence of complications in children with snake bite.

**Method:** This was a retrospective, observational descriptive record based study conducted in a Medical College in South India between May 2011 and April 2020.

**Results:** A total of 160 snake bite patient case records over the last 10 years were evaluated out of which signs of envenomation were seen in 65 cases. The male: female ratio was 1.8:1. Peak age group affected was 6 to 15 years. Lower limbs were the most common site of snake bite. Pain and swelling at the site of bite were the most common symptoms of envenomation. Cellulitis and coagulopathy were the most common complications seen in our study. Anti-snake venom (ASV) was used in 65 cases and the average ASV required in local and systemic envenomation was 5 and 20 vials respectively. There was one death during the study period.

**Conclusions:** Lower limbs were the most common site of snake bite. Pain and swelling at the site of bite were the most common symptoms of envenomation. Cellulitis and coagulopathy were the most common complications. The case fatality rate was 0.6%.

(Key words: Snake bite, Anti-snake venom, Children)

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(Received on 11 December 2020; Accepted after revision on 22 January 2021)

The authors declare that there are no conflicts of interest.

Personal funding was used for the project.

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### Introduction

Snake bite is an important public health problem in the rural tropics, resulting in envenomation and death. Of the 216 snake species in India, about 52 are poisonous<sup>1</sup>. The chief poisonous snakes in India are common cobra, king cobra, common krait, Russell viper, saw scaled viper, pit viper and sea snakes. Around 100,000 deaths due to snake bite are seen worldwide per year of which 35,000-50,000 deaths are from India<sup>2,3</sup>. Populations in these regions experience high morbidity and mortality because of poor access to health services and due to scarcity of anti-snake venom (ASV), which is the only specific treatment. As followed in many developing countries, traditional snake-bite remedies such as application of tourniquet, suctioning at the bite site, amputation of the bitten finger and application of herbal leaf extracts over the bite site may be important determinants of morbidity and mortality<sup>4</sup>. ASV available in India is polyvalent and is effective against the cobra, krait, Russell viper and saw scaled viper (the big four). It is ineffective against hump nosed pit viper, king cobra, sea snakes and other poisonous snakes. A significant number of children are bitten by snakes every year in our region. Majority of studies have been done on adult snake bite victims and only limited studies are available based on snake bite envenomation in children in our region. The clinical presentation and the complications of snake bite in children also differ significantly from adult snake bite victims.

### Objectives

- To study the clinical profile of snake bite at a tertiary care centre in South India.
- To estimate the case fatality rate due to snake bite.
- To estimate the prevalence of complications in children with snake bite.

### Method

A retrospective, observational, descriptive record based study was conducted over a period of 10 years (1st May 2011 to 30th April 2020) in a tertiary medical centre in South India. Patient information was obtained from medical case records which included parameters like age, gender, time of bite, site of bite, time of presentation to the hospital after the bite, clinical manifestations, complications, reaction to ASV and outcome of treatment.

**Ethical issues:** The study protocol was approved by the Institutional Ethics Committee of Father Muller Medical College, Mangalore India (No FMIEC/CCM/351/2020). As this was a retrospective study, written informed consent was not possible.

**Statistical analysis:** The data were statistically analysed for mean, standard deviation, Chi square test by using SPSS software.

**Results**

Our study included 160 diagnosed cases of snake bite of which 104 were male and 56 were female. The male: female ratio was 1.8:1. Figure 1 is the study flow chart.

Majority (73%) of children affected by snake bite were in the school going age group (6-15 years) as shown in figure 2.

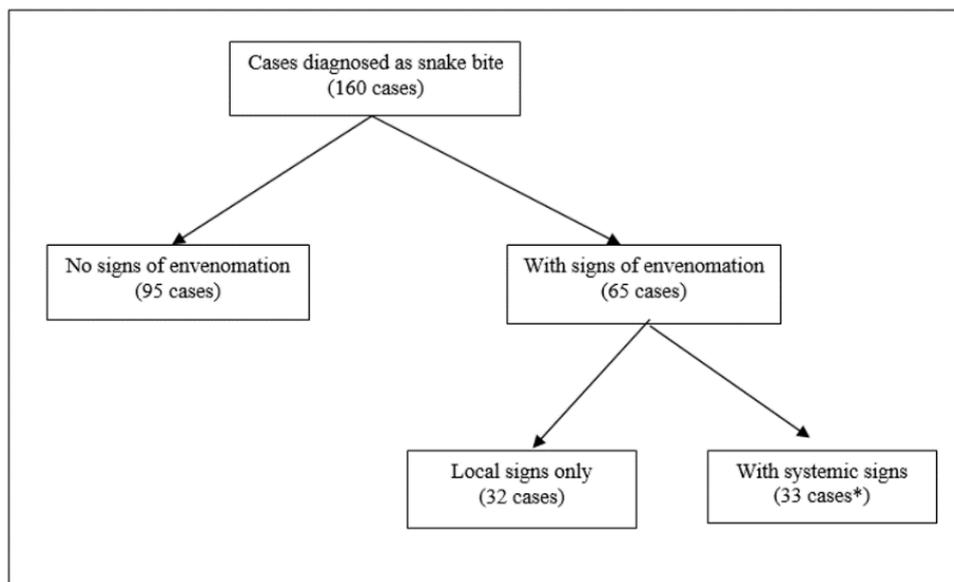


Figure 1: Study flow chart

\*All had local signs in addition

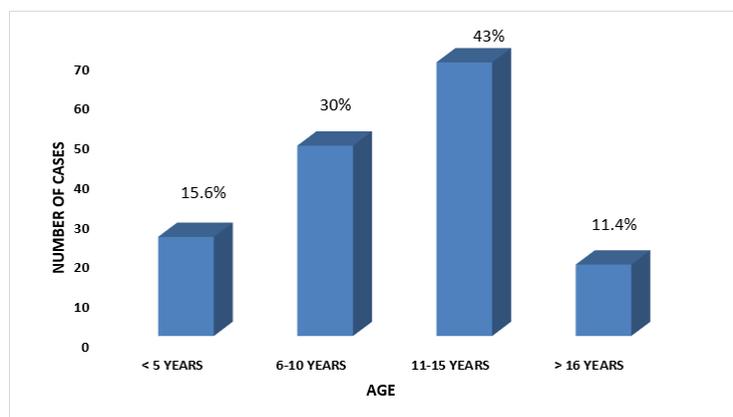


Figure 2: Age distribution of snake bite

Children from rural areas (n=92) were more affected than urban children (n=68). More than half the children (n=89) were bitten in the daytime. All Krait bites were reported at night (n=9). The types of snake bite seen in our study are shown in table 1.

In almost a quarter of cases, we were unable to identify the type of snake. The most common site of bite was the lower limb (n=126) as shown in table 2.

Table 1: Type of snake bite

Type of snake	Number (%)
Saw scaled viper	23 (35.3)
Russell viper	01 (0.6)
Cobra	13 (20.0)
Krait	09 (13.8)
Hump nosed pit viper	03 (04.6)
Unidentified	16 (24.6)
Total	65 (100.0)

**Table 2: Site of snake bite**

Site of bite	Number (%)
Upper limb	33 (20.6)
Lower limb	126 (78.8)
Multiple bites	01 (0.6)
Total	160 (100.0)

Most of the cases (n=138) were brought to the hospital within 6 hours of the bite. Pain (100%) and oedema (86.1%) were the common local effects and ptosis (9.23%) was the most common neurological sign of envenomation as shown in Table 3.

**Table 3: Clinical manifestation of envenomation**

Clinical feature	Number (%)
<i>Local signs</i>	
Oedema/swelling	56 (86.1)
Pain	65 (100.0)
Bleeding from bite site	17 (26.2)
<i>Systemic signs</i>	
Diplopia	01 (01.53)
Dysphagia	01 (01.53)
Dysarthria	0 (0)
Ptosis	06 (09.23)
Respiratory distress	04 (06.15)
Haematuria	04 (06.15)

The envenomation pattern in our study is shown in Table 4.

**Table 4: Type of envenomation**

Type of envenomation	n (%)
No envenomation	95 (59.4)
Local envenomation only	32 (20.0)
Local + Haemotoxic	30 (18.7)
Local + Neurotoxic	10 (06.3)
Haemotoxic only	24 (15.0)
Neurotoxic only	09 (05.6)
Local + Haemotoxic + Neurotoxic	02 (01.2)
Neurotoxic + Haemotoxic	01 (0.6)

Average ASV required in local and systemic envenomation was 5 and 20 vials respectively. Table 5 shows the number of vials of ASV used.

**Table 5: Number of vials of anti-snake venom used**

Number of vials	Number (%)
1-10	38 (58.5)
11-20	21 (32.3)
>20	06 (09.2)
Total	65 (100.0)

In the 65 children showing signs of envenomation, 38 required less than 10 vials and only 6 required more than 20 vials of ASV.

In our study, 33.8% of cases developed cellulitis as a local complication and 36.9% developed venom induced consumption coagulopathy (VICC) as a systemic complication as shown in table 6.

**Table 6: Complications of snake bite**

Complication	n (%)
<i>Local complications</i>	
Cellulitis	22 (33.8)
Necrosis	04 (06.2)
Ulceration	03 (04.6)
Blister	01 (01.5)
<i>Systemic complications</i>	
Venom induced consumption coagulopathy	24 (36.9)
Myocarditis	01 (01.5)
Neuroparalysis	04 (06.2)
Acute renal failure	02 (03.0)

In our study, which included 160 cases of snake bite (65 with signs of envenomation), only one child died amounting to a case fatality rate of 0.6%.

### Discussion

This was a retrospective, observational descriptive record based study conducted over a period of 10 years in a tertiary medical centre in South India and included a total of 160 diagnosed cases of snake bite. In our study we found that snake bite was more commonly seen in male children with a male: female ratio of 1.8:1. Kshirsagar VY, *et al*<sup>5</sup> and Kumar AH, *et al*<sup>6</sup> found a male: female ratio of 1.5:1 and 1.9:1 respectively in studies comprising 162 and 242 cases of snake bite. In our study, 95 (59.4%) children had no signs of envenomation and 65 (40.6%) children showed signs of envenomation. Whilst 32 cases developed only local signs, 33 had both local and systemic signs. A study done by Kumar AH, *et al*<sup>6</sup>, found that 80 (33%) children had no signs of envenomation and 69 (28.5%) children had only local envenomation.

In our study, out of 65 cases of envenomation, 23 (35.3%) were identified as saw scaled viper bite, 13 (20%) as cobra, 9 (13.8%) as krait, 3 (4.6%) as hump nosed pit viper, 1 (0.6%) as Russell viper and the remaining 16 cases were unidentified. Sankar J, *et al*<sup>7</sup> from Pondicherry identified saw scaled viper as the most common snake in their study while Jayakrishnan MP, *et al*<sup>8</sup> found Russell viper as the most common snake found in Kozhikode<sup>8</sup>. In our study, we found that children in the age group of 6-15 years were more prone for snake bite. Kumar AH, *et al*<sup>6</sup>, Rao KV, *et al*<sup>9</sup> found similar vulnerability of children of school going age.

In our study, it was observed that lower limbs were the site of snake bite in 126 (78.8%) children. This finding is a consistent feature seen in all studies done in children<sup>5-9</sup>. We would suggest that use of protective footwear and clothes would help in reducing the risk of snake bite envenomation. In 5 cases, people followed traditional practices like oral suctioning of blood from the site of bite in 3 cases and 2 cases applied ayurvedic medication at the site

of the bite. Use of traditional remedies may cause delay in seeking medical attention and probably increase the risk of morbidity and mortality<sup>11</sup>. Local pain (100%) and swelling (86.1%) at the site of bite were the most common manifestations of snake bite with envenomation in our study. Kumaravel K, *et al*<sup>10</sup> found almost 87% of cases developed local pain and swelling at the site of the bite in their study.

In the present study, cellulitis (33.8%) was the most common local complication and VICC (36.9%) was the most common systemic complication of snake bite. Average number of days required to treat VICC was 5 days. Neuroparalysis was seen in 2.4% of children and 1.2% of children developed acute renal failure requiring dialysis. Myocarditis was documented in only one child and 4 children required fasciotomy for impending compartment syndrome. Rao KV, *et al*<sup>9</sup> and Kumaravel K, *et al*<sup>10</sup> also found that cellulitis was the most common local complication of snake bite in children. Kumar AH, *et al*<sup>6</sup> found that compartment syndrome (14.5%), acute kidney injury (6.7%) and VICC (4.5%) were the common systemic complications of snake bite in children.

In 58.5% of cases, envenomation was successfully treated with less than 10 vials of ASV. Only 9.2% children required more than 20 vials of ASV for treatment of coagulopathy. Pore SM, *et al*<sup>12</sup>, found that 48.6% of cases were treated with less than 10 vials and only 9.6% required more than 20 vials. Allergic reactions to ASV were seen in 28% of cases and they were treated as per WHO protocol. ASV was continued in them after the reactions subsided. All cases of hump nosed pit viper (HNPV) bites developed allergic reactions to ASV. This finding could be a clue to suspect HNPV bites. Bites of the HNPV had incoagulable blood for a mean of 6 days. As the existing ASV works only against cobra, krait, Russell viper and saw scaled viper (the big four), finding the particular component of the HNPV venom that makes blood incoagulable could be of major therapeutic importance in the field of anticoagulation. Luckily, HNPV are less venomous and can be managed without ASV.

We had only one death out of 160 cases of snake bite and the cause of death was multi-organ dysfunction following snake bite identified as common krait which required 4 days of ventilation. The case fatality rate in our study was 0.6%. The case fatality rate in studies done by Kumar AH, *et al*<sup>6</sup>, Sankar J, *et al*<sup>7</sup> and Rao KV, *et al*<sup>9</sup> ranged from 1.5% to 13%. Snake bite is a preventable cause of death if signs of envenomation are recognized early and if treatment is initiated at the earliest. Polyvalent ASV is effective against the common species of poisonous snakes in India and every effort should be made in making polyvalent ASV freely available. The

availability of monovalent ASV in the future would potentially be helpful in reducing anaphylaxis and be more effective in neutralisation of venom.

### Conclusions

Lower limbs were the most common site of snake bite. Pain and swelling at the site of bite were the most common symptoms of envenomation. Cellulitis and coagulopathy were the most common complications. The case fatality rate was 0.6%.

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