

Clinical Profile of Snake Bite in Children in Rural India

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Abstract

Objective: A high incidence of snake bite envenomation has been reported from rural India. Due to inadequate epidemiological data, the incidence is underestimated. This study analyses the pattern of snake bite and their management in children in rural areas of Maharashtra, India. To determine the age, mode of presentation, seasonal variation, clinical profile and outcome of patients with snake bite less than 15 years of age.

Methods: This study is a retrospective, descriptive study including 162 patients, who presented with history of snake bite. Clinical data about age, sex, clinical manifestations, complications and outcome were obtained from case records and were analyzed.

Findings: Out of the 162 patients 98 (60.49%) were males. The bites were vasculotoxic in 147 (90.74%) and neuroparalytic in 15 (9.25%) patients. Mainly bites occurred from July to September with 84 (51.85%) bites. Bites were more common in males in age more than 5 years (89%) with bite marks mainly on lower limbs in 120 (74.04%) patients. Deaths were reported in patients who reported late to the hospital with a mortality rate of 1.85%.

Conclusion: Snake bite is a life threatening emergency. The key to minimizing mortality and severe morbidity is aggressive management of the ABC's of resuscitation, and timely and judicious administration of adequate dose of anti-venom.

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Key Words: Snake Bite; Snake Envenomation; Vasculotoxic; Neuroparalytic; Children; Outcome Assessment

Introduction

Snake bite which is an important cause of death in rural patients in developing countries, is a neglected public health problem^[1]. It is a recent inclusion to the list of neglected tropical diseases drawn up by the World Health Organization, and it could be the most neglected of all tropical diseases in the 21st century, according to a new analysis^[2]. Recently the Government of India's Central Bureau of Health Intelligence reported only 985 snake bite deaths in 2010. Its incidence is usually underestimated because of lack of epidemiological

data. In India the number of snake-bite fatalities has long been controversial. Estimates as low as 61,507 bites and 1,124 deaths in 2006 and 76,948 bites and 1,359 deaths in 2007 and as high as 50,000 deaths each year have been published^[3].

There are about 216 species of snakes identifiable in India, of which 52 are known to be poisonous. The major families of poisonous snakes in India are Elapidae which includes common cobra (*Naja naja*), king cobra and common krait (*Bungarus caeruleus*), viperidae includes *Russell's viper*, *Echiscarinatus* (saw scaled or carpet viper) and pit viper and hydrophidae (sea snakes)^[4].

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Snake bite is most common in school age children, adolescent and young adults. It accounts for 3% of all deaths in children of ages 5–14 years. Ninety seven per cent of the victims of snake bite die in rural areas with a survival rate of 3%, among the 97% deaths around 77% are outside health care facilities, presumably because they chose traditional therapy from *tantriks*, *vaidyas* and *ojhas*^[5]. In Maharashtra, common poisonous snakes are cobra, russell viper, saw scaled viper and krait^[6]. Also, snake bite cases have shot up sharply due to long period of electric load shedding in villages leaving them in darkness. Snake bite is thus an important medical emergency and important cause of hospital admission in a rural set up.

This retrospective, descriptive study aims to ascertain ages, mode of presentation, complications and outcome in patients of snake bite in pediatric age group in a rural set-up.

Subjects and Methods

This is a retrospective, descriptive study conducted in the pediatric department of Krishna Institute of Medical Sciences, Karad, Maharashtra, India between June 2008 – June 2012. All the patients who had presented to us with alleged history of snake bite and received ASV for treatment were registered for the study. Clinical data about age, sex, clinical manifestations, complications and outcome were obtained from case records and were analyzed.

According to our protocols our patients are initially evaluated with a complete history and physical examination. We start symptomatic treatment along with tetanus toxoid, antibiotics and adequate hydration. All our snake bite patients are investigated with complete blood count, renal function tests, electrolytes, urine for hematuria, bleeding and clotting time, 20 minute whole blood clotting time and chest radiograph. ASV is administered by intravenous route only after taking proper informed consent from the parents.

Anti-venom dosing recommendations are based on the quantity of particular venom (in mg, dry weight) that can be neutralized by each milliliter

(ml) of antivenom. In India, each milliliter of polyvalent antivenom is supposed to neutralize 0.6mg of Indian cobra venom, 0.6 mg of Russel viper venom, 0.45 mg of common krait venom, 0.45 mg of saw scaled viper venom^[7]. Skin testing is done prior to ASV administration. According to the severity of symptoms 50-150 ml of ASV was diluted with 200 ml of normal saline and administered as a bolus dose.

Depending on the clinical response the dose is repeated till all the systemic signs and symptoms disappeared. The patients are examined for development of any neurologic or hematological signs and symptoms. Hematological parameters are monitored. The end point of the study was normalization of hematological or neurological parameter or death.

Finding

We had a total of 162 patients who were registered for the study. Analysis of the data revealed that out of the 162, 98 (60.49%) were males and 64 (39.50%) females. Most of the bites were seen in children more than 5 years of age (89%). The average age for male children was 9.2 years and for female children was 8.6 years. Depending upon the development of clinical features the type of snakes was divided into poisonous and non-poisonous. 108 (66.66%) bites were due to poisonous snake and 54 (33.33%) bites due to non-poisonous snakes. Eighty four (51.85 %) patients were bitten during the months of July to September when most of the bites have occurred.

Lower limbs were the most common site of bites where marks were seen in 120 (74.04%) patients. This was followed by upper limbs which had 32 (19.75%) bite marks and other sites had 10 (6.17%) marks. The bite marks were very faint in 4 (2.46%) patients which could be appreciated only after keen observation.

The ratio of vasculotoxic to neuropalytic snake bite in male patients was 90:8 and in female patients 57:7. 67.28% patients were admitted within 6 hours of the bite. There were various modes of presentation of patients suggestive of either vasculotoxic or neuroparalytic nature of the

Table 1: Clinical profile of patients with Snake Bite

Variables	Total	Percentage (%)
Males	98 (90 vasculotoxic, 8 neuroparalytic)	60.5
Females	64 (57 vasculotoxic, 7 neuroparalytic)	39.5
Admission <6 hours of bite	109	67.3
Admission >6 hours of bite	53	32.7
Local edema	147 (n=147)	100
Pain	14 (n=147)	9.5
Cellulitis	23 (n=147)	15.6
Gum bleed	1 (n=147)	0.7
Hematuria	10 (n=147)	6.8
Hematemesis	1 (n=147)	0.7
Ptosis/ophthalmoplegia	4 (n=15)	26.7
Respiratory distress	10 (n=15)	66.7
Pain in abdomen	9 (n=15)	60
Vomiting	3 (n=15)	20
Diplopia	11 (n=15)	73.3

bite (Table 1). Local edema was present in all patients presenting with vasculotoxic snake bites but cellulitis was present in only 23 (15.64%) patients. Bleeding from various sites i.e. hematuria, hematemesis and gum bleeding was observed in vasculotoxic bites.

Among the neuroparalytic bites 9 (60 %) patients presented with abdominal pain which was the main presenting complaint. Eleven (73.33%) patients developed diplopia in 6 hours from the time of presentation and 10 (66.66%) patients developed respiratory failure for which they had to be given artificial ventilation.

Complications encountered in our study are given in Table 2. Only 2 patients developed mild allergic reactions to ASV, who were treated with pheniramine maleate and dexamethasone after stopping ASV infusion. The infusion was restarted again after 20 minutes at a rate which was tolerated by the patients. Mortality rate was higher when treatment was sought at longer time

interval from the time of bite and in patients under 5 years of age. We had a mortality of 3 (1.84%), 2 (66.66%) patients of which were under 5 years. Deaths occurred in patients who had presented more than 8 hours after the bite and all deaths occurred within 6 hours from admission to the hospital.

Discussion

Venomous snakes are distributed throughout the warm continents. *Bungarus caeruleus* (krait), *Naja naja* (cobra), saw scaled (*Echis carinatus*) and *Russell's viper* are common poisonous snakes flourished all over rural Maharashtra^[6].

Children over 5 years are at risk of snakebite because they are involved more in outdoor games. Older children in rural areas are given

Table 2: Complications of snake bite envenomation

Complications	Patients	Percentage (%)
Vasculotoxic snake bites	147 (n=162)	90.7
Cellulitis	23 (n=147)	15.6
Hypotension	5 (n=147)	3.4
Acute renal failure	1 (n=147)	0.7
Neuroparalytic snake bite	15 (n=162)	9.3
Respiratory paralysis	10 (n=15)	66.7
Reaction to ASV	2 (n=162)	1.2
Death	3 (n=162)	1.8

responsibility of carrying out outdoor activities like grass cutting, cattle grazing and firewood collection etc. thus making them an exposed age group for snake bite as seen in our study. We also found preschool children had an incidence of 10% as compared of 35% in a study by Jamieson and Pearn^[8] and 13% in study by Shrestha^[9].

Incidence was more in boys (60.49%) as compared to girls (39.50%), this is in coordination with other studies where the incidence is always higher in male children^[8,9,10] which can be attributed to their behavior and nature to play more of outdoor games. Saborio et al found no significant gender differences^[11].

Recently the curtailment of electric power has increased the incidence of snake bite cases. Incidence is also more in heavy rain during monsoon, where the holes and burrows occupied by snakes and rats are filled with water thus the snakes have no shelter. Most bites occur during night times when the snake is accidentally disturbed by the prey and also since snakes are nocturnally active. As seen in our study the incidence of snake bite (51.85 %) is more in months of July to September. This characteristic pattern has also been reported in other studies^[9,11-13].

Snake bite is more common in rural areas. Due to non availability of transport during night hours the primary health centre is not approachable. The patient is transported to the health care centre by bullock cart or carried in a bamboo basket^[14]. Also due to the mentality of the villagers to seek treatment from quacks they present to the hospital late after the incidence^[15]. As seen in our study, 32.71 % patients presented beyond 6 hours after the bite. Due to delay in seeking treatment the condition of the patient has deteriorated and as observed in our study all the 3 mortalities have occurred in patients presenting beyond 6 hours of the bite.

Snake bites are more common on the lower extremities due to accidental stampede while walking or playing in the dark^[8]. We found that 120 (74.04%) patients had bite marks on the lower limbs similar to various studies which have shown that in 70-86% patients bite marks are present on the lower limbs^[8-12,16,17]. Children are very curious and have the habit to explore various holes and crevices which may be the hiding places of snakes^[18]. This explains the 19.75% bite marks

on the upper limbs.

Majority of the children following snake bite envenomation developed local or systemic complications. Local edema was seen in all patients of vasculotoxic snake bites and cellulitis following edema developed in 23 (15.64%) patients. Acute renal failure developed in 1 (0.68%) patient who had presented to us 8 hours after the bite and unfortunately this patient succumbed to the condition within 6 hours of admission. Chronic renal failure in other studies varied from 0-28%^[9,10,16,19,20], but no such cases were observed in our study. Of the 15 (9.25%) patients of neuroparalytic bites, 10 (66.66%) patients developed respiratory paralysis and required ventilatory support.

Snake bite is thus an important and serious medical problem in many parts of India, mainly the Konkan areas of Maharashtra where this study was conducted. We conclude that boys aged more than 5 years are more prone to snake bites. Outcome can be fatal in patients presenting late so awareness amongst masses is important regarding the seriousness and early treatment. Early diagnosis, appropriate treatment and close monitoring of children for development of complications and its prompt management can be life saving.

Conclusion

The key to minimizing mortality and severe morbidity is aggressive management of the ABC's of resuscitation, and timely and judicious administration of adequate dose of anti-venom. Since ASV has now been included in the Essential Medicines of WHO list, it should be a part of primary health care package in areas where snake bites are common thereby referral to higher centers can be minimised and timely treatment can be given.

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Conflict of Interest: None

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