

Original article:

Epidemiology & outcome of snake bite in a rural teaching hospital: a retrospective study

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Abstract:

Poisonous snakebites are a serious health challenge in tropical regions due to their incidence, morbidity and mortality. The principal effects of envenomation are on the nervous system, kidneys, heart, blood coagulability, vascular endothelium, and locally at the site of bite.^{3,4,5} Envenomation due to cobra and krait bites causes paralysis of the ocular, bulbar, and limb girdle muscles where as viper bites mainly cause bleeding from muco-cutaneous sites, hemolysis, acute renal failure, and occasionally shock. This retrospective study was done in Pediatric department of Pravara Rural Hospital, Loni to study the epidemiology and outcome of snake bites in a rural tertiary care centre. 48 cases of snake bite were reported during the study period. 28 of the bites were poisonous. Male preponderance was seen. Maximum number of cases were seen during monsoon and pre monsoon season, more during evening time and lower limbs were involved the most. Out of 48 cases, 47 cases recovered and only 1 expired. Polyvalent Anti Snake Venom (ASV) vials were used as specific treatment. Prompt hospitalization and specific treatment and prior first aid measures may be responsible for reducing the mortality.

Keywords: Snake bite, Envenomation, Polyvalent anti snake venom.

Introduction:

World population of snakes is comprised of about 2,800 species of which 375 are venomous. Of this vast number of faunal spectrum of snakes only 242 species of snakes have been known from the Indian region of which only 57 species are poisonous or harmful⁶. Poisonous snakebites are a serious health challenge in tropical regions due to their incidence, morbidity and mortality⁷. More than 200,000 cases of snake bite are reported in India each year. The annual mortality from snake bite is said to be between 25000 to 30000 in India.⁸ This may actually be much less than the real numbers since majority of snake bite

deaths go unreported, as many villagers go to traditional healers who do not report any cases. Poorly informed rural population often applies inappropriate first aid and major and vital time is lost before the victim is transported to treatment center.

The four common venomous land snakes which are found in this region include the Common cobra (*Naja naja*), the Common krait (*Bangarus caeruleus*), the Russell's viper (*Vipera russelli*) and the Saw scaled viper (*Echis carinatus*)^{4,9}. The principal effects of envenomation are on the nervous system, kidneys, heart, blood coagulability, vascular endothelium, and locally at the site of bite^{3,4,5}. Envenomation due to

cobra and krait bites causes paralysis of the ocular, bulbar, and limb girdle muscles where as viper bites mainly cause bleeding from muco-cutaneous sites, hemolysis, acute renal failure, and occasionally shock⁵.

Cobra: The subcontinent harbors many varieties of cobras but the primarily identified species are binocled or spectacled cobra, monocled cobra, black cobra, and albino cobra. Naja (Common Indian cobra) most adult cobra measures 100-150cm. It can be easily recognized by its hood which has a characteristic spectacle mark on the dorsal surface. Cobras are found in a variety of habitats, but are especially common in agricultural fields, mud houses and fire wood. Cobra venom consists of three types of proteins namely cardiotoxin, neurotoxin and phosphokinase A2 toxin. Cardiotoxin neurotoxins are small molecular weight protein. Neurotoxin interacts with post synaptic acetylcholine receptor¹⁰ and causes muscle paralysis initially of cranial nerve innervated muscles commencing with ptosis diplopia or opthalmoplegia, difficulty in swallowing, difficulty in breathing and bulbar paralysis and hypoxia due to inadequate ventilation. This further leads to cynosis, altered sensorium, cardiotoxin causing haemolysis, muscle contracture and involves membrane depolarization and activation of cytophospholypase release leading to severe inflammation and necrosis. Cobra can deliver 60 mg of venom in a bite.

Kraits: In the subcontinent, there are a variety of kraits which vary in size, color and toxicity, but the common krait is considered the most aggressive species and nocturnal bite habit. It is reportedly responsible for the biggest number of snakebite deaths in India. It has small fangs and therefore indistinct bite marks. The common Krait is of

relatively small size 30-120cm. Its head is slightly broader than the neck and eyes have round pupils. The krait venom is not well documented. Its bite may not be painful and the local symptoms are barely discernible, but systemic symptoms and abdominal pain are the distinctive features of a krait envenomation along with hypokalemia. The neurotoxins¹¹ in the krait venom are prominently pre-synaptic and prevent release of acetylcholine at the neuromuscular junctions. Krait venom has a fatal dose of 6 mg with an average deliverable dose of 20 mg.

Russell's Viper: It is a large and thick viper with one chain of rings on the vertebrae and two more dorsal chains symmetrically placed on either side. The head is much broader than neck color is brown or yellowish brown. The head usually "V" shaped mark. It is aggressive and may bite under provocations. It is generally 90-150cm. long with stout and rough – scaled body. Viper venom¹² contains cytotoxins and cardiotoxins, and hemotoxic¹⁴ manifestations locally as blister, echymotic patches and systemic as bleeding gums, gingival sulci and other orifices. Epistaxis. hematuria, renal failure¹³, hypotension edema, hemorrhage and anemia are observed. This snake has a fatal dose of 15 mg and the average venom yield per bite is 63 mg. In case of vipers, swelling, pain and blistering is presented at local site.

Saw scaled Viper- It is the smallest member of the big four snakes that are responsible for causing the most snakebite cases and deaths, due to various factors including their frequent occurrence in highly populated regions, and their inconspicuous nature. It produces on average about 18 mg of dry venom by weight, with a recorded maximum of 72 mg. It may inject as much as 12 mg, whereas the lethal dose for an adult is estimated to be only 5 mg. Envenomation

results in local symptoms as well as severe systemic symptoms that may prove fatal. Local symptoms include swelling and pain, which appear within minutes of a bite. In very bad cases the swelling may extend up the entire affected limb within 12–24 hours and blisters form on the skin. Of the more dangerous systemic symptoms, hemorrhage and coagulation defects are the most striking. Hematemesis, melena, hemoptysis, hematuria and epistaxis also occur and may lead to hypovolemic shock. It is more often the result of intravascular hemolysis, which occurs in about half of all cases. In other cases, ARF is often caused by disseminated intravascular coagulation.

Materials and methods:

This retrospective study was done at Pediatric department, Pravara Rural Hospital, Loni. Our hospital is a tertiary care center and teaching hospital of RMC, Loni, and the main referral center for cases of snakebite in the region. Records of all the patients with history of snake bite or suspected snake bite (on basis of clinical presentation and history) in the past two years were collected and analysed. Snakes were identified based on the description given by the patients/ relatives/ bystanders and by correlating the clinical manifestations. Some of the relatives bought the snake with them thereby helping in identifying the species and preventing the delay in treatment. Case details including age, sex, the site of bite, time of bite, delay in admission to the hospital, clinical manifestations, specific treatment, complications and outcome were obtained from patients, their relatives and hospital records.

Investigations:

Twenty minute whole Blood clotting Test (20WBCT) was done. Other investigations included haemoglobin, PCV, Platelet count, PT, APTT, Peripheral Smear and urine test for proteinuria, RBC

Biochemistry for serum creatinine, urea, potassium was done. Oxygen saturation, PR, BP, RR, postural blood pressure, ECG, X-ray & Ultrasound was also done.

Treatment:

All patients were given first aid by cleaning the wound, immobilization of part, tetanus toxoid, analgesic, antibiotic and IV fluid was given. Immunotherapy is the only specific treatment for snake bite. Envenoming was started with lyophilized, polyvalent ASV. ASV was given ranging from 5 to 20 vials depending on the clinical assessment of the patient and severity of the bite. In cases anaphylactic reaction manifested, adrenaline was given. Injection of hydrocortisone and chlorpheniramine maleate was also given. In case of cobra bite inj. neostigmine in half hourly plus atropine was started. In case of viper because of bleeding gums, hematuria, bleeding of the site of wound, haemostatic and blood transfusion was given. Polyvalent ASV is effective in all the types of cases with doses of 5 to 25 vials.

Results:

48 victims of snake bite were admitted in the Pediatric department of Pravara Rural Hospital, Loni. Of 48 victims 30 were males and 18 were females. Victims were aged between 4 months to 12 yrs with maximum presence being in the age group of 2 to 6 years. Of the 48 victims 28 were poisonous snake bites and 20 were non poisonous snake bites. Of the Poisonous snakes cobra bite was seen in 5 cases, Krait bite in 6 cases, Saw scaled viper in 5 cases, russels viper in 4 cases. In 8 cases symptoms and history were supportive of snake bite and hence treatment given according to the same. Maximum number of victims were seen during the rainy season i.e from June to September (30 cases), followed by period from February to May (12 cases), least cases

in the period from October to January (6 cases). Most of the victims in our study were bitten during evening hours (28) followed by night time (15) and least during day time (5). Most of the victims bitten during night time were either playing in the field or sleeping on the floor. 31 victims were bitten outdoors and 17 victims were bitten while being indoors. Definitive bite marks were seen in 42 out of 48 cases.

Of the 42 cases 22 bite marks were seen in the lower limbs, 15 in the upper limbs and 5 at other sites. 30 victims were brought within 6 hours of the bite, while 12 patients were brought or referred to our hospital between 6-12 hours of bite. Only 3 patients came to our hospital after 12 hours of bite. Out of the 3 patients which presented after 12 hours 1 patient expired.

Table 1

Total number of cases	48 (100%)
Nature of Snake	
a) Poisonous	28 (58.3%)
b) Non Poisonous	20 (41.6%)
Poisonous Snakes	
a) Cobra	5 (10.4%)
b) Krait	6 (12.5%)
c) Saw Scaled Viper	5 (10.4%)
d) Russels Viper	4 (8.3%)
e) Unknown (Based on symptoms and history)	8 (16.6%)
Sex	
a) Male	30 (62.5%)
b) Female	18 (37.5%)
Age groups	
a) <6 months	2 (4.1%)
b) 6 months – 2 yrs	14 (29.1%)
c) 2 yrs – 6 yrs	24 (50%)
d) >6 yrs	8 (16.6%)
Season wise distribution	
a) June to sept	30 (62.5%0
b) Oct to Jan	6 (12.5%)
c) Feb to May	12 (25%)
Place of Bite	
a) Outdoor	31 (64.5%)
b) Indoor	17 (34.5%)
Site of bite	
a) Upper Limb	15 (31.25%)
b) Lower Limb	22 (45.8)
c) Other site	5 (10.4%)
Time of Bite	
a) Morning	28 (58.3%)
b) Evening	15 (31.25%)
c) Night	3 (6.25%)
Time of admission	
a) <6 hrs	30 (62.5%)
b) 6 – 12 hrs	15 (31.25%)
c) >12 hrs	3 (6.25%)
Final outcome	
a) Recovered and discharged	47 (97.9%)
b) Expired	1 (2.08%)

Conclusion:

In our study we found that males were more involved than the females. Maximum preponderance was seen in 2-6 yrs of age. In rainy season more number of snake bites were seen followed by pre rainy season. Maximum snake bites were during the evening time in an outdoor setting. Bites were seen more in the lower limbs. 8 patients were successfully treated on the basis of history and symptoms shown by the

patient. Envenomation was observed even when fang marks were unappreciable, suggesting the importance of keeping the victim under observation in all the alleged snakebite cases even in the absence of fang marks. Maximum number of patients were brought to our hospital within 6 hrs of bite. Prompt hospitalization and specific treatment and prior first aid measures may be responsible for preventing systemic envenomation and reducing the mortality.

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