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A study of the Epidemiological profile and outcome of Snake bite at tertiary care Hospital, South India.

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***Abstract**: Snake bite is a major health hazard and contributes to significant mortality and morbidity especially in tropical countries. There is only scarce reliable data on the profile and outcome of snake bite envenomation from regions of South Asia.*
The clinical manifestations may differ with the geographical location. This may be due to various factors such as prevalence of the snake species, variation in venom constituents within the species, timing of the bites and the percentage of dry bites.
This study was conducted from March 2014 to March 2017. A total of 220 Snake bite patients were studied during this period with a male to female ratio of 4:1. The majority of patients belonged to rural areas; most of them were bitten during outdoor activity. 60% of snakes were identified and among the poisonous snakes viperidea type were 82% and 18% were elapidae. The peak time of snake bite was between 6pm and 11pm. 75% bites were in the lower limb. The most common symptom was pain at the local site. Majority (97%) of patients with signs of systemic envenomation survived.
***Keywords:** Snakebite, South india*

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I. Introduction

Snake venom is perhaps the oldest and most notorious poison known to mankind from what has been described in writings and scriptures. Snakes have been mentioned in various mythologies and is worshipped with gods and goddesses and has also found a place in the universal symbol of medical profession in modern times.

Snake bite is a tropical health disease which is often overlooked and has frequently disastrous environmental and occupational effects in India. Snake bites are a major problem especially in rural areas amongst the agricultural community. Most of the snake bites are generally sustained by the economically disadvantaged members of the farming community, thereby increasing the economical burden on these socio-economic strata. The million death study estimated that approximately 50,000 people die of snake bite every year in India indicating that this is a major public health problem[1]. But the true incidence of snake bite may be an underestimate as large numbers of cases go unnoticed, treated by local quacks, or ignored as non-poisonous bites.

There are 216 species of snakes in India with 52 being poisonous. A vast majority of snake envenomation associated mortality and morbidity have been attributed to 4 snakes- The Indian big four.

1. Russel's viper
2. Saw scaled viper
3. Indian cobra (Naja Naja)
4. Common krait (Bungarus caeruleus)

The bites from the elapidae species are usually in the confines of the home such as Cobras which may live in roof spaces and kraits which enter the house at night and may settle under the comforts of a blanket. It is difficult to determine the exact incidence of snake bite as majority of them are underreported and as the first point of care people seek treatment from traditional healers, who, unfortunately are glorified and endorsed by some television serial stories and cinemas[2].

The clinical manifestations may differ with the region and this may be due to various factors such as the prevalence of the snake species, variation in venom constituents within the species, timing of bites and the percentage of dry bites. This may be the reason why about 50%of bites by Russel's viper, 30% of bites by Cobras and 5-10% of bites by Saw-scaled viper do not result in any symptoms or signs of envenoming[3].

It is known that there is regional variation of the venomous snakes and the snake syndromes from different parts of India. Examples of snakes outside the "big four" from our location are

-Hump nosed pit viper (Hypnale Hypnale)

-Malabar pit viper (Trimereserus malabaricus)

Both of these species cause severe local and systemic envenomation. It is worrying to note that the polyvalent ASV currently available in India does not work against the venom of these species. A peculiar nature of pit viper bites is that the clotting parameters tend to remain prolonged for days or maybe weeks.

Aims and objectives

- To determine the epidemiological profile of snake bites around Pariyaram region (Kannur/North Kerala/South India)
- To study the syndrome species correlation and outcome.

II. Materials and Methods

Inclusion criteria:

1. All patients with history of snake bite were included in the study.
2. Patients with history of unknown bite with or without a characteristic snake envenomation symptom.

Exclusion criteria:

1. Patients who did not give consent and who did not want to participate in the study were excluded.

Data entry

Documentation of clinical data was done in a written proforma along with a web-based internet data entry page, which is secured with a user id and password.

Ethics statement

This study was approved by "Institutional Ethics Committee" of Academy of Medical Sciences, Pariyaram.

III. Results

A total n=220 patients were studied. Among this 160(73%) were males and 60(27%) were females. Maximum number of cases belonged to 30-50 years age group(48%) and least belonged to the <30 years age group.
Of these 220, 167(75.9%) patients showed definite signs of envenomation and received ASV.

Table 1. Genderwise distribution

Gender	No.of cases	Total(%)
Males	160	73 %
Females	60	27 %

Table 2. Snakebite characteristics

Type of snake	No. of cases	Total (%)
Poisonous	167	76 %
i) viperidae	137	82 %
ii)elapidae	30	18 %
Non-poisonous	53	24 %

Bulk of the population i.e-, 99(45%) was involved in agriculture and a significant association was found between occupation and sex($p<0.05$) among the cases of snakebite poisoning. Majority of the snakebite cases were from the rural region (68%) and mostly the bites occurred outdoors(60%). This indicates that snake bite affects mostly the poor people who depend on agriculture as source of livelihood. More than half the number of snakebite envenomation cases occurred between 6pm and 12 midnight.

Most of the time the snake was identified , and among identified poisonous snakes viperidea type constituted 82% and rest were elapidae. Of the viperidea , russels viper bite constituted 60% , 35% pit viper and 5% saw scaled viper.

Table 3. Type of viperidae

Vipers type	No.of cases	Total (%)
Russel's viper	82	60 %
Pit viper	48	35 %
Saw-scaled viper	7	5 %

Out of the 220 cases, majority of persons were bitten in the lower limbs . A significant association($p<0.05$) was found between site and time of bite.

After excluding general symptoms like anxiety, fright, diaphoresis; pain at the local site was the most common symptom followed by swelling.

Majority of the patients who were administered ASV (antisnake venom) recovered without sequelae. Out of 220 cases, 6 cases expired , and DIC was the major cause of death. Total 80% cases recovered with 10 vials of polyvalent antivenom serum but others required upto 30 vials depending on severity of symptoms and its duration.

Time delay between bite and initiation of treatment had a bearing on mortality. When treatment was started before 12 hours, the mortality rate was 2.6% and if treatment was delayed more than 12 hours, the mortality rate was 13.5%.

IV. Discussion

Transcending barriers of class distinction, education, income and social standing, 60% victims were able to identify the offending snake. On the basis of signs and symptoms this study was able to establish hemotoxic bites in 82% and rest were neurotoxic. Most of the victims did bring the snake- dead and captured alive. Species identification was done with the help of a herpetologist and an expert in this field.

45% of snakebites occurred in agriculture industry and farming activities, which can be attributed their habit of walking barefooted[4,9].

Biggest chunk of casualities were formed by the rural inhabitants as the labour which they are engaged in predisposes them to snakebite[4,9-13].

This study shows that most of the snakebite victims were males(73 %) as compared to females (27 %). The predominance of male victims suggests a special risk of outdoor activity. This is comparable to the studies done by other authors[4,11-14].

62.7% of the study group victims were bitten while being outdoors forming the ratio of 1.7:1 of outdoor to indoor bites. this ratio is completely in alignment of facts deducted in similar studies done elsewhere[4,14-16].

Highest numbers of bites (67.4%) were recorded in the months of July and September, which corresponds to the monsoon season in India and such incidences could be directly related to flooding of human dwellings in rural areas. A similar conclusion has been reached in studies conducted earlier[4,9,11,12].

Lower extremities were the most observed bitten part of body (69.2%) commonly the feet, upper limb (26%), head and neck (4.1%) and least on other sites such as scrotum [17] in decreasing order. Bites on the head and trunk mostly occur when nocturnal species bite people while sleeping [19]. Lower extremity as the most common site for snake bite has been observed in similar other studies[9,11,14,19].

In the present study, the maximum incidence of snakebite occurred between 6:00 PM to midnight (30.2%), followed by midnight to 6:00 AM (24.9%). This is mostly because of poor visibility and accidental stepping on the snake. Similar studies conducted in other parts of country showed relatively higher incidence of snake bitten cases between 6:00 PM and midnight [9,16] as found in our series.

The most common symptom reported by the victim was fright (85.2%) followed by pain at site of snake bite (57.9%). Majority of the cases were administered anti-snake venom (ASV) on admission and most of them survived.

Nearly half of the victims (48.5%) were admitted to the hospital within 6 hours of snake bite. Similar observation was also made by other authors [11,18,19]. The location of hospital and the means of transportation serve as the main limiting factor apart from the usual treatment from quacks for delay in arrival at hospital.

Various hospital based studies have reported mortality rate ranging from 3% to 20%.(2-3,4)) It has been found many contributors to death- Delay in arriving the hospital (2-13). Sharma et al.; [2] found that median bite to hospital time in their study group was 9 hrs and delayed arrival was seen in patients presenting with ARF. Kalantri et al.; [3] studied 277 patients , in whom mean bite to hospital time was 6.5+10.3 hrs .In survivors it was 5,6 +10.3 hrs and in no survivors it was11.4+14.5 hrs. Sanjib K Sharma et al.; [4] wrote in their study that simple educational messages and promotion of immediate and rapid transport of victims to a treatment center by motor cycle volunteers decreased the mortality rate and incidence of snakebite in southeastern Nepal. In particular the use of a motorcycle to transport the victim was strongly associated with survival. Suchithra N et al.; [7] stated in their study of Snakebite envenoming in Kerala, South India; Clinical profile and factors involved in adverse outcomes: Those who received ASV early (bite to needle time < 6hrs) had more severe local envenoming than those who received ASV late (bite to needle time > 6 hrs), but latter group were more likely to suffer complication and those who received ASV late had a higher risk of developing acute renal failure. Higher rates of complications were seen in those with severe coagulopathy, leucocytosis and those who received ASV late.

Most of the studies observed this correlation between bite to hospital and complication and mortality [2-14]. The incidence of complication is directly proportional to duration of venom in the blood prior to neutralization by ASV, due to lack of awareness of hazards of snake bite, belief in traditional treatment [15] and lack of transport facilities [16].

Management must be started immediately to be effective. Our apparently high mortality rate may be due to the delay in arriving at the hospital after the snakebite, since most patients came from 80 to 100 km away and perhaps due to patients initially seeking treatment from traditional healers and local practitioners. External factors that are not in control of the hospitals, which increase the chances of mortality in admitted cases, include not receiving first aid, unavailability of anti-snake venom (ASV) at health centres in rural areas, no transport facilities, and lack of public awareness about the urgency of treatment. The limitation of this study is that it is a study from one centre and a multicentre study would provide a more complete epidemiology of snake bites in North India.

V. Conclusion

Snakebite still remains an important cause of accidental death in modern India, and its public health importance has been systematically underestimated. It is an important occupational injury affecting plantation workers, construction laborers, and farmers working in fields. The above study clearly showed that snake bites were more common in rural areas and among people who were engaged in agricultural works. Most common occurrences were during the monsoons. The lower limbs were affected the most and majority victims were males, mostly bitten by poisonous snakes.

Avoiding snake bites specially during the peak season when agricultural works are in its full swing, by taking precautions like wearing protective foot-wears, carrying a stick, approaching debris cautiously, paying attention to ground etc are perhaps the most effective tools that may significantly bring down the incidence of snake bite. Also primary health centres should be fully equipped with facilities to give first aid measures and administer anti-snake venom if required. Dissemination of information regarding quick transport, correct first aid measures and training of primary level health workers can drastically bring down the mortality of this neglected tropical disease.

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