

## STUDY OF CLINICAL PROFILE OF SNAKE BITE

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### ABSTRACT

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#### BACKGROUND

The aim of this study is to determine the incidence and study clinical profile of snake bites reported in Community Health Center, Haliyal.

#### MATERIALS AND METHODS

A prospective study was conducted at Community Health Center, Haliyal. All patients with definite history of snake bite were included, categorized and studied as per fixed protocols. Study period was December 2015 to March 2017.

#### RESULTS

Total number of snake bite victims reported was 65 from December 2015 to March 2017. There was higher number of male victims as compared to the females. The higher number of cases, 42 out of 65 belonged to the age group less than 40 years. Out of 65 cases, 12 were referred to higher center. In our study, farmers were mostly affected while working in farms and upper limb was more commonly involved than lower limb in contrary to other studies.

#### CONCLUSION

Haliyal is a forest area, so there is much risk of exposure to snake bites. Snake bite is imposing significant burden on health service despite of the fact that it is preventable. There is urgent need of continuous awareness program for general public and improvise treating capacity of health care providers regarding first aid and emergency medical line of treatment. There is need of developing Community Health Centers with ICU with Ventilators to prevent mortality and morbidity due to delay in transfer of needful patients to tertiary care.

#### KEYWORDS

Snake Bite, ASV: Anti Snake Venom, Envenomation, Tertiary Care.

**HOW TO CITE THIS ARTICLE:** Hakki SA. Study of clinical profile of snake bite. J. Evid. Based Med. Healthc. 2018; 5(31), 2334-2339. DOI: 10.18410/jebmh/2018/481

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#### BACKGROUND

Our study was also conducted in high prevalence forest area, where incidence of snake bites is high. Snake bite is a common medical emergency. It is not only devastating environmental and occupational disease but also is one of the most important and complicated medical emergencies with high rate of morbidity and mortality. Different species could be identified based on epidemiologic characteristics of a specific area.<sup>1</sup>

A person bitten by a snake could present with a variety of symptoms, from being asymptomatic or having mild local symptoms to tissue damage and varied multi system involvement and even rapid death. Venomous snake bites can be presented with local or systemic features of envenoming-neurological, haematotoxicities, myotoxicities, organ failure and some nonspecific features.<sup>2</sup> Moreover, infection with oral flora of the snake can occur and lead to

secondary infection and multi-organ dysfunction in body. Snakes are most likely to bite human beings when they feel threatened, startled or provoked, and/or have no means of escape when cornered. Snakes are likely to approach residential areas when attracted by prey, such as mice and frogs. Many a times delay in transportation of patient itself can lead to complications and death.

Snakebite is generally considered to be a rural problem and has been linked with environmental and occupational conditions. Farmers are more vulnerable group of victims. Our study also showed high prevalence in farmers. Most houses in the rural areas of India are made of mud and have many crevices where rodents flourish. Snakes have easy ingress to such houses and often enter them in search of food. Firewood and dried cow dung, stored in or near the house, provide ready shelter for snakes and rodents. Morbidity and mortality from snakebite envenomation depends on the species of snake, since the estimated fatal dose of venom varies among species. Different snakes have their own fatal mechanism of action as per their toxin and severity of envenomation of fatal dose.

In India, almost two-thirds of the bites are attributed to the saw-scaled viper (as high as 95%) in some areas such as Jammu,<sup>3</sup> about a quarter to Russell's viper, and smaller proportions to cobras and kraits. Snakebite is an important and serious medical problem in many parts of India.

*Financial or Other, Competing Interest: None.*

*Submission 06-07-2018, Peer Review 12-07-2018,*

*Acceptance 19-07-2018, Published 30-07-2018.*

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*DOI: 10.18410/jebmh/2018/481*



However, very reliable data for morbidity and mortality are not available since there is no proper reporting system and no continuous studies in snake bite prone areas. Moreover, many cases are not recorded in official statistics, as people seek traditional treatment methods. Most snakebite studies conducted in India deal with clinical profile and management aspects, and there are very few epidemiological studies.<sup>4</sup>

The incidence of bites is high in warm regions, where snakes are abundant and economic activities are mainly agricultural. Workers are in the fields, cutting grass, etc., their lower limbs, hands and fingers are closest to ground level. Consequently, snake bites are more common on the lower and upper extremities. Same was the case in our study with maximum bite marks on extremities with upper limb more than lower limb. It is difficult to know the actual number of morbidity and mortality of snake bites as these events are not systematically reported in most countries and very few countries possess a reliable epidemiological reporting system.<sup>5</sup> In our study also we could not get exact rate of mortality as follow up was not done of patients referred to tertiary care.

## MATERIALS AND METHODS

In this prospective study, all patients with final diagnosis of snake bite who were admitted to Community Health Centre Haliyal, were investigated during period from December 2016 to March 2017. All cases were registered medico legally.

### Inclusion Criteria

Inclusion criteria included patients above 14 years of age who were admitted to hospital with confirmed diagnosis of snake bite. None of the snake bite Patients had any underlying condition which could have compromised coagulation process.

In this study information such as age, sex, occupation, date and place of bite, site of bite on the body, arrival time, signs and symptoms, complications, type of snake bite. Management such as antibiotics, supportive therapy, antsnake venom requirement, need for intubation were collected by using a checklist.

Injection Tetanus Toxoid was given to all the patients. Antivenom administration was done after test dose whenever indicated. Antsnake venom is of immense importance in the management of snakebites. In all previous studies also, there is no fixed protocol for ASV neither a fixed regime A suitable dose and regimen is to be selected depending on the severity of envenomation whether mild, moderate or severe. Though administration of antsnake venom earlier is the better, antsnake venom should be continued till the sign and symptoms of envenomation are brought under control. Though anaphylaxis is a potentially dangerous complication, it can be managed with steroids and antihistaminic. There is always a need to balance and take decision to proceed for ASV in spite of anaphylaxis, as our main aim should be to bring envenomation under control and simultaneously prevent anaphylaxis by supportive above-mentioned therapy.

Other complications can be managed in following ways. Blood transfusion helps to combat bleeding manifestation by providing clotting factor. Renal failure seen in cases of snakebites can be managed with dialysis for a brief period. Antibiotics, tetanus toxin, anti-inflammatory drugs and anti-inflammatory enzymes are part of treatment. Prevention is better than cure. So protective measures should be taken to prevent the snakebite itself instead of killing the snake which alters the ecological balance.<sup>3</sup>

### Treatment

Treating snake bite is a challenge as it has no fixed protocol or regime. We also treated individual patients as per his or her individual presentation and associated complications. Antsnake venom is of immense importance in the management of snakebites. Though there is no fixed regime for treatment of snake bite, Low-dose ASV (national protocol: maximum dose 200 ml) may be as efficacious as the conventional regimen (100 ml six hourly till all symptoms disappear). In many studies the national ASV protocol has set 200 ml ASV as the maximum dose needed to treat was as effective as the conventional regimen for neurotoxic snake bites.<sup>6</sup>

A suitable dose and regimen is to be selected depending on the severity of envenomation whether mild, moderate or severe. It is clearly evident that the longer the treatment with ASV was delayed, the more persistent was the coagulation defect, more was the quantity of ASV necessary to reverse the defect.<sup>3</sup>

Treatment in form of ASV varied from no need of ASV to variable number of ASV vials.<sup>7</sup> In a study from north India, 200 ml ASV was used as the initial bolus, which was then continued with maintenance doses of 100 ml six hourly till complete resolution of paralysis.<sup>5</sup> They concluded that the 200ml bolus, instead of 100 ml, 'resulted in an early recovery, a reduced total dose of ASV consumed, reduced the duration of mechanical ventilation, reduced the incidence of complications and thus was much more cost effective'.

Another study from West Bengal compared the national protocol with a control group that received higher ASV doses. Protocol-guided treatment resulted in 66 per cent decline in the amount of ASV used, and an absolute mortality reduction of 24 percent.<sup>6</sup>

However, starting with 10 vials ensures that there is sufficient neutralizing power to neutralize the average amount of venom injected and during the next 12 hours to neutralize any remaining free flowing venom, the amount of ASV exceeded 50 vials in some patients. So, decision of the treating physician is of utmost importance, because the guidelines may not be useful for all patients. So the main important aspect in treating snake bite patients is to load with ASV, watch and repeat after six hours if needed. Stop ASV whenever anaphylaxis occurs and inject adrenaline, correct hypotension with IV fluids; restart ASV again.<sup>7</sup>

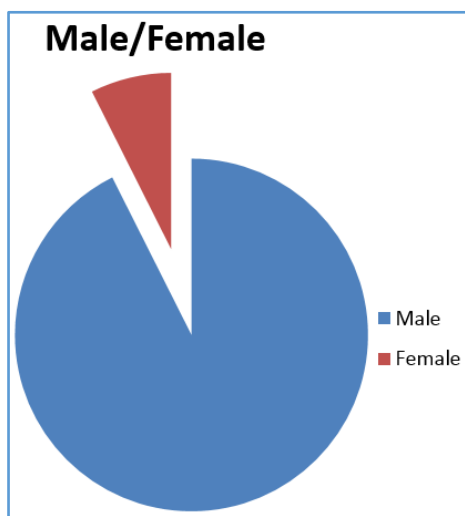
In this study, we admitted 37 uncomplicated snake bite patients under observation only supportive treatment including tetanus prophylaxis and assurance is sufficient for

non-poisonous bites. 8 Neurotoxic and 18 Vasculotoxic patients were treated with ASV after test dose. The need of ASV varied from patient to patient. For 3 patients we gave 10 vials stat followed by 10 vials infusion while on the way to referral to higher center. While 13 patients needed 10 vials and rest 10 patients after first loading 10 vials needed second 10 vials infusion after 6 hrs.

**The Following Conservative Measures are Suggested<sup>7</sup>**

1. Neurotoxic envenoming: Neurotoxic snake bite patients present with respiratory paralysis. Ventilatory support is main key factor in treating these patients. Assisted ventilation till complete recovery from respiratory paralysis is important aspect in treating such cases. It may take weeks for patient to recover. Mechanical ventilation whenever needed is important treatment protocol in such cases.
2. Haematotoxic envenomation: Bleeding manifestation is common in haematotoxic snake bites. Blood doesn't clot in many severe cases. Strict bed rest is recommended to avoid even minor trauma and secondary complications. Transfusion of clotting factors and platelets is recommended in such cases. Fresh frozen plasma (FFP) and cryoprecipitate with platelet concentrates, fresh whole blood are alternatives to add on therapy. Intramuscular injections should be avoided in such cases.
3. Acute kidney injury: Dialysis is advised in such cases.

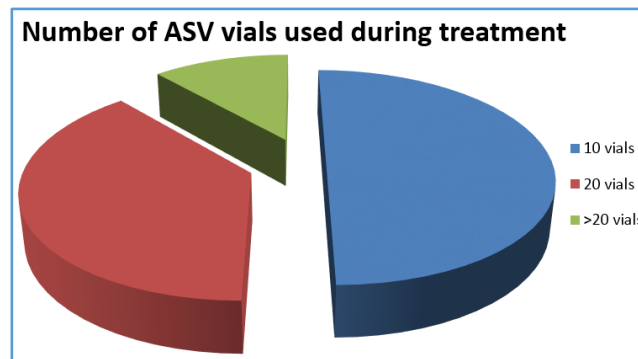
**Our study showed male preponderance.**



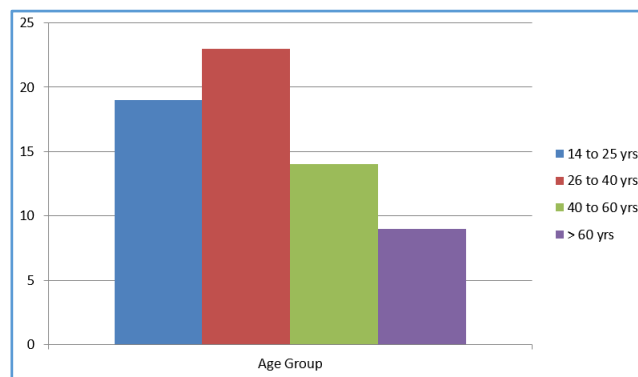
**Figure 1**

Duration	No. of Patients
< 1 Hour	40
1 to 2 hours	4
2 to 6 hrs	10
>6 hrs	6
>4 days	5

**Table 1. Distribution of Patients According to Time of Presentation**



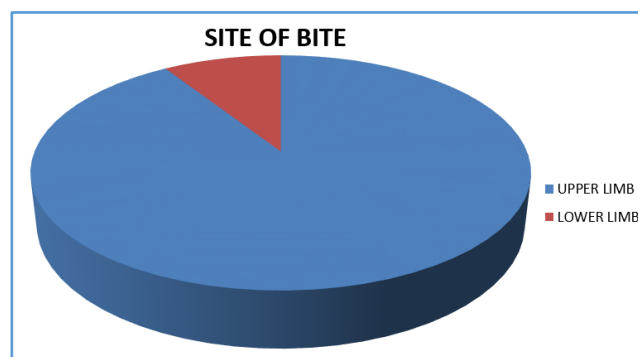
**Figure 2**



**Figure 3**

Type of Snake Bite	No. of Patients
Neurotoxic	8
Vasculotoxic	18
Uncomplicated	37
Local cellulitis	2
Vasculotoxic + Local cellulitis	1
Death	1

**Table 2. Distribution of Patients According to Type of Bite**



**Figure 4**

**Observations**

Characteristic	Details
Age	Three-quarters of the victims were in the 14 to 40-year age group.
Gender	There is a clear preponderance of males among snake bite victims. There were 40 males and 15 females.
Occupation	Farmers account for more than half of the victims.
Time of Presentation	Bite and time of hospitalization is within less than 1 hour to more than 4 days.
Site of Bite	50% of patients had bites in upper limbs.
Delay between Bite and Treatment	The bite-to-treatment delay varies greatly, on an average ranging from 30 minutes to 4 days. Our study shows that victims reach our centre maximum within less than one-hour duration to six hours.
First aid Methods	In 5 out of 64 studies, of snake bite victims used inappropriate and harmful first aid methods. Local treatment and Tourniquets were used.
Mortality	Out of 65 cases one death occurred in our hospital. Follow up was not kept of 12 referred patients to higher centers in view of need of ventilator support. So exact mortality could not be commented

**Table 3<sup>8</sup>**

**RESULTS**

1. A total of 65 patient 40 were male, maximum within age group of 14 to 40 yrs.<sup>9</sup>
2. With regard to occupation, farmers accounted for the largest portion.<sup>1</sup>
3. The mean time between occurrence of snake bite and reaching medical center was less than one hour to 4 days.
4. In present study, pain and local swelling were two main complaints, while vomiting, dizziness and tingling in extremities were some other variable complaints in 8 patients. Oedema and ecchymosis were the most prevalent signs observed among 20 victims. Out of which 2 developed local cellulites that underwent surgical debridement.
5. All 8 Neurotoxic and 2 out of 18 vasculotoxic patients were referred to higher center.
6. 32 Patients had bite marks on upper limbs while 22 had on lower limbs

7. The number of patients who were referred in view of need of mechanical ventilation was 12 in this study, follow up of these patients was not possible.
8. One patient who was brought unconscious and in critical stage could not be revived.

**DISCUSSION**

Snake bite affects about 2 million people every year, with more than 100000 mortalities annually. The prognosis for snakebites depends on many other factors besides hospital treatment:

1. Whether first aid is given immediately after the bite,
2. Use of unhealthy methods may complicate the local infection rather than help.
3. Early initiation of appropriate treatment, the type of venom and its toxicity as per its lethal dose.
4. Availabilities of tertiary care/mechanical ventilator whenever needed.
5. Delays due to shifting.
6. Associated underlying complications/co morbidities.
7. Availability of ASV.
8. Urgency of treatment and good team work inform of identifying high risk victim, first aid. Appropriate treatment and shifting to higher center whenever needed.
9. Tight tourniquet itself may falsely mimic vasculotoxic manifestation of local swelling.

Elapidae snake bites cause Neurotoxic effects and present with paralysis, respiratory failure, while the symptoms for Viperidae snake bites cause Haematotoxic effects which include haemorrhage, disseminated intravascular coagulation (DIC), oedema, necrosis, gangrene and bullae.<sup>1</sup>

Cortaliidae snake bites cause local tissue destruction i.e., Myotoxic effect and Hydrophilidae snake bites can cause much severe damage in form of myoglobinuria and renal damage.

All patients with poisonous snake bite should be treated with polyvalent antivenom serum. Availability of anti-venom at primary healthcare centre and rapid transportation facilities may change the morbidity associated with snakebites. Early administration of the polyvalent antivenom has reduced morbidity and mortality.<sup>2</sup>

The snake species diversity has a significant public health impact. It complicates clinical management with respect to diagnosis and treatment, as well as antivenom design and manufacture.

**Myotoxic**

Myotoxic snake bites have venom toxicity that results in myotoxic effects such as muscular pain, stiffness and myoglobinuria. Myoglobinuria is characterized by the brown discoloration of urine and usually eventual respiratory and renal failure. E.g. sea snakes predominantly cause myotoxicity.

**Neurotoxic**

Neurotoxic snake bites result in neurotoxic effects such as muscular weakness, progressive paralysis (within 15 min to 2 h), dysphasia, ptosis, external ophthalmoplegia. Patients may present with slowed, laboured breathing, culminating in respiratory arrest. This may be associated with or without convulsions. E.g. Elapidae the venom of predominantly in neurotoxicity,

**Haemotoxic**

Hemotoxic snake bites result in hemotoxic effects in form of bleeding manifestations such as ecchymoses, petechial haemorrhage, epistaxis, hematemesis, melena, coagulopathy, haematuria. The venom of pit vipers often results predominantly with haemotoxicity, though these are classic finding as per envenomation the types often overlaps in symptom presentation<sup>9</sup> and there may be even mixed presentation.

According to WHO following classification and manifestation as per snake species help in deciding treatment protocol.

Syndrome 1	Local Envenomation	Viperidae
Syndrome 2	Local Envenomation Local bleeding Acute Renal Injury	Russel’s viper
Syndrome 3	Local Envenomation Paralysis	Cobra
Syndrome 4	Paralysis	Krait/ sea snake
Syndrome 5	Local Envenomation Local bleeding Paralysis Acute kidney Injury	Russel’s/Krait /sea snake

**Table 4**

**Limitations**

Our study had some limitations. First, the total number of study participants was only 65.

We could not follow-up the referred cases; so could not come to thorough final conclusion. We could not get details of snake species.

**CONCLUSION**

However, this being a preliminary study with a small sample size, this needs to be tested in a larger trial before definite commendations and interpretations can be made. Though our study area was more prone to snake bite, it was observed that duration of hospitalization after bite was less, ranging from less than hour to more than 6 hours. There is need of developing Community Health Centers with ICU with Ventilators to prevent mortality and morbidity due to delay in transfer of needful patients to higher center.<sup>4</sup>

Ready availability and appropriate use of antivenom, early referral when required, and close monitoring of patients in the hospital will help to reduce mortality from snakebites. There is need of functional snake bite control

program and fixed treatment protocols and regimes. Awareness should be created among the rural people through mass media like radio, television & newspaper so that they go to hospitals after snake bite rather than to traditional unhygienic treatment providers after getting first aid by themselves. We recommend the following steps to prevent snake bites and educate not only people but also staff personnel.

**Recommendations**

Our study provides following recommendation to general public and higher health authorities.<sup>10</sup>

1. People working in fields should use long rubber shoes as they are more at risk of snake bite and the commonest site of bite being lower limb.
2. Higher number of cases reported in villages and remote peripheral areas, so more ASV should be provided to community health centers and primary health centers.
3. During floods there are chances of more cases; so, health emergency should focus on this aspect by providing more ASV.
4. More ASV be provided in rural health centers and urban health centers as compared to District Hospital.
5. There should be regular promotions to create awareness on first-aid principles in snakebite management.
6. Monitoring under appropriate medical supervision is the key to effective management of victims of snakebite.
7. The rural and semi urban population must be informed of the recognized medical centers with adequate infrastructure to facilitate appropriate early treatment in order to reduce the morbidity and mortality in snakebite patients.<sup>11</sup>

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