

A STUDY OF CLINICAL PROFILE OF SNAKEBITE AND RESPONSE TO TREATMENT AT A TERTIARY HOSPITAL

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ABSTRACT

BACKGROUND

Snake bite is a major public health problem throughout the world, especially in tropical and subtropical countries. The objective of the study is to analyse the factors, which determine the prognosis of patients admitted with poisonous envenomation.

The prognostic factors include-

- 1) Time since snake bite and admission to ASRAM hospital.
- 2) Whether patient received first aid.
- 3) Systemic involvement.
- 4) Site of Bite.

MATERIALS AND METHODS

Total number of cases studied is 35, of which 60% were male, 40% were female. A detailed history of bite including time of bite, site of bite, type of snake, first aid history, patient's manifestation and history of treatment received from outside was taken. A detailed clinical examination was done, and each patient was subjected to investigations like complete blood count, BT, CT, PT, blood urea, serum creatinine, electrolytes and ECG. All investigations were repeated to evaluate the progress.

RESULTS

1. Age group of 12 – 40 years (82.84%).
2. Occupation – Purely agricultural workers (85.71%)
3. Site of bite – there was more incidence of bite on lower extremity.
4. Time of arrival to Hospital: There was no complication in patients presenting within 6 hrs of bite.
5. Type of envenomation: out of 35 cases of snake bite 18 were neurotoxic and 17 were vasculotoxic and of these 2 patients expired of neurotoxic envenomation.

CONCLUSION

In this study, maximum number of patients (54.28%) reported between 6- 24 hours of bite and all those who presented within 6 hours of bite, did not have any complications. In the present study, none of the patients received proper first aid and so first aid as a prognostic factor cannot be concluded. Systemic involvement worsened the prognosis, the more severe the systemic involvement, the bad is the prognosis.

KEYWORDS

Snake bite, Prognosis.

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BACKGROUND

Snake bite is a major public health problem especially in tropical and subtropical countries. Snake venom is probably the oldest known poison to mankind and described in oldest medical writings and myths. Frayer in his study of

thanatophidia of India estimated that about 1 in 10, 00 population died due to snake bite.¹

Snake bite is responsible for about 2.85% - 5.3% of the mortality of total hospital admissions in India in different states as compared to 20 per year in USA or even lower in Europe. The high mortality in India is due to climatic factors rural predominance of population and their agricultural dependence. Nearly 3500 species of snakes exist in the world. India has about 300 varieties of snakes of which about 70 are venomous and of these only 4 varieties of snakes are commonly encountered as the cause of snake bite poisoning. They are Russell's viper, Echis Carinatus (Viperidae), Cobras (Elapidae) and Pit Vipers (Cortalicidae).² Viperidae group causes haemorrhagic syndromes. Elapidae

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group³ cause neuromuscular paralysis leading to flaccid paralysis leading to flaccid paralysis and death by respiratory failure.

Indian Scenario

Various estimates have shown almost the same statistics that 15,000 to 25,000 people die annually in India due to snake envenomation. Males suffer twice more than females. Maharashtra, one of the states in India with the highest incidence of snake bite reported, 70 per 1,00,000 Population and mortality of 2.4 per 1,00,000 per year.⁴ The commonest cause of snake bite poisoning in Jammu is Viperine snake bite accounting for 310 cases in years 1968 to 1971.⁵ The other states with a large number of snake bite cases include west Bengal, Tamil Nadu, Uttar Pradesh and Kerala.⁶

Epidemiology of Snake Bite

Snake bite remains a public health problem in most countries. The true incidence of snake envenomation could exceed 3 million per year. About 1,00,000 of these develop severe sequelae. The global disparity in the epidemiological data for snake bite reflects variation of health reporting accuracy and the great diversity of ecological and economic conditions throughout the world. Finally, health facilities and availability of antivenin have to be considered in implementing the treatment of envenomations. In most developing countries lack of medical, especially antivenin therapy leads to high mortality levels. Considerable efforts will be needed to develop studies on snake bite epidemiology and improve the distribution and use of antivenin.^{7,8} Swaroop reported about 2,00,000 bites and 15,000 deaths in India due to snake bite poisoning as far back as 1954.⁷ In Sri Lanka the overall annual mortality from a single venomous species ranges from 5.6 per 1,00,000 to as high as 18 per 1,00,000 in some areas.⁹ Maharashtra one of the states in India with the highest incidence reported 70 bites per 1,00,000 population and mortality of 2.4 per 1,00,000 per year. The other states with a large number of snakebite cases include West Bengal, Tamil Nadu, Uttar Pradesh and Kerala. It has been estimated that 150 to 200 snakebite related deaths occur annually in Nepalese hospitals. It has been reported that in most developing countries upto 80% of individuals bitten by snake first consult traditional practitioners before visiting a medical centre & owing to the delay several victims die during transit to the hospital.¹⁰

The Age and Sex Incidence

Snakebite is observed in all, majority is in males aged 11 to 50 years (outdoor activity). The incidence shows a distinct seasonal pattern closely related to rainfall and temperature which compels the reptiles to come out of their shelter.^{9,10} Most patients are unable to identify the snake species either because of ignorance or poor visibility in darkness as large number of bites occur in fields, individuals are unable to spot the snake due to crops in the fields. The most frequent site of bites is the lower extremity.¹⁰ Among the host factors, people involved in occupations requiring movement in dense undergrowth or undeveloped land are the worst affected

including farmers and hunters.⁹ Unprovoked attacks are excessively rare, but snakes will bite if they are cornered or feel threatened.¹¹

Aims and Objectives

To analyse the factors which determine the prognosis of patients, admitted with poisonous envenomation, depending on mode of presentation and their response to the treatment given.

Prognostic Factors Include-

1. Time since snake bite and admission to ASRAM hospital, Eluru.
2. Whether patient received first aid.
3. Systemic involvement.
4. Site of bite.

MATERIALS AND METHODS

This study was conducted by the Department of Medicine ASRAM hospital, Eluru. (2011-2013)

Inclusion Criteria

All patients with history of snake bite with a fang marks were included in the study and, they were subjected to investigations like Complete blood count, BT, CT, PT, urea, Creatinine, Electrolytes and ECG.

Following criteria were taken into consideration to differentiate snake bite with or without envenomation.

1. Presence of local swelling, blister or necrosis at or around the site of bite.
2. Hypotension or shock.
3. Laboratory evidence of coagulation disturbances.
4. Haemorrhage.
5. Neurotoxic presentations.
6. Cardiotoxicity in the form of irregular pulse, tachycardia or bradycardia.

Exclusion Criteria

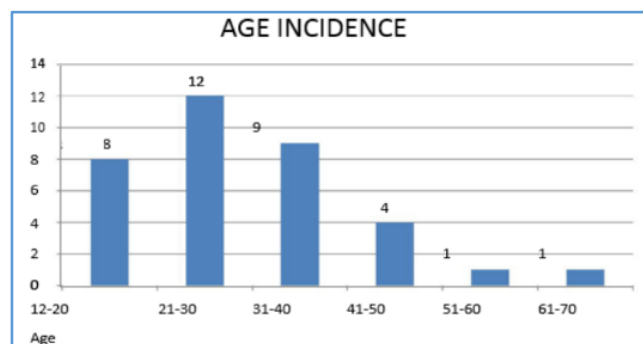
Patients who had no fang marks were excluded from the study. A detailed history of bite including time of bite, site of bite, type of snake, first aid history, immediate manifestation and history of treatment received from outside were taken from each patient and from the witness. A detailed clinical examination of every patient was done with a standard proforma. A set of investigations like complete blood count, BT, CT, PT, urea, creatinine, electrolytes and ECG were done for each patient. All investigations were repeated to evaluate the progress during and after treatment. Clinical progress was assessed every day. All the patients received anti-snake venom according to the grading and progression of signs and symptoms. All patients received prophylactic antibiotics, surgical intervention like fasciotomy was done for patients who had severe local oedema with compartmental syndrome.

RESULTS

Total Cases studied were 35, in that 21 (60%) were males and 14 (40%) were females. Age ranges from 12 to 65 years.

Age in Years	Number of Patients (%)
12- 20	8 (22.85%)
21 – 30	12 (34.28%)
31 – 40	9 (25.71%)
41 - 50	4(11.42%)
51 - 60	1 (2.85%)
61 - 70	1 (2.85%)
Total	35 (100%)

Table 1. Showing Age Incidence

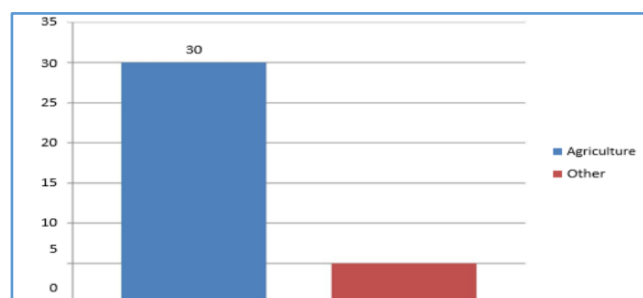


Graph 1

The highest incidence of snake bite was observed in the age group of 12 to 40 years (82.84%) and the lowest incidence was seen in age group of 51 to 70 years (5.7%). The incidence of snake bite among the age 12 to 40 years (82.84%) 29 out of 35 patients, was highest and was highly significant, the group which most of the time goes out door for work. The incidence of snake bite in rural area was 91.42% while that in urban area was only 8.57%. In both rural and urban areas outdoor snake bites were more than indoor snake bites which were accounting to less than 30% in total.

Occupation	No. of Cases	Percentage
1) Agriculture	30	85.71%
2) Other	5	14.28%

Table 2. Showing Occupational Incidence

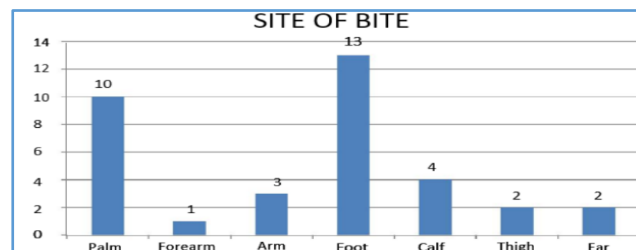


Graph 2

The highest percentage was seen in purely agricultural workers.

Site	No. of Cases	Percentage
Palm	10	28.57%
Forearm	1	2.85%
Arm	3	8.57%
Foot	13	37.14%
Calf	4	11.42%
Thigh	2	5.71%
Ear	2	5.71%

Table 3. Showing Site of Bite

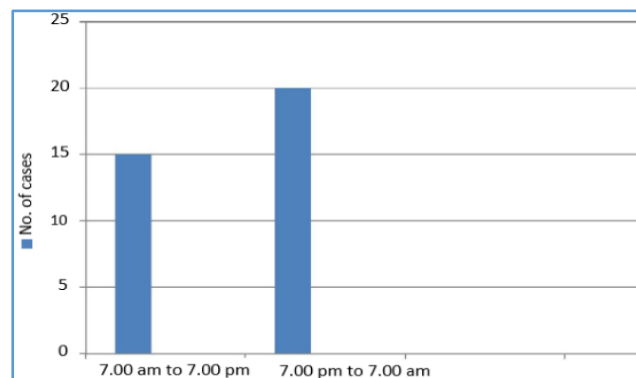


Graph 3

There was higher incidence of bite on lower extremity than upper extremity.

Time	No. of Cases	Percentage
7.00 am to 7.00 pm	15	42.85%
7.00 pm to 7.00 am	20	57.15%

Table 4. Showing Time of Bite

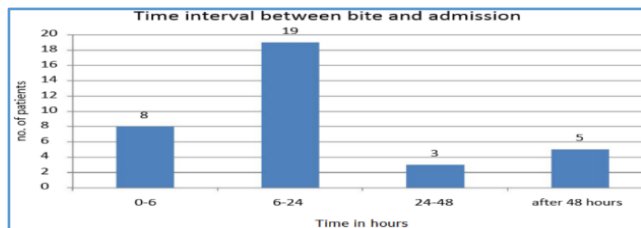


Graph 4

There were 15 bites (42.85%) during day time and 20 bites (57.15%) during night time.

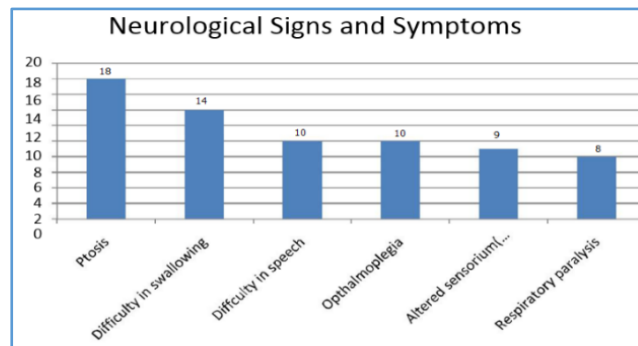
Hours	No. of Cases	Death
0-6	8	0
6-24	19	2
24-48	3	0
After 48 hours	5	0

Table 5. Showing Time Interval Between the Bite and Admission in the Hospital



Graph 5

In this study, 2 patients out of 35 have died. These two patients got admitted after 6 hrs but before 24 hrs of bites.

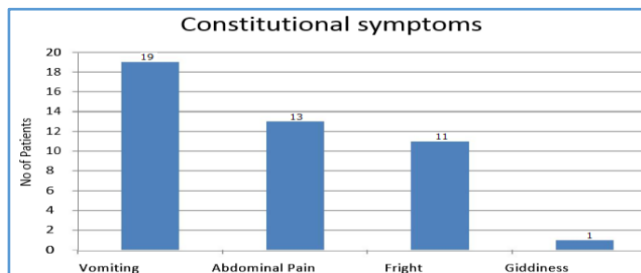


Graph 8

Ptosis was the commonest (51.4%) neurological sign followed by dysphagia (40%).

1. Constitutional Symptoms		
	No. of Patients	Percentage
Vomiting	19	54.2%
Abdominal pain	13	37.1%
Fright	11	31.4%
Giddiness	1	2.85%

Table 6. Showing Symptomatology

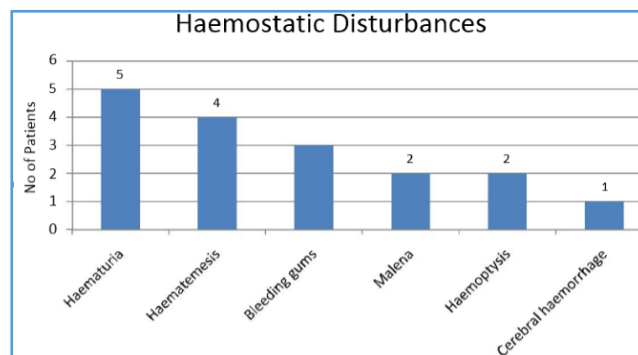


Graph 6

Vomiting was relatively common (54%) few had abdominal pain (37%) and fright (31.4%).

4. Haemostatic Disturbances		
	No. of Patients	Percentage
Haematuria	5	14.2%
Haematemesis	4	11.4%
Bleeding Gums	3	8.57%
Malena	2	5.71%
Haemoptysis	2	5.71%
Cerebral haemorrhage	1	2.85%

Table 9

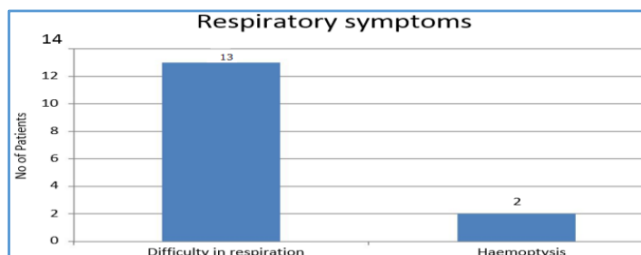


Graph 9

Only a few had haemostatic disturbances out of which haematuria (14.2%) and haematemesis (11.4%) were common.

2. Respiratory Symptoms		
	No. of Patients	Percentage
Difficulty in Respiration	13	37.1%
Haemoptysis	2	5.71%

Table 7



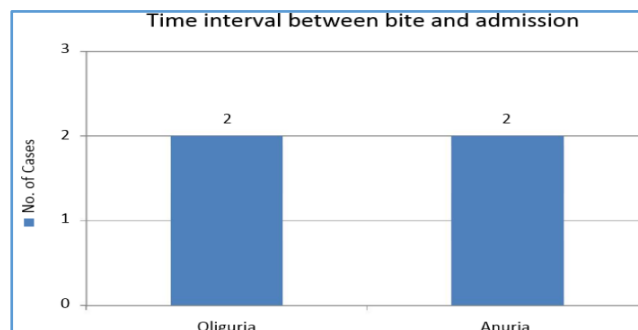
Graph 7

3. Neurological Signs and Symptoms		
	No. of Patients	Percentage
Ptosis	18	51.4%
Difficulty in swallowing	14	40%
Difficulty in speech	10	28.57%
Ophthalmoplegia	10	28.57%
Altered sensorium (drowsiness)	9	25.7%
Respiratory paralysis	8	22.85%

Table 8

5. Renal Symptoms		
	No. of Patients	Percentage
Oliguria	2	5.71%
Anuria	2	5.71%

Table 10



Graph 10

6. Local Pathology		
No. of Patients		Percentage
Local Cellulitis	18	51.42%
Blisters	2	5.71%
Pain at local site	28	80%
Regional Lymphadenitis	1	2.85%
Only 4 patients had renal manifestations in the form of oliguria (2) and anuria (2)		
Table 11		

The commonest feature is local pain (80%) and local cellulitis (51.42%) was relatively common. Out of 35 cases of snake bite 18 were neurotoxic and 17 were vasculotoxic. Many cases had more than one forms of systemic involvement. All cases with coagulopathies (13) & renal failure (3) had local tissue involvement. Only 1 out of 18 cases of neuroparalysis had local swelling. In none of the neuroparalytic cases there was renal involvement. Out of 18 cases, 2 died of neuroparalysis. In Viperine bite 5 out of 17 had renal involvement, 13 had coagulopathies, 4 had compartment syndrome, 1 had intracerebral bleed and 1 had developed gangrene of the limb other than bitten limb.

Mortality

It is difficult to draw any firm conclusion from this study of 2 fatal cases, massive envenomation was responsible for death of both cases. In none of fatal cases ASV was given before admission.

Sl. No.	Particulars	Case No. I	Case No. II
1.	Age (in years)	25	40
2.	Interval between bite and admission (in hours)	13	20
3.	Treatment already received before admission	No	No
4.	Clinical type	Neuroparalytic	Neuroparalytic
5.	ASV given in hospital (in ml)	40 ml	40 ml
6.	Blood Transfusion	No	No
7.	Respiratory support	Yes	Yes
8.	Neostigmine and atropine	Yes	Yes
9.	Interval between admission and death (in hours)	4	6
10.	Immediate cause of death	Respiratory	Respiratory
		Paralysis	Paralysis
Table 12			

Both of these cases received delayed (>12 hours) treatment and both of them were treated outside by quacks.

Management

All patients were given Inj. Tetanus toxoid 0.5ml IM stat & antibiotics. The patient who had local oedema was treated by elevation of the limbs. Daily dressing with antiseptics was done in cases where blisters and ulceration occurred. Only four patients required decompressive fasciotomy.

Anti-Snake Venom

All 35 cases were given ASV, the dose ranging from 30 ml to 450 ml with a mean dose of 160 ml. Out of 35 patients, 2 patients developed reaction to ASV both of them had only skin rashes. No patient had developed serious anaphylactic reactions.

Haemodialysis

3 patients of acute renal failure had undergone haemodialysis and all of them recovered.

Neostigmine and Atropine

This combination of drug was given in all 18 cases of neuroparalysis. Neostigmine was given in a dose of 0.5mg IV every 30 minutes to 4 hours with atropine 0.6mg prior to neostigmine to reduce cholinergic effect of neostigmine. 10 patients recovered with these drugs and ASV without assisted respiration.

Assisted Respiration

8 patients required assisted respiration, 2 died and 6 recovered.

Blood Transfusion

4 cases out of 17 vasculotoxic patients were given blood.

DISCUSSION

Snake bite is one of the greatest public health problems in the tropics. It is an occupational hazard of agricultural workers, hunters in many tropical countries. Mortality in India from snake bite is 15000 per annum whereas the world mortality is estimated at 30-40,000 per annum. It is difficult to ascertain the correct incidence of snake bites as large number of unregistered cases occur. The purpose of this study is to analyse the factors which determine the prognosis of patients admitted with poisonous envenomation depending on mode of presentation.

These prognostic factors are-

1. Time since snake bite and patient's admission to the hospital.
2. Whether patient received first aid.
3. Systemic involvement.
4. Site of bite.

This is a prospective study of a total 35 poisonous snake bite cases admitted to department of Medicine, ASRAM Hospital, Eluru. (A. P. State).

The study shows-

Age and Sex

The highest incidence of snake bite was in the age group of 12 to 40 years (82%) in that 60% were male and 40% were females. The predominance of male victims suggests a special risk of outdoor activity. This finding is similar to Hati A K et al and Kularatne SAM study.^{9,10}

Time Interval between Bite and Admission

Time interval between bite and admission in the hospital carries a prognostic importance, lesser the time interval better the prognosis. In this study 8 cases (22%) reported within 6 hours of bite and did not have any complications, 19 cases reported between 6-24 hours, 3 cases between 24-48 hours and 5 cases after 48 hours of bite. All the patients who have died and had complications like compartmental syndrome, ARF, intracranial bleed and those who required ventilatory support had presented after 12 hours of bite.

Site of Bite

Present study showed that maximum cases of bites occurred on lower extremity (37.14%) followed by upper extremity (28.57%). because people move around without any protection to their feet.

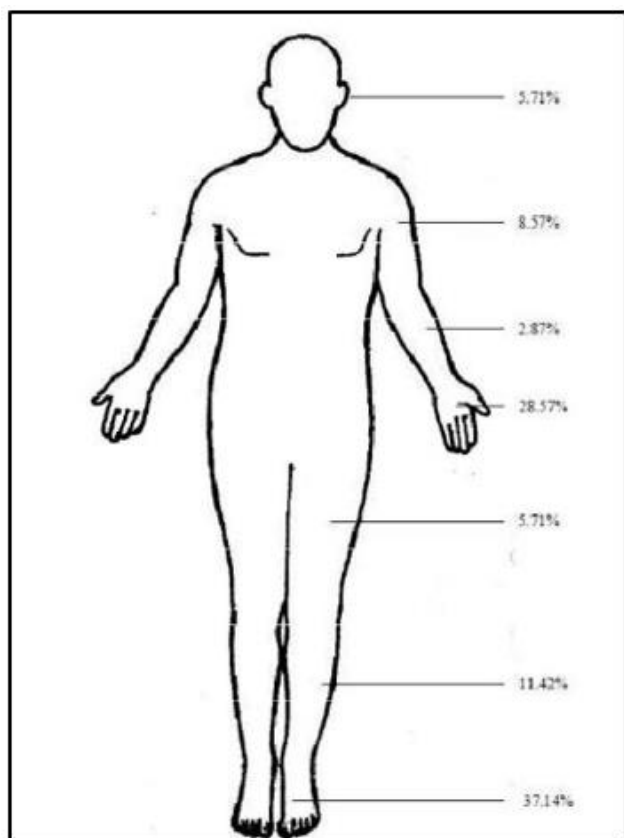


Figure 1. Site of Snake Bite and its Percentage

First Aid Measures

Only two (5.71%) patients received first aid prior to admission in the form of tourniquet application and both of them had developed signs of systemic envenomation, another 13 patients received treatment in the form of application of herbal medication locally and have also taken oral herbs.

Rural / Urban Incidence

In this study 95 % of the cases are from rural areas depicting snakebite a major public health problem in rural population.

Identification of Snake

In our study 20(57.14%) patients saw snake but none of them brought snake for identification.

Clinical Features

Pain at the site of bite was a common symptom 80%, similar high incidence of pain was reported by Rodney E et al & Saini RK et al.^{12,13} Local swelling was present in 57% of cases, this incidence of local swelling is similar in comparison with that reported by Virmani S.K et al study² Blister formation was seen in 5.71% of cases, which is similar to that in study of Rodney E et al study.¹² One patient had gangrene in a limb other than that bitten by the snake, similar finding was reported by Sathyanathan VP, et al study.¹⁴

Vomiting was observed in 54.2% of patients.¹⁵

Haematological Manifestations

Haematuria was observed in 5 cases (14.2%) followed by haematemesis in 4 cases (11.4%), Bleeding gums in 3 cases (8.57%), melena in 2 cases (5.71%), Haemoptysis in 2 cases (5.71%) and Cerebral haemorrhage in 1 case (2.85%). Virmani S.K² in his study reported haematuria as the commonest (67.2%) presentation followed by bleeding from gums (36.2%), bleeding from injection site (38.7%), haemoptysis (18.1%), haematemesis (28.4%), melena (25.4%) and epistaxis (12.5%). In our study epistaxis was not observed in any case.

Renal Failure

Renal failure was observed in 3 cases (8.57%), all of these 3 cases were subjected to haemodialysis, out of which all recovered, Virmani S.K. et al reported 3 cases (1.29%) of acute renal failure^{2,16} Saini et al reported 8 cases of acute renal failure.¹³

Neurotoxicity

In our study 18 patients (51.42%) out of 35 developed neurotoxic manifestations. In that altered sensorium (drowsiness) was observed in 9 cases (25.7%), ptosis was observed in 18 cases (51.4%), difficulty in swallowing seen in 14 cases (40%), difficulty in speech seen in 10 cases (28.5%), difficulty in respiration in 13 cases (37.1%), respiratory paralysis in 8 cases (22.85%) and ophthalmoplegia in 10 cases (28.57%). In study conducted by Saini et al,¹³ ptosis was the commonest (91.8%) and

earliest symptom. He observed respiratory failure in 66% and flaccid limb paralysis in 31.25%. Also, in Vermani S. K. et al study,² ptosis (75%) was the earliest and the commonest presentation. In our study 8 patients had respiratory failure that required assisted ventilation out of which 6 recovered and 2 died. Convulsions, hemiplegia, coma and aphasia were not observed in any of the cases in present study.

Mortality

Mortality rate in Bhat ⁵ et al study was 1.96%, whereas our study showed a slightly higher mortality of 5.71% (two patients) due to respiratory failure.

Cardiotoxicity

Cardiotoxicity was observed in 8 patients (22.85%). sinus bradycardia is probably because of a direct depressant action of snake venom over sinoatrial node.¹ Myocardial ischaemia, infarction, other arrhythmias were not observed in any of the cases.

Summary

This study was conducted by the Department of Medicine ASRAM Academy of Medical Sciences, Eluru. It is a prospective study (2011-2013) of a total 35 poisonous snake bite cases. Following points of each patient was noted – name, age, sex, occupation, address, date and time of bite, time interval between bite and admission, Site of bite, presence of fang marks, type of snake, first aid measures taken. Each patient was examined for local as well as systemic signs of envenomation. Each patient was subjected to following investigations, Hb%, TLC, DLC, bleeding time, clotting time, prothrombin time, blood urea, serum creatinine, serum electrolytes and ECG and other investigations whenever required.

According to Signs of Envenomation and Investigations, the Following Treatment^{17,18} was given-

1. General: Inj. Tetanus toxoid, antibiotics, steroids, IV fluids, analgesics.
2. Specific: ASV, neostigmine, atropine, blood transfusion, assisted ventilation, diuretics and dialysis.

Out of 35, 18 were neurotoxic and 17 were vasculotoxic.

The following features were noted in this study

1. Out of 35, 21(60%) were males and 14(40%) were females.
2. Highest incidence of snake bite was seen in the age group of 12 to 40 years.
3. The agricultural workers had a higher prevalence of snake bite than others.
4. Incidence of snakebite in rural area was high (91.42%) and a large number of bites occurred in fields, which shows snake bite remains a major public health problem in rural population especially farmers.

5. The bites were more during night when compared to daytime.
6. The bites were more common on distal parts of body. More incidence seen in lower extremities.
7. Maximum number of patients reported between 6-24 hours of bite. All those who presented within 6 hours of bite never had any complications.
8. Identification of snake was difficult for most of the patients either because of ignorance or poor visibility in darkness.
9. The neurotoxic features were very prominent in Elapid bites and none of them had haematological manifestation.
10. Ptosis was the commonest early manifestation of neurotoxicity.
11. Many cases with systemic poisoning had multisystem involvement. The systemic poisoning was in the following form a) Coagulopathy, b) Renal Failure and c) Neurotoxicity.

a. Coagulopathy

In systemic poisoning with Viperine bites haematuria¹⁹ was commonly observed, the next was haematemesis followed by bleeding gums, melena, haemoptysis, cerebral haemorrhage. There were no coagulopathies in elapid systemic poisoning.

b. Renal failure

3 cases developed acute renal failure out of 17 cases of vasculotoxic snake bite (Viperine bites) with systemic poisoning, all of them also had coagulopathy. In none of the elapid poisoning there was any evidence of renal failure.

c. Neurotoxicity

18 patients developed neurotoxicity in which ptosis was the commonest, followed by difficulty in swallowing, difficulty in speech, ophthalmoplegia, drowsiness, and respiratory paralysis.

12. Most of the patients were treated outside by quacks, but none of them received proper first aid measures.
13. In elapid bites and also in Viperine bites with systemic toxicity ASV has a definite role in the treatment by reducing the morbidity and mortality. However, there is no unanimity about the dose to be used.
14. In elapid bites with signs of paresis or paralysis, neostigmine with atropine is of definite value and may sustain gravely ill patients with respiratory paralysis until he is transported to a place where respiratory support can be given. Indeed, it may be worthwhile including neostigmine and atropine as first aid measure for neurotoxicity.
15. 2(5.71%) patients developed reaction to ASV in the form of skin rash and none of them developed serious anaphylaxis.

16. In present study 3 patients developed acute renal failure, 8 developed respiratory paralysis and 2 patients died (of neurotoxic snake bite). The overall mortality was 5.71%.
17. There was very less mortality among snake bite victim who were treated in our hospital. Early admission (within 6 hours) of snake bite and timely treatment of its complications can reduce the morbidity and mortality.
18. All primary health centres should be equipped with the facilities to render first aid measures (including neostigmine and atropine) and to administer ASV.

CONCLUSION

In this study maximum number of patients (54.28%) reported between 6- 24 hours of bite and all those who presented within 6 hours of bite did not have any complications and prognosis was better. In the present study, none of the patient received proper first aid and so first aid as a prognostic factor cannot be concluded. Systemic involvement worsens the prognosis, the more severe the systemic involvement, worse is the prognosis. There was no relation between site of bite and severity of envenomation

Other Measures to Reduce Incidence of Mortality and Morbidity-

To bring the patient immediately to the doctor rather than resorting to mantras or any other traditional treatment by non-medical persons. Public health education is the most important to emphasize about this. All primary health centres should be fully equipped with facilities to give first aid measures and administer specific antsnake venom if required. Since snake bite is primarily a rural occupational hazard, dissemination of information regarding readily available effective treatment may drastically bring down the morbidity and mortality associated with treatment by quacks. If the precautions mentioned above are observed then the incidence of snake bite and its morbidity and mortality can be reduced considerably^{15,20}

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