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A Prevalence Study of Snake Bite and their Clinical and Coagulation Profile

[1]Snehalatha Inturi, [2]Prasad Vemula and [3]G. Ajitha
[1-3]*Department of General Medicine, Dr Patnam Mahender Reddy Institute of Medical Sciences, Chevella, Telangana, India*

ABSTRACT
This cross sectional study conducted on 100 patients, for analysis of clinical feature with evaluation of coagulation disorder in patients presented themselves to emergency ward with symptoms, signs and definite evidences of snakebite. Since most of our cases were haematotoxic, it appears that viper bites are much more rampant than cobra bites. We observed bites by both russell's viper and echis carinatum. Al most all our patients were farmers. Most of our patients were males(65 %). This is probably because, more males are involved in farming as compared to females. Most of our patients belonged to the age group of 18-45 years(74%). This is probably because most of the farmers working in the fields(including female) belonged to the age group of 18-45 years. We found that living condition in rural areas, their living habits, working and walking bare footed and their occupation were the obvious reasons for their high incidence of snakebite in the rural population. Rainy season is the period of activity for snakes, when busy agricultural work, coincidentally doubles the risk. Most of the snake bites occurred in the day time (6am-6pm)(69%). This probably because most of the victims couldn't visualize the snake which they stamped while working in a field during daytime. Nocturnal bites were more venomous than bites by day time. This may be due to their clear vision at night. The presence of local swelling in most of the patient who received local treatment 51(tourniquet by patient relatives and first aid by PHC staff) and some of them who had no local treatment, with no appreciable difference in the grade of systemic poisoning in the two groups, would indicate that local. The most common bleeding manifestation that we observed in our study is the bleeding from the site of bite. We didn't have any case of subarachanoid hemorrhage. Ptosis and diplopia were the most common neurological manifestation we observed. Four patients developed respiratory paralysis and recovered after 2-3 days. Although patients had chest pain, breathlessness and palpitations, examination and ECG were normal. We attribute these symptoms to anxiety. Out of 14 patients who developed renal failure, 10 patients improved following conservative management. 4 patients had severe renal failure. These patients had to undergo hematolysis thrice in a week for a period of 1 month, after which their renal function recovered fully. Fang marks were seen on 87 patients. We observed that most of the snake bites occurred in the toes and feet in LL(79%) and hands and fingers in UL(20%). This is because most of the snake bites occurred when the farmers were working in the field. Vomiting is an early symptom of systemic envenomation. 57 patients in our study had vomiting as predominant GI symptoms. PT, APTT can remain normal or short in DIC. 23 patients had laboratory evidence of DIC. (prolonged PT, APTT).All coagulation defect can be reversed promptly with the administration of ASV. Delay in the administration of ASV will delay the reversal of coagulation defect and is more persistent will be the coagulation defect. The quantity of ASV required to reverse the coagulation defect will also be more.

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Key Words
Anti snake venom, clotting time, intensive care unit, acute kidney injury

Corresponding Author
G. Ajitha,
Department of General Medicine, Dr Patnam Mahender Reddy Institute of Medical Sciences, Chevella, Telangana, India

Author Designation
[1-3]Assistant Professor

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INTRODUCTION

Snakebite is a common medical emergency and an occupational hazard in most parts of India, with farming, as a major source of employment. Early in 2009, snake-bite was finally included in the WHO's list of neglected tropical diseases[1] confirming the experience in many parts of this region that snake-bite is a common occupational hazard of farmers, plantation workers and others, resulting in tens of thousands of deaths each year and many cases of chronic physical handicap. Much is now known about the species of venomous snakes responsible for these bites, the nature of their venoms and the clinical effects of envenoming in human patients. Worldwide, up to five million people are bitten by snakes every year. Of these, poisonous (envenoming) snakes cause considerable morbidity and mortality. There are an estimated 2.4 million envenomation (poisonings from snake bites) and 94 000-125 000 deaths annually. Poor access to health care and scarcity of antivenom increases the severity of the injuries and their outcomes[2]. Indian Sub Continent constitutes >40% of the share[3], partly because of the ignorance, prevalence of old practices and lack of proper medical facility in far flung areas[4]. One must know the local snakes, the sort of places where they prefer to live and hide, the time of year and time of day or night and the kind of weather when they are most likely to be actively out and about. Many species are mainly nocturnal (night hunters) e.g. kraits, but other species are mainly diurnal (day-time hunters). In India there are about 216 species of snakes of which about 52 are venomous and of these only 5 varieties of snakes are commonly encountered as the cause of snakebite poisoning[5]. They are:

- Russell's viper-Doboia russelii.
- Cobras-(Common cobra)-Naja Naja.
- Krait-Bungarus Caeruleus.
- Saw scaled viper-Echis Carinatus and Pit viper.

Aims and Objectives:

- To study the different clinical manifestation following snakebite.
- To study the coagulation abnormality following haematotoxic snakebite.

MATERIALS AND METHODS

This cross sectional study conducted on 100 patients, for analysis of clinical feature with evaluation of coagulation disorder in patients presented themselves to emergency ward with symptoms, signs and definite evidences of snakebite. Patients are from the nearby rural areas. All patients were studied at the time of admission, before and after administration of ASV and were treated and followed up in the hospital until recovery or death. We excluded those patients, who came with history of snakebite, but no definite symptoms, signs or evidence. Those patients were bitten by some other animals, non poisonous snake. We have studied and analyzed clinical features of snakebite in a total of 100 cases. In most of the studies, they observed that hemorrhages in different forms and sites are the major clinical manifestations, following snake bites. We analyzed cases of snakebite for the evaluation of coagulation disorder, after screening the patients with CT and BT even with normal value along with signs of systemic envenomation.

Methods of Collection of Data: We conducted **our cross-sectional study** on patients admitted with symptoms, signs and definite evidence of snakebite. We considered following observation as definite evidences of snakebite. The presence of fang marks. The snake itself which had bitten the victim and was brought along with him after being killed. Reliable unequivocal evidence of either the victim or attendant having seen the snake which bite the patient. Initial laboratory evaluation by performing clotting time, bleeding time, at bedside. If they prolonged, we took it as an evidence of envenomation with coagulation disorder. We also took an evidence of envenomation by observing a local reaction confined to the site of bite with evidence of rapid extension of swelling and cellulitis involving >one joint. We took one healthy volunteer who was matched with respect to age and sex with the case as a control. We have analyzed clinical features following snakebite even if the initial evaluation by CT and BT remained normal. This is because, from literature we gathered that the spectrum of venom toxicity following snakebite varies from haemototoxicity to neurotoxicity. Sometimes even combined manifestation of hepatotoxicity and neurotoxicity is seen.

Inclusion Criteria:

- History of snake bite.
- Patients with presence of fang marks.
- Patients with prolonged bleeding time and clotting time when performed at bed side.
- Patients with one or more clinical manifestation of snakebite like local swelling, hemorrhages, blister formation, vomiting, abdominal pain, regional lymphadenopathy etc.

Exclusion Criteria:

- Patients with bites other than snake bites.
- A patient who is a known case of any bleeding disorder.
- Chronic alcoholics.
- Individuals with acute or chronic liver disease.
- Pregnant females.
- Patients on anticoagulation therapy.

Tourniquet Test: (Capillary resistance test of Hess). Thrombocytopenia is accompanied by increased capillary fragility. It is performed by placing a sphygmomanometer cuff around the upper arm and raising the pressure to 100 mg of for 5-7 minutes. If systolic BP is <100 mm Hg, the pressure is raised to half way between the systolic and diastolic pressure. Two to three minutes after the cuff has been deflated and the congestion has disappeared, the number of petechiae in an area with a 3cm diameter, 1 cm below the cubital fossa is counted. In most normal subjects number of petechia is up to 10, although up to 20 may be present. >20 is abnormal. In severe thrombocytopenia, the count is increased up to 100 or more. The tourniquet test is positive in most cases of reasonably thrombocytopenia, but is occasionally negative in patients with mild or moderate thrombocytopenia. In patients with widespread purpura, the test is redundant and inappropriate.

Statistical Analysis: Interval data are expressed as Mean+/--SD and categorical data in percentages. Differences between study and control groups were analyzed by chi-square test. P value of <0.005 was considered significant.

RESULTS AND DISCUSSIONS

Males showed a higher incidence (65%) compared to females (35%). We conclude that this is because, more males were involved in farming as compared to females. Most of our patients were farmers who were bitten while working in the fields. This finding confirms the fact that most of the snake bites in India are occupational hazards in rural area. Most of the farmer working in the fields (including females) belong to the age group of 18-45 years. We conclude that for the same reason snakebite is maximum in these age group. Since we have excluded patients with age <18 years, we couldn't study incidence in this age group. Most of our patients were from rural area. Living conditions in rural area, their living habits, working and walking bare footed and their occupation were to obvious reasons for this high incidence in rural population. Most of our snakebite (55%) cases occurred during the period of may to September. This is probably because rainy season is the period of activity for the snakes, where busy agricultural work coincidentally doubles the risk. Most of the snakebite occurred in the day time between 6 am-6 pm. This is probably because most of the victims couldn't aware of the snake which they stamped on, or accidently touched the snake while working. We had considerable difficulty in identification of the biting species with nocturnal as well as day time bites. 82% of the patients admitted with in first 6 hours after the bite , 15% in between 6-24 hours after the bite and only 3% came after 24 hour with severe complication of bleeding manifestation.

Confirmation of the Bite: Fang mark seen in 87 patients. Fang marks are typically 2 (occasionally one) clean puncture wound 0.5-1 cm apart, depending on the size of the snake, often with persistent oozing of blood from the site of bite. Only 37 patients and their relative know the type of snake, recognized and identified as viper in 35 cases and 2 in cobra bite. Identification of type of snake is most difficult thing by the people residing in rural area, 2 patients brought the snake killed after the bite. Remaining 53 patients had seen the snake but could not be captured or confirmed the type of snake. 10 patients did not see the snake, in these cases the snakebite was confirmed by clinical examination and by fang mark. We observed that most of the snakebite occurred foot and toes in the lower limb and finger and hand in the upper limb. This is probably because most of snakebite occurred while the farmers were working in the fields.

Local Reaction: Most common local reaction we observed were swelling at the site of bite. This had a variable extension in to the limbs concerned. Fang mark present in 87 patients. Bleeding from the site of bite were 73 cases. Ecchymosis were present near the bite in 5 patients. Bleeding was continuous in severe envenomation patient, with considerable blood loss by the coagulation disorder. Many of these patients needed blood transfusion. In other patients bleeding was a mild ooze and it was a considerable guide to haemorrhagic state. All these resolved either spontaneously or following treatment with ASV. 4 patient had haematuria, once it occurred it persisted and it was a serious manifestation and patient with haematuria needed blood transfusion. Neurological symptoms were observed in a total of 5 patients. Among these 2 patient had combined features of haematotoxicity and neurotoxicity. These patient had continuous bleeding from the site of bite with ecchymoses and ptosis. 2 patients had only neurological symptoms with respiratory paralysis. Remaining one patient developed ptosis and difficulty in speaking and swallowing. In our study 2 patient developed respiratory paralysis and they recovered after treatment with ASV, neostigmine, atropine and mechanical ventilation in ICU. They were successfully extubated after 3 days. The remaining 3 patient recovered with injection Neostigmine, atropine and ASV. Vomiting is an early symptom of systemic envenomation. In our study vomiting occurred in 57 patients. In 16 patients vomiting was precipitated by the administration of ASV. Correction dehydration and electrolyte imbalance done immediately, as it is liable to endanger a patient life. Local pain at the site of bite occurred in 62 patients and pain was mild to moderate and usually subsided within 24 hours. 12 patients had fever ranging between 990-1010 F, after local debridement of the wound. Weakness of the bitten

Table 1: Clotting Time is Prolonged in 15 Patients

			GROUPS		
			Test	**Ctrl**	**Total**
CT	Abnormal	Count	15	0	15
		% within GROUPS	15%	0%	7.5%
	Normal	Count	85	100	85
		%within groups	85%	100%	92.5%
Total		Count	100	100	200
		% within GROUPS	100.0%	100.0%	100.0%

Table 2: Prothrombin Time

			GROUPS		
			Test	**Ctrl**	**Total**
PT		Count	77	100	177
	Normal	% within GROUPS	77.0%	100.0%	88.5%
	Ab Normal	Count	23	0	23
		% within GROUPS	23.0%	.0%	11.5%
Total		Count	100	100	200
		% within GROUPS	100.0%	100.0%	100.0%

Table 3: APTT

			GROUPS		
			Test	**Ctrl**	**Total**
APTT	Normal	Count	85	100	185
		% within GROUPS	85.0%	100.0%	92.5%
	Ab Normal	Count	15	0	15
		% within GROUPS	15.0%	.0%	7.5%
Total		Count	100	100	200
		% within GROUPS	100.0%	100.0%	100.0%

limb was complained of by 2 patients after all the signs and symptom of the disease had subsided. No neurological abnormality was detected. 10 patient developed reaction following administration of ASV. 6 patient developed only mild reaction and were controlled by hydro-cortisone and anti histaminics. We didn't have difficulty in administering ASV further. 4 patients developed severe reaction like hypotension, wheezing, allergic rashes all over the body with itching and irritability. We had to stop administering ASV in these patient. Only on treatment with adrenaline we continue further ASV administration at slower rate. No patient developed tetanus or gas gangrene. 40 patient in our study received injection tetanus toxoid before reaching our hospital.

Mortality: We had 2 mortalities in our study (2%).

The incidence of the snake bite in males in present study (100 patients) is 65% and females is 35%, ratio of male to female is 1.8:1. We observed that the study of time period between the snakebite and the onset of coagulation disorder varied from person to person between one to several hour depending upon the amount of venom injected and type of snake. Most common bleeding manifestation we have observed is bleeding form site of bite (48 patients i.e.,48%). None of our patient developed tetanus. Majority of the patient were given inj. Tetanus toxoid. We have not come across the snakebite in a pregnant woman, we couldn't analyze the effect of snake venom on pregnancy. All 3 pregnant patients in Bhat[6] study aborted and had severe bleeding needing blood transfusion. Delay in treatment and hemorrhage are liable to precipitate post hemorrhagic peripheral circulatory failure. One patient developed shock within first 2 hr after the bite and died while undergoing treatment may be due to arrhythmia. In this regard we don't agree with Bhat[6] finding shock does not seem to be a direct result of envenomation. No patient was seen in Bhat's study whose blood after remaining normal for 24hours, developed clotting defect later. He concluded that:

- If the clotting defect does not develop within the first 24hr after the bite, systemic poisoning can be ruled out.
- There is no correlation between the time of onset of clotting defect and the time of onset of hemorrhagic syndrome.
- The onset of hemorrhagic syndrome may be delayed upto 72 hour.
- The delayed onset of hemorrhagic syndrome seems to be related to trauma and physical exertion after snakebite before the clotting defect is reversed.
- Physical activity after snake bite seems to increases the incidence and severity of bleeding.

Since our observation were similar to his conclusion even we advised complete bed rest and immobilization. In present study, 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. In all patients, whose bleeding continued in spite of ASV beyond 24hours, blood transfusion and fresh frozen plasma was given in addition. Besides

replacing the blood lost, it shortens the duration of bleeding. In the absence of ASV, blood transfusion by itself can stop the bleeding but the coagulation defect may be reversed only temporarily. In our study we observed that most of the patient (82%) came to hospital within six hour and received treatment, this is similar to Patil[7] ,who reported that 78.64% presented within 6 hours of snake bite. We observed very less complication compared to other studies with long duration between bite and admission to hospital. On the contrary, in one study they observed that there was no association of bite to hospital time with development of AKI. Chaudhari[8]. also found that prolonged bite to hospital time i.e., delayed arrival to hospital was associated with mortality. APTT prolonged in 31(62%) patients of Harshavardhana[9] study but present study we observed 15(15%) patients had abnormal APTT.

CONCLUSION

Regarding the management, simple, cheap procedures like estimation of bleeding time and clotting time are adequate indicator of hepatotoxicity of snakebite. But costlier and time consuming procedures like prothrombin time, activated thromboplastin time, thrombin time and fibrin degradation product are more sensitive and wherever possible these can be used. Antisnake venom is of immense importance in the management of snake bites. A suitable dose and regimen is to be selected depending on the severity of envenomation whether mild, moderate or severe. Though administration of anti snake venom the earlier is the better, anti snake venom should be continued till the sign and symptoms of envenomation are brought under control. Though anaphylaxis is a potentially dangerous complication, the incidence of this seems to be low and can be managed with steroids and antihistamines. Topical infiltration of anti snake venom seems to be of no use. Blood transfusion helps to combat bleeding manifestation by providing clotting factor. Renal failure seen in cases of snake bites can be managed with dialysis for a brief period. Antibiotics, tetanus toxoid, 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.

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