



## Original Research Article

## Clinical Outcome in snake bite envenomation patients based on their time of presentation

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### Article Info

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### Abstract:

Snake bite is a medical emergency requiring timely intervention. Apart from the panic attack and the local injury, snake bites have no adverse effects on the patient. The common cobra (Najanaja), Russell's viper, saw-scaled viper, and common krait are four of the 13 poisonous species that are known to exist. This was a cross-sectional study of patients who presented with snake bite envenomation admitted to a tertiary care centre in central Karnataka between July and December 2022. The objective of the study was to assess the clinical outcome in patients with snake bite envenomation based on their time of presentation after the snake bite to a tertiary care centre. The subjects were stratified into two groups based on their time of presentation as early and late presentation groups and the need for ASV (anti-snake venom), FFP (fresh frozen plasma), development of cellulitis, conservative or surgical measures required for cellulitis, development of other complications like AKI (acute kidney injury) and need for hemodialysis was compared in these two groups. Pregnant women and patients with less than 18 years of age were excluded from the study. After a primary and secondary survey, WBCT 20 mins along with coagulation factors was noted in two groups, need for

ASV, need for FFP, development of complications like cellulitis, AKI is compared in both groups along with management measures whether conservative or surgical, need for hemodialysis was compared in two groups. In this study, of 30 patients 76.6% were males 26.6% of the patients were between 30-39 years of age. 23 patients (76.6%) presented within 6h (early presentation). 7 patients (23.4%) were in the delayed presentation group. WBCT 20 mins and coagulation profile was prolonged in all patients who presented late (more than 6h). 85.7% of patients who presented late required more than 20 vials of ASV whereas 30% of patients who presented early did not even require ASV. 57% of patients who presented late required 12 or more pints of FFP whereas 60% of the patients who presented early did not require FFP transfusion. 57% of patients (4 patients) who presented late died during the course of treatment whereas 86.9% of patients who presented early were conservatively managed. AKI developed in all patients who presented late and hemodialysis was required in all those patients who developed AKI. Snakebite is a medical emergency. Patients if brought early within a few hours of snake bite can be conservatively managed and those patients are less likely to develop complications like cellulitis and AKI and even death.

**Keywords:** snake bite, ASV, Cellulitis, AKI, Hemodialysis, FFP, Time of presentation

### Introduction

Snakebite is an acute medical emergency. Snakebite is recognised by the World Health Organisation (WHO) as a neglected tropical illness. With almost 10,000 fatalities each year, India has the highest rate of deadly snake bite mortality worldwide.[1]

There are 216 different species of snakes in India, however, only 4 are considered

venomous snakes (cobra, krait, Russell's viper, and saw-scaled viper). Snake venom contains high protein and peptide content and has an affinity for various tissue receptors, making them challenging for drug design.[2] Poorly trained rural people often practise inappropriate first aid and take them to natural healers or herbal practitioners wasting vital time till a patient is taken to a treatment facility, where the cost of medical treatment could be another barrier.[3,4]

This study was done in a tertiary care centre in Central Karnataka, to determine the clinical outcome in Snake bite envenomation patients based on the time of their presentation to a tertiary care centre.

### Material and Methods

This was a prospective observational study conducted from July to December 2022. It included patients presented to the Emergency Medicine Department(ED) of SSIMS & RC Davanagere, Karnatakawith snake bite envenomation Patients were evaluated with a proforma which included an in-depth history and findings of a clinical examination. Additionally, information was obtained on patients' understanding of preventive measures, their want for immediate care, and previous interactions with natural or herbal practitioners prior to presentation to ED. Treatment by non-medical personnel includes incision and suction, application of neem leaves, garlic, turmeric, asafoetida, and use of hens to suck the venom from the bite site. Clinical confirmation of snake bite was by clinical signs and symptoms. Local complications include pain, oedema, cellulitis, compartment syndrome, abscess formation and gangrene. Systemic toxicity was defined by the presence of haematological or neurological dysfunction like ptosis, paralysis, diplopia, dysarthria, dysphonia, dyspnea and dysphagia.[5]

The subjects were stratified into two groups based on their time of presentation to the ED of the hospital after the snake bite as an early presentation (less than 6h) and delayed presentation (more than 6h). Pregnant women and patients with less than 18 years of age were excluded from the study. After primary and

secondary surveys WBCT 20 mins along with coagulation factors were noted in two groups, Need for ASV, need for FFP, development of complications like cellulitis, and development of Acute Kidney Injury(AKI) is compared in both groups along with management measures whether conservative or surgical, need for haemodialysis was compared in two groups.

As per hospital protocol (WHO-based), all patients bitten by a poisonous snake received polyvalent anti-snake venom within 15 minutes of reaching the hospital, if they had clinical features of envenomation. If the patient was brought after 6h of envenomation the anti-snake venom administration was done based on the clinical presentation of the patient. The Institutional Ethics Committee of SSIMS & RC, Davanagere approved the study and written informed consent was taken from all patients participating in the study.

### Results

The study was conducted on 30 patients. 23 of the study subjects were male (76.6%) whereas 7 were female (23.3%). Most of the cases of snake bite were within 18-29 years and 30-39 years of age (23.3% in each group). 23 patients (76.6%) had bites in the lower extremity whereas 23.3% of patients had bites in the upper extremity. 23 patients (76.6 %) presented within 6h of envenomation(early presentation) while 23.4 % of patients presented after 6 h of presentation. All patients who presented late (7/7) had prolonged WBCT while 65% of patients who presented early also had prolonged WBCT. All patients who presented after 6 h (delayed presentation) had a deranged coagulation profile while 39% of patients who presented early also had a deranged coagulation profile. 16 patients in total developed cellulitis and all presented after 6h (delayed presentation). Patients who presented late (after 6h) required more vials of ASV (anti-snake venom). 4 out of 7 patients who presented late required 12 or more pints of FFP whereas 14 out of 23 patients who presented within 6 h did not require FFP. 20 patients out of 23 patients who presented early (86%) required only conservative management whereas in the delayed presentation

group 2 out of 7 patients required surgery (fasciotomy) whereas 4 patients out of 7 patients who had delayed presentation (57%) succumbed to death. All patients who presented late (> 6 h) developed AKI and needed hemodialysis. Whereas no patients who presented early developed AKI.

## Discussion

In our study of 30 subjects with snake bite envenomation, 23 patients presented early (within 6h) whereas 7 patients presented late (after 6h). The study was conducted from July to December 2022, in the rainy season when vegetation is extensive and people are involved in agricultural activities, suggesting rains to be the most appropriate time for snakes to be out in open fields. Various other studies also reported similar seasonal incidences.[6]

No clear pattern for the timing of biting in our cases. which is in contrast to other studies that observed a nighttime prevalence.[7] In the study, it was also found that 14 patients were of age group 18-39 years of age (7 subjects between 18-29, 7 subjects between 30-39 years) with males being affected more than females. Similar male preponderance was observed in other studies too.[8] The lower limb bite was the most common site of the bite(23 patients out of 30), followed by the upper limb (7patients out of 30). It is similar to a study conducted by Alirol et al, the majority of patients had lower extremity bites.[9]

In the present study, all patients who had delayed presentation (more than 6 h) had prolonged 20 min WBCT while 15 patients out of 23 patients who presented within 6 h also had prolonged 20 min WBCT. This may be attributed to the type of venomous snake. All patients who had delayed presentation (more than 6 h) had deranged coagulation profiles. Altogether 16 patients out of 30 subjects developed cellulitis or local toxicity in which all had delayed presentation (after 6 h). Similar findings were also reflected in various other studies suggesting primary wound care to be of utmost importance to avoid more grievous complications like gangrene and compartment syndrome.[10]

In the present study, in 7 patients who

presented late (after 6h), 6 patients required 20 or more vials of ASV(anti-snake venom) whereas 7 patients who presented early did not even require ASV and 4 patients who presented early required 20 or more vials of ASV. Time from bite to ASV administration has been observed to be an important factor in preventing complications and predicting the outcome in various studies.[10,11] We observed that significant change in the patient's outcomes with respect to time of envenomation and ASV administration.

In the present study of 30 patients, 4 out of 7 patients who presented late required 12 or more pints of FFP whereas 14 out of 23 patients who presented within 6 h did not require FFP. Studies have shown that fresh frozen plasma (FFP) reduces the venom-induced consumption coagulopathy quicker, thus aiding in the usage of a reduced number of anti-snake venom vials.[12] Some studies also conclude that FFP does not hasten recovery of coagulopathy, especially in Russell's viper bites.[13] Thus, ASV administration and FFP are the variables that were found to be predicting the outcome significantly if given early after a snake bite; thus, is an independent variable affecting the outcome.

In the present study, all patients who had delayed presentation(> 6h) had developed AKI whereas no patients who presented early developed AKI. In India, the incidence of acute renal failure is 13-32% following a viper bite.[14] In the present study it was found that all patients who presented late (> 6 h) developed AKI and in all those patients who developed AKI, there was a need for hemodialysis. N Suchithra et al. in their study of 586 cases with snake bites, 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 and those who received ASV late.[15]

In the present study, 20 patients out of 23 patients who presented early (86%) required only conservative management whereas in the delayed presentation group, 2 out of 7 patients required surgery (fasciotomy). 4 patients out of 7 patients who had delayed presentation (57%) succumbed to death making it 13.3% death rate (total of 4 died out of 30 subjects). This is far more when compared with the death rate from other studies

across India.[16]This may be due to delays in treatment taken by patients or attenders or seeking of natural or traditional methods as treatment options or lack of health facilities. If doctors in charge of primary care are well-trained in snake bite management, the referral to tertiary care centres decreases, and mortality rates improve.[17]

## Conclusion

Snake bite is an acute medical emergency. Snakebite is recognised by the World Health Organisation (WHO) as a neglected tropical illness. With almost 10,000 fatalities each year, India has the highest rate of deadly snake bite mortality worldwide. This study was aimed in determining the clinical outcome of snake bite envenomation patients based on their time of presentation to a tertiary care centre. Many patients avoid going to hospitals because they believe in numerous myths. As it may be challenging to identify the type of snake, the only therapeutic option is still polyvalent anti-snake venom. Cost is a crucial consideration for these patients because of the economic circumstances of the victims who were most severely impacted. As was seen at our tertiary care institution, readily available treatment resources, prompt intervention, appropriate referral, and a close ICU will reduce mortality.

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**Table 1:** Distribution of cases according to the age group of patients

Age group	Males	Females
18-29	7	0
30-39	6	1
40-49	2	4
50-59	2	2
60-69	4	0
70 and above	1	0

**Table 2:** Distribution of cases based on the site of the bite

Site of bite	No of patients
Lower limb	23
Upper limb	7
Trunk	0
Head	0

**Table 3:** Distribution of cases according to their time of presentation to ED

Presentation	Number	Percentage
Early(6 h)	23	76.6
Delayed(> 6h)	7	23.4
Total	30	100.0

**Table 4:** Presentation and 20 min WBCT

	Normal WBCT	Prolonged WBCT	Total
Early	8	15	23
Delayed	0	7	7

**Table 5:** Presentation time and coagulation factors

	Normal coagulation profile	Prolonged coagulation profile	Total
Early presentation	14	9	23
Delayed presentation	0	7	7

**Table 6:** Presentation and development of cellulitis /compartment syndrome

	Development of cellulitis	
	Yes	No
Early presentation	9	14
Delayed presentation	7	0
Total	16	14

P=0.94

**Table 7:** Presentation and ASV requirement

	ASV requirement in vials				Total
	Nil	≤ 10 vials	10-20 vials	>20 vials	
Early Presentation	7	5	7	4	23
Delayed Presentation	0	0	1	6	7

**Table 8 :** Presentation and requirements of FFP

	FFP requirements			
	Nil	4 pint	8 pint	12 or more pint
Early Presentation	14	5	4	0
Delayed Presentation	0	2	1	4

P<0.5

**Table 9 :** Presentation and outcome

	Need for surgery		
	Fasciotomy	Conservative	Death
Early presentation	3	20	0
Delayed presentation	2	1	4

P<0.5

**Table 10 :** Presentation time and acute kidney injury (AKI)

	AKI	
	Yes	No
Early Presentation	0	23
Delayed Presentation	7	0

P <0.5 denoting statistically significant

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