

A RETROSPECTIVE STUDY OF MECHANICALLY-VENTILATED PATIENTS WITH SNAKEBITE ADMITTED IN ICU

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ABSTRACT

BACKGROUND

Snakebite is an important medical emergency, which results in the death or chronic disability of many active younger people. Despite its importance, there have been fewer proper clinical studies of snakebite than any other tropical disease. This study is done with the objective of studying the incidence of various types of snakebite patients requiring ventilator support and their outcome.

MATERIALS AND METHODS

This is a retrospective analysis of 62 patients with snakebite admitted in Adult Medical ICU between September 2012 and August 2015 in Chigateri General Hospital, Tertiary Healthcare Centre attached to J.J.M. Medical College, Davangere. Case records were analysed and details of each case was entered in a proforma with respect to demographic details like age, sex, time since bite to hospital presentation, type of snake, site of bite and ventilator outcome.

RESULTS

Out of 62 patients, 26cases (42%) were females and 36 cases (58%) were males. Incidence of snakebite was 45.16% among age group 18 to 30years, 35.48% among age group 31 to 50years and 19.35% were aged more than 50 years. Incidence of vasculotoxic and neurotoxic snakebites was found to be 25.8% and 74.2%, respectively. 63% of patients were bitten on lower limb followed by 29% in upper limb and 8% on other sites. Recovery among vasculotoxic and neurotoxic bites were 62.5% and 82.6%, respectively. Recovery was 90.47% among those who presented to hospital within first 2hours of snakebite followed by 84.5% among those who presented between 2 to 4 hours and 12.5% among those who presented between 5 to 6 hours.

CONCLUSION

Most common snakebite patients requiring ventilator were males bitten by neurotoxic snakes. Shorter time since snakebite to hospital admission is found to be associated with better outcome. Neurotoxic snakebite patients had a better prognosis than vasculotoxic snakebite patients.

KEYWORDS

Snakebite, Vasculotoxic, Neurotoxic, ICU Admission.

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BACKGROUND

Snakebite is an important medical emergency and an occupational hazard, which results in the death or chronic disability of many active younger people. There are about 3000 species of snakes in the world known to date, out of which 300 species are poisonous to man.¹ India is estimated to have the highest snakebite mortality in the world. World Health Organization (WHO) estimates place

the number of bites to be 83,000 per annum with 11,000 deaths.² Most of the fatalities are due to the victim not reaching the hospital in time where definite treatment can be administered.

Despite its importance, there have been fewer proper clinical studies of snakebite than any other tropical disease. This retrospective study is done with the objective of studying the incidence of various types of snakebite patients requiring ICU care and ventilator support and their outcome.

MATERIALS AND METHODS

Hospital Ethical Committee approval was taken to review the case records of patients with snakebite from September 2012 to August 2015, which required ICU admission. This retrospective analysis was conducted in Chigateri General Hospital, Tertiary Healthcare Centre

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attached to J.J.M. Medical College, Davangere. 62 case records of patients with snakebite admitted in Adult Medical ICU were analysed with respect to following inclusion and exclusion criteria.

Inclusion Criteria

Snakebite patients aged ≥18 years of both sexes admitted in ICU who required mechanical ventilation.

Exclusion Criteria

Snakebite patients aged <18 years and patients not requiring ventilatory support.

Case records were analysed and details of each case was entered in a proforma with respect to demographic details like age, sex, time since bite to hospital presentation, type of snake, site of bite and ventilator outcome.

The review of case records revealed that all the patients who were referred to ICU for respiratory failure from emergency ward were intubated with appropriate size endotracheal tube and ventilated with SIMV mode-pressure support and following recovery of adequate respiratory efforts weaning was initiated with CPAP ventilation and followed by T-piece trial before extubation as per institutional ICU protocol. All patients were investigated for complete blood count, 20 minutes whole blood clotting test (20WBCT), arterial blood gases, renal function tests, liver function tests, coagulation profile, serum electrolytes, chest x-ray, ECG and urine routine.

Antivenom treatment was given for the patients who showed signs of systemic and local envenomation with polyvalent ASV as per WHO guidelines. Intravenous infusion of 10 vials ASV reconstituted with 500mL of 5% dextrose was administered over a period of 1 hour with continuous monitoring. Repeat dose of 10 vials ASV was considered if patient had no signs of improvement after 2 hours and 6 hours with neurotoxic and haematotoxic snakebite, respectively. Antibiotics and other supportive treatment was continued according to institutional protocol.

A proportion of patients develop reactions either early (within a few hours) or late (five days or more) after being given antivenom. At the earliest of reaction, antivenom administration must be temporarily suspended. Epinephrine (adrenaline) 1mg/mL (1:1000) is given intramuscularly into upper lateral thigh, antihistaminics like chlorpheniramine maleate 10mg slow intravenous injection, followed by steroids like hydrocortisone 100mg intravenously according to institutional protocol.

Epinephrine should be given at the very first sign of a reaction even when only a few spots of urticaria have appeared or at the start of itching, tachycardia or restlessness.

Descriptive statistical analysis was done for percentages and proportions and Fischer’s exact test was done for categorical data using SPSS-16 software. P-value <0.05 is considered as significant.

RESULTS

A total number of 62 snakebite patients were shifted to ICU from emergency ward for ventilator support during the study period in the institute. Out of 62 patients, 26 cases were females and 36 cases were males as shown in Figure 1.



Figure 1. Sex Distribution of Snakebite Patients

Out of 62 snakebite patients, 28 patients were in the age group of 18-30 years, which accounts for 45.16% of all the bites. 22 patients who were in the age group of 30-50 years who accounted for 35.48% of snakebite cases. 12 patients were aged above 50 years, which accounted for 19.35% of all snakebite cases. The age group of snakebite cases varied from 18 to 75 years with mean ± SD =39.6 ± 16.5 years and shown in Figure 2.

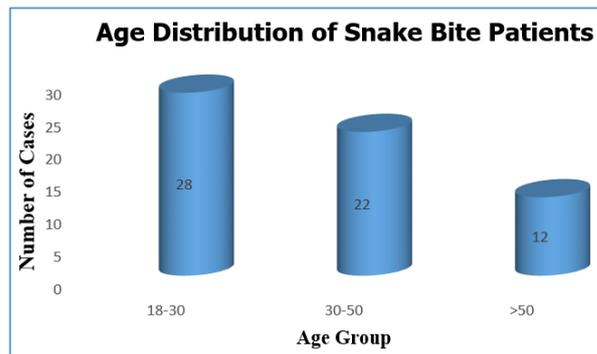


Figure 2. Age Distribution

Mean ± SD = 39.6±16.5years.

Out of 62 cases of snakebite cases, we reviewed 21 cases presented within 2 hours of bite, 33 cases presented between 2-4 hours and 8 cases presented between 4-6 hours and details are shown in Table 1.

Duration(in Hours)	Outcome		
	DAMA	Dead	Recovered
1-2	1(4.76%)	1(4.76%)	19(90.47%)
3-4	1(3.03%)	4(12.12%)	28(84.85%)
5-6	1(12.5%)	6(75.0%)	1(12.5%)
Total	3(4.84%)	11(17.74%)	48(77.42%)

Table 1. Duration Since Snakebite to Hospital Presentation and Outcome

Fischer’s Exact Test-x²=19.381, df =4, P=0.000 (Highly Significant)

Recovery rate of patients who presented between 1-2 hours of snakebite was 90.47% (19 out of 21 cases). The patients who presented after 2 hours of bite, but before 4 hours had a recovery rate of 84.85% (28 out of 33 cases). The patients who presented after 4 hours and before 6 hours had a recovery rate of 12.5% (1 out of 8 cases). P value was found to be = 0.000 (highly significant).

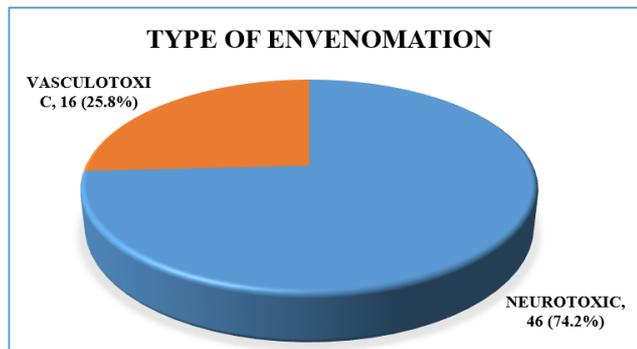


Figure 3. Types of Envenomation

Out of 62 cases of snakebite, 16 cases were vasculotoxic in nature and 46 cases were neurotoxic in nature as shown in Figure 3.

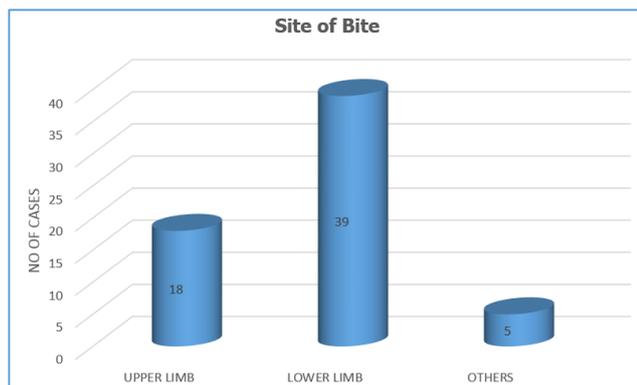


Figure 4. Site of Bite

Most common site of bite was lower limb (62.5%) followed by upper limb (29.1%) and other sites (8.4%) as shown in the Figure 4.

The duration of ICU stay varied between 1 to 7 days. The details of outcome are as shown in Table 2 and 3.

ICU Stay Duration (Days)	Neurotoxic Snakebite	Vasculotoxic Snakebite	Total
1.	0 (0%)	1(6.2%)	1(1.6%)
2.	0 (0%)	4(25.0%)	4(6.5%)
3.	11(23.9%)	1(6.2%)	12(19.4%)
4.	16(34.8%)	6(37.5%)	22(35.5%)
5.	15(32.6%)	3(18.8%)	18(29.0%)
6.	4(8.7%)	0 (0%)	4(6.5%)
7.	0(0%)	1(6.2%)	1(1.6%)
Total	46(100%)	16(100%)	62(100%)

Table 2. Duration of ICU Stay

Fischer’s exact test- $\chi^2=17.444$, $df=6$, $P=0.001$ (significant).

During the course of stay in ICU, first day recovery rate was 0% and 6.2% among neurotoxic and vasculotoxic bites, respectively; second recovery rate was 0% and 25% among neurotoxic and vasculotoxic bites, respectively; third recovery rate was 23.9% and 6.2% among neurotoxic and vasculotoxic bites, respectively; fourth day recovery rate was 34.8% and 37.5% among neurotoxic and vasculotoxic bites, respectively; fifth day recovery rate was 32.6% and 18.8% among neurotoxic and vasculotoxic bites, respectively; sixth day recovery rate was 8.7% and 0% among neurotoxic and vasculotoxic bites, respectively; and seventh day recovery rate was found to be 0% and 6.2% among neurotoxic and vasculotoxic bites, respectively. P value was found to be 0.001 (significant).

Type of Snakebite	Dama	Dead	Recovery
Neurotoxic	2(4.35%)	6(13.04%)	38(82.61%)
Vasculotoxic	1(6.25%)	5(31.25%)	10(62.50%)
Total	3(4.84%)	11(17.74%)	48(77.42%)

Table 3. Outcome of Snakebite Patients

Fischer’s exact test- $\chi^2=2.702$, $df=2$, $P=0.237$ (insignificant).

Among 46 cases of neurotoxic envenomation, recovery rate was 82.61% (38 patients out of 46), mortality rate was 13.04% (6 patients out of 46) and patients who got discharged against medical advice was 4.35% (2 patients out of 46 cases). Among 16 cases of vasculotoxic envenomation, recovery rate was 62.50% (10 out of 16 cases), mortality rate was 31.25% (5 out of 16 cases) and patients who got discharged against medical advice was 6.25% (1 patients out of 16 cases). P value was found to be 0.237 (insignificant).

DISCUSSION

To a large extent, the manifestation of snakebite depends upon the species of snake and therefore identification of the type of snake is important. At times, the bite mark might not be visible (e.g. in the case of krait). The three major families of venomous snakes are the Elapidae (cobra, king cobra, krait and coral snake), the Viperidae (vipers) and the Hydrophidae (sea snakes).³

There are about 236 species of snakes in India, most of which are nonpoisonous. However, there are around 13 known species that are poisonous and of these four, namely common cobra (Naja naja), Russell’s viper (Daboia russelii), saw-scaled viper (Echis carinatus) and common krait (Bungarus caeruleus) are highly venomous and believed to be responsible for most of the poisonous bites in India.⁴

Much of the first aid currently carried out is ineffective and dangerous.⁵ These methods include making local incisions or pricks/puncture at the site of bite or in the bitten limb, attempts to suck the venom out of the wound, use of black snake stones, tying tight bands (tourniquets) around the limb, electric shock, topical instillation or application of chemicals, herbs and ice packs. Local people may have great confidence in traditional treatments

(herbal), but they must not be allowed to delay medical treatment or to do harm. The case management at the field level should include reassurance, immobilising the bitten limb and transporting the victim to nearest treatment facility at the earliest where definite treatment can be provided.⁶

In our study, incidence of snakebite cases requiring ICU care is more among males with mean age distribution of 39.6 years. Adult males of this age group more commonly work in fields and agriculture lands in India and it may be the reason for increased incidences of snakebite among males. Studies of M. L. Kulkarni,⁷ Harsoor S. S.⁸ also shown that incidence is more among males.

In our study, 21 patients presented to hospital within 2 hours and 33 patients between 2 to 4 hours with mean duration of 3 hours. In our study, patients have arrived early to hospital compared to other observations done by Dr. Harsoor⁸ (7 hrs.), SAM Kularatne⁹ (7 hrs.) and Sharma et al¹⁰ (9hrs.). Among the patients presented within 2 hours, 92% of the patients recovered, 84% presented between 2 to 4 hours and 12.5% of the patients presented after 4 hours recovered. The early the presentation to the hospital better will be the recovery.

Among our study group, neurotoxic envenomation were 46 cases and vasculotoxic envenomation was 16 cases indicating that respiratory failure and requirement of mechanical ventilation is more for neurotoxic envenomation because of neuromuscular paralysis. In our study, more common site of bite was lower limb than upper limb followed by other sites like trunk and face. As majority of our patients are from rural background, field predominance of victims is obvious cause of more incidence in lower limb.

Duration of ICU stay in our study ranged between 1 to 7 days with maximum patients recovered by fourth day. Among the 62 patients, 82% (38 out of 46) neurotoxic envenomation cases and 55% (10 out of 16) vasculotoxic envenomation cases recovered.

Increased incidence of death in vasculotoxic envenomation can be explained due to their varied and severe complications such as DIC, renal failure and multiorgan dysfunction.

CONCLUSION

- Most common snakebite patients requiring ventilator were males bitten by neurotoxic snakes.
- Peak age of incidence is found to be more in younger age group (18-30 years).
- Shorter time since snakebite to hospital admission is associated with better outcome.
- Neurotoxic snakebite patients had a better prognosis than vasculotoxic snakebite patients, though the result was found to be statistically insignificant.

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