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Role of Antisnake Venom (ASV) in Decreasing Severity of Acute Renal Failure in Snake Bite

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Abstract: ***Snakebite is a significant public health problem causing considerable morbidity and mortality worldwide. The mortality due to venomous snakebite in India continues to be high due to various social, economic, and cultural reasons. In this study, we investigated the correlation between early administration of anti-snake venom and the severity of acute renal failure. A total of 100 patients with snake bites with acute renal failure were included in a hospital-based prospective study in the Department of Medicine from October 2020 to November 2021. All the patients were investigated regarding the time of the bite to time of ASV administration, it was found that in the study of 100 patients with acute renal failure 80 had received ASV within 6 hours of the bite of which 20 required dialysis and 4 died while 20 patients who had received ASV after 6 hours out of which 10 required dialysis and 6 died, the p-value for mortality <0.00085 which is statistically very significant. Therefore study concludes a strong association between time of administration of ASV in the prevention of acute renal failure in snake bite patients.***

Keywords: acute renal failure, antisnake venom

1. Introduction

Snakebite is a significant public health problem causing considerable morbidity and mortality worldwide, particularly in tropics. Snakebite is now recognized as a Neglected Tropical Disease by the World Health Organization (WHO).[1]According to WHO estimates about 5 million people are bitten each year by poisonous snakes which results in 2.5 million envenomations, at least 100000 deaths, and 300000 amputations and other permanent disabilities.[2]The mortality due to venomous snakebite in India is estimated between 35000-50000 per annum, which is the highest in the world.[1,3]

Medically Important snakes of India include the so called "Big 4", Russel's viper (*Daboia russelli*), Cobra (*Naja naja*), Common Krait (*Bungarus caeruleus*) and Saw scaled viper (*Echis carinatus*) that occur throughout the country. The pit viper species - Malabar, green and the hump-nosed, sea snakes and others like the king cobra (*Ophiophagus hannah*), monocle cobra (*Naja Kaouthia*), Banded Krait (*Bungarus fasciatus*) and *Echis sochureki* are important causes in certain geographical areas.[5,6]

Acute kidney injury (AKI) is an important complication of snake bite and a major cause of mortality. [8]

The incidence of AKI caused by these snakes varies from 5% to 29% depending on the species of snake and the severity of envenomation. [9-11] The onset of AKI is from a few hours to as late as 96 h after the bite. The duration of AKI after snake bite generally ranges from 2 to 3 wk.[9-11]

Anti venom is Immunoglobulin (enzyme refined Fab2 fragment of IgG) purified from serum or plasma of a horse or sheep that has been immunised with venoms of one or more species of snakes. In India, only polyvalent ASV isavailable and it neutralizes venom of four important snakes in India namely Indian cobra, Common krait, Russell viper and saw scaled viper.[12] ASV should be given as early as possible and when it is delayed more than 2 hrs it will not reverse the local effect of snake venom. Once initial dose (10 vials) has been administered over one hr, no further ASV is given for 6 hrs [13].

In this study we investigated about the association of time of administration of antisnake venom and severity of renal involvement and outcome of patients with snake bite.

2. Material and Methodology

A hospital based prospective study in the Department of Medicine in tertiary care hospital for period from October 2020 to November 2021. The study was conducted after formal approval of institutional ethics committee.

Inclusion criteria:

1) All the Patients giving definitive history of snake bite.
2) Clinical picture consistent with snake bite, as presence of fang marks or cellulitis or coagulopathy.
3) Presence of AKI as defined using KDIGO criteria based on serum creatinine (increase in serum creatinine by ≥ 0.3 mg/dL within 48 h or increase in serum creatinine to ≥ 1.5 times baseline, which is known or presumed to have occurred within the prior 7 d. It was presumed that the patient had normal renal function if the serum creatinine was 1.5 mg/dl.

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Exclusion criteria:

1) Patients with pre-existent renal disease (serum creatinine>1.5 mg/dL prior to snake bite or ultrasonography of abdomen suggestive of bilateral small kidneys/loss of corticomedullary differentiation /obstructive nephropathy/ other renal pathology).
2) Diagnosed cases of hypertension /diabetes mellitus
3) Exposure to nephrotoxic drugs/toxins.

All the patients were subjected to

- Admission
- Detail clinical history
- Thorough examination
- 20 min WBCT
- Kidney function test
- Urine output monitoring and routine microscopy
- Other investigations as required

3. Results / Discussion

Time of administration of ASV:

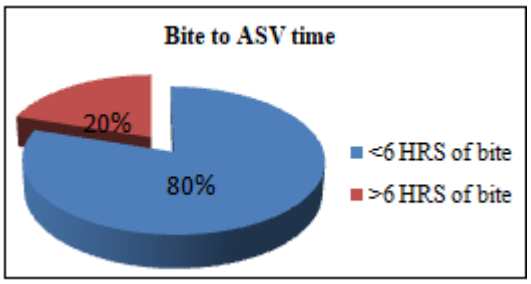

Figure 1

In our study of 100 patients 80 received ASV within 6 hours of bite while 20 patients received after 6 hours.

Requirement of dialysis:

Out of the 80 patients who received ASV within 6 HRS of bite only 20 (25%) required dialysis where as 10(50%) required dialysis out of 20 who received ASV after 6 HRS of bite.

Table 1

ASV	Conservative management	Dialysis
<6 HRS	60	20
>6 HRS	10	10

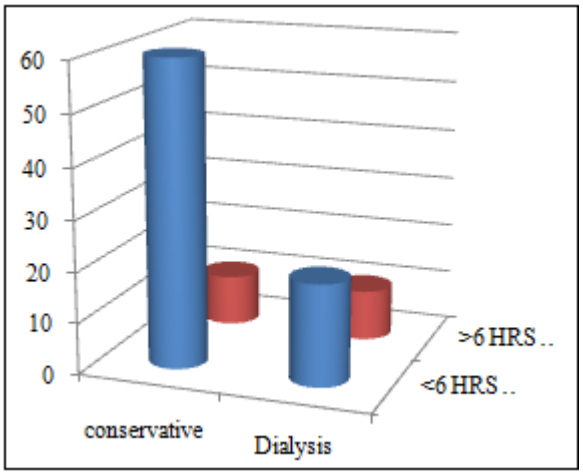

Figure 2

by using statistical methods we got **Chi- square- 4.76, p-0.029** where p is significant at <0.05(p<0.05) which is statistically significant to show that early administration of ASV decrease need of dialysis

Mortality:

In this study total mortality was 10%.but if we analyse data to find association of mortality with time of ASV administration only 4(5%) patients died who received ASV within 6 HRS of bite where as 6(30%) patients died who had received ASV after 6 HRS of bite.

Table 2

	Survived	Died
ASV<6HRS	76	4
ASV6>HRS	14	6

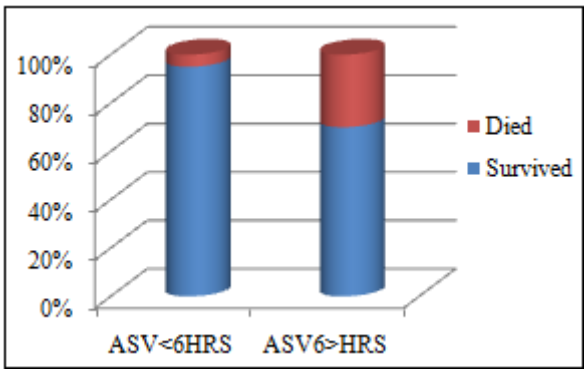

Figure 3

by using statistical methods we got **Chi- square- 11.111, *p*-0.0008** where *p* is significant at <0.05(*p*<0.05) which is statistically significant to show that early administration of ASV decrease mortality in snake bite with acute renal failure. The above inference is supported by Athappan G., et al. [14]

4. Conclusion

Early administration of Antisnake Venom reduce the severity of acute renal failure ,decrease need of dialysis and decrease overall mortality in patients of snake bite with acute renal failure.

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