

Original Research Article

Outcome of poisonous snake bites treated with high dose anti snake venom serum versus low dose – A critical review

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Abstract

Background: In India, about 1 million people are bitten by snakes more in the rural area and they get admitted to hospitals. About 50,000, people die of snake bites every year in India. The patients admitted with poisonous snake bites were treated with polyvalent anti snake venom serum.

Aim: To determine the significant difference and outcome between High Dose and Low dose Polyvalent Anti Snake Venom Serum (PVASVS), with regards to age gender and severity of coagulation abnormalities. The cost of ASV has an economic impact and if low dose ASV saves the scarce resource.

Materials and Methods: 45 patients bitten by snake admitted and treated which included both males and females were taken up for this study based on Poisson model of sampling. All the patients had cellulitis, renal failure and varying degree of coagulation abnormalities. They were classified into LDG and HDG depending on the number of PVASVS they received which was ≤ 25 vials or >25 vials respectively. This was decided based on the treatment of ASV analyzed using chi-square contingency statistically for its significance.

Results: The age and clotting time as such do not have association to distinguish HDG or LDG. It was revealed that Gender has an effect that female HDG are 26.3% (5 out of 19) as compared to male 73.7% (14 out of 19). In each group, 2 patients died out of 18, LDG (11%) 27 in HDG (7.4%) 62.9% of patients in LDG and 38.8% in HDG required hospital stay more than 10 days.

Conclusions: The female gender falls in low dose conserving ASV. The LD ASV demands higher duration of stay (more than 10 days) in the hospital. The age, coagulation abnormality did not establish the significant results in the LDG and HDG.

Key words

Snake Bites, Poly valent anti snake venom serum (PVASVS), High dose group (HDG), Low dose group (LDG), Dialysis, Renal Failure, Cellulitis, Disseminated Intra Vascular Coagulation (DIVC), Clotting time (CT).

Introduction

Snake bite is a well known occupational hazard amongst farmers plantation workers and other outdoor workers. There are about 270 plus species of snakes in India out of which about 60 are highly venomous. The big 4 dangerous snakes in India are Indian cobra, krait, russell's viper and saw scaled viper [1, 2]. Every year 50,000 people die of snake bite in India. In the Indian setting about two thirds of bites are attributed to saw scaled viper and one fourth to Russel's viper and only a small proportion to cobra and krait [3, 4]. Fatality in snake bite is due to wide species variation, shortage of ASV, poor compliance with treatment. It is further augmented by reliance on traditional healers and various myths. The widely differing manifestations of snake bites could be attributed to complexity of venom to some extent. Blood clotting can be stimulated by serine proteases and other pro-coagulant enzymes in viper venom. Russell's viper venom activates Factor V, X, IX & VIII, Fibrinolysis, protein C, platelet aggregation anticoagulation and haemorrhage [5].

Polyvalent anti snake venom serum is the specific anti dote and is expensive not freely available because of economic constraints. It is protective against the big 4 poisonous snakes available in India.

Materials and methods

The patients who got admitted and treated for snake bites were analyzed for effects depending on the number of polyvalent anti snake venom serum they received. They are grouped into two categories as low dose when less than 25 vials were used and high dose group when more than 25 vials were used.

Inclusion and Exclusion criteria

The patients admitted with a history of snake bite and had clinical manifestation of coagulopathy as evidenced by bleeding tendency and or prolonged clotting time, renal failure by evidence of oligoanuria or elevated blood urea and serum creatinine and cellulitis of the bite area were all included in the study and others are excluded.

Results

In one study 70% of snake bites were males between 20-50 years of age basically meaning these are the bread winners of their families. Alicol, et al. 2010 posing lot of economical Complications [7]. In our study 77.7% represented the age group of 20-50 almost matching with previous study. The results were given in the table as follows

Low dose group ≤ 25 vials 19-26 averaging 18+8
High dose group > 25 vials 30-40 averaging 30+10

Time delay < 2 days 20 vials

> 2 days 6 vials

As the delay increases the vials requirement comes down (**Table – 1**).

41 patients had bite in lower limbs and three patients in hands and one had on the hip.

The patients who did not receive ASV because of delayed admission after snake bite or those who received 10 vials (2 pts) 5 vials (4 pts,) 0 vials (5 pts.) only one died showing a mortality rate 9%. 5 patients received > 40 vials out of which 3 died accounting for 60% mortality in the HDG probably indicating the severity of snake bite, nature of venom of that particular family of snake. In one study the same is cited as identified a bite dependent exposure related to different families indicating that viperidae family injects approximately a 75% higher dose which may reflect higher dose of ASV requirement in this study [9].

Table – 1: HDG and LDG.

Variability	HDG	LDG	P value inference
No. of pts	27	18	0.140 (The age does not have association to distinguish HDG or LDG)
Age			
<10	1		
11-30	9	3	
31.-50	16	7	
>51	1	8	
Sex			0.036 (females require lower dose as compared to males)
Male	14	11	
Female	5	15	
Clotting Time			0.225 (The clotting time does not discriminate between HDG and LDG)
<8 mts	3	7	
8-15 mts	12	7	
>15 mts	9	7	

Table – 2: Fatal dose and Fatal period.

Type of snake	Fatal dose	Avg. del. dose	Fatal period.
Indian cobra	12 mgs	60 mgs	8 hours
Common krait	6 mgs	20 mgs	18 hours
Russell’s viper	15 mgs	63 mgs	3 days
Saw scaled viper	8 mgs	13-40 mgs	41 days

Discussion

Local symptoms/signs of inflammation (cellulitis), laboratory and clinical evidence of coagulopathy (clotting time and evidence of bleeding) were the criteria used for further doses of ASV. Urine output and blood urea and serum creatinine were used for giving dialysis support [8].

The delay between bite and hospital admission if it is more than 2 days revealed a lesser dose of ASV requirement as may be explained by the fact that the detoxifying system in the body will bring down the effect of venom [10]. The delay does not seem to affect the mortality and morbidity in this study too. As per WHO guidelines viper bites may require an initial dose of 5 vials and subsequent doses according to requirement [12, 13].

The common poisonous snakes, the fatal dose of the venom average delivered dose per bite and fatal period is shown in **Table – 2**.

Each ml of polyvalent anti snake venom serum neutralizes 0.6 mgs of dried Russell’s viper venom and 0.45 mgs of saw scaled viper [11].

Conclusion

In this study out of 45 patients 25 were males out of which 14 received high dose ASV and 20 were females out of which 5 received high dose of ASV and 15 received low dose. The death rate in HDG is 7.4% and in the low dose group was 11%. LDG had a prolonged hospital stay of more than 10 days as compared to high dose group. Age does not discriminate the requirement of ASV. Females require lower dose as compared to males. As there is a admission delay after the bite the requirement of ASV comes down. The clotting time has no relationship to LDG or HDG.

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