

Clinical Profile and Complications of Snake Bite Envenomation: Study from Tertiary Care Center Bikaner

Dr. Veer Bahadur Singh¹, Subhash Gaur², Deepak Kumar³, Babulal Meena⁴

¹Department of Medicine, Sardar Patel Medical College, Bikaner, Rajasthan, India

Abstract: *Context:* Every year 80,000 people are reported as victims of snakebite and about 25,000 to 50,000 people are reported as fatal victims mostly from the rural communities of India who lack the financial backups & basic awareness. *Aims:* This study was conducted to assess the clinical profile of snakebite cases reported to tertiary care institute in Bikaner Rajasthan. *Methods and Material:* 138 patients admitted with history of snakebite in Medicine department, S.P.MC, Bikaner from Jan 2012 to Dec 2012 were included for prospective study. The demographic and clinical details of each case were obtained from the patients, their relatives and analysed. *Statistical analysis used:* Statistical Package for the Social Sciences, version 11.0 (SPSS Inc., Chicago, IL, USA). *Results:* Most common age group is 20-40 years. Males were prone to the bites more in rainy seasons (May to August) during day time mostly involving their lower limbs. Poisonous bites are more common among hospitalized patients. The mortality rate of our study was 5.79% *Conclusions:* Snake bite complications remains to be common medical emergency being more frequent in agricultural and farm workers, thus becoming a sort of occupational hazard. Viper bites are more in this area than elapsidae bites. So role of monovalent asv was more in comparison to polyvalent asv, if available than undue complication of polyvalent asv can be prevented. Comorbidity was more among patient reported late to hospital thus emphasis on early transport and primary first aid need to be emphasized.

Keywords: Envenomation; Antisnake venom; Bandi; Viper bite; occupational hazard.

Key Messages

- 1) Need for development of monovalent ASV
- 2) Specific mass media communication programs.
- 3) Emphasis for early transport and better primary first aid at peripheral especially rural areas.

1. Introduction

Snakes have always held a great fascination for people, which has often bordered on an obsession. Since prehistoric times, snakes have been shrouded in mysticism and superstition. This fascination is due at least partly to their very strange shape and motion and their ability to strike unexpectedly with deadly accuracy. With such inhuman and 'unnatural' attributes people consider them to be supernatural and superhuman. Snake bite is one of the most neglected public health issues in poor rural communities living in the tropics. Globally, at least 421,000 evenomation and 20,000 deaths are estimated to occur annually from snakebites; however, these figures may be as high as 1,841,000 and 94,000, respectively¹. Based on the most conservative country estimates, India had the highest number of evenomation (81,000 per year) and the highest number of deaths (11,000 per year) due to snakebite in the world, mostly effecting the farmers and rural community thereby making it a occupational hazard^(2,3). The actual incidence of snakebite may be much higher, as the majority of cases occurring in villages go unreported. In India, 236 species of snakes have been identified out of which 52 are poisonous⁴. There are four medically important venomous land snakes in India, the Indian Krait (Bangarus Coeruleus), the common Cobra (Naja Naja), the saw scaled viper (Echis Carinatus) and Russel's viper (Viper Russellii). Viper bites are more common than other poisonous snakebites in human beings. Of the different varieties of viper, Russell's viper (*Vipera russelli*) commonly inhabits South Asian countries, and Russell's viper bite is regarded as an occupational hazard for

the farming community. A fragile symbiotic coexistence of the paddy farmer and Russell's viper is observed⁵. This study was conducted to put together the victim profiles of snake bite cases in this region and to determine the pattern of snake bite, and their various manifestations, complications and associated risk factors.

2. Ethic Statement

A written informed consent was obtained from each subject included in the study. Ethical approval for the study was obtained from the Ethical committee S P Medical College, PBM and A.G of hospitals Bikaner, Rajasthan prior to the commencement of the study.

3. Materials and Methods

This prospective study was conducted among the patient admitted to Medicine Department PBM and A.G of Hospital, a tertiary care centre of North West rajasthan from January 2012 to December 2012. This centre mostly provides tertiary care to the surrounding urban and rural community and is the main referral centre for snake bite cases in the region. All patients with relevant history suggestive of evenomation admitted to PBM Hospital were included in the study. Patient who did not show any signs of evenomation or the patient who had received antisnake venom prior to presenting to our institution were excluded from the study. Insect bite cases were excluded from the study. The condition of each snakebite patient admitted to the hospital was followed up from the time of admission to the end of

their hospital stay. Modified criteria of Sarangi et⁶ at was used to identify and determine the severity of snake bite. Clinical details of each patient were registered, and statistical analysis was conducted using the Statistical Package for the Social Sciences, version 11.0 (SPSS Inc., Chicago, IL, USA)

4. Result

In our study during January 2012 to December 2012 total 14600 patients were admitted in different Medicine Wards and out of them 138 were snake bite patients. So in this region, the incidence of snake bite was 945.2/100000. The victims were predominantly males (n=109, 79%) mostly of age group 20- 50ys (n=94; 68.11%) with maximum morbidity seen in 2nd and 3rd decade (n=41; 29.7%). Rural communities were severely effected in comparison to urban community (n=124; 89.9%) as major victims were farmer (n=77; 55.8%) thus manifesting predominantly as a occupation hazard to farmers. (graphs 1,2 and 5) Most incidence of snake bite were seen during May to July (n=89; 64.49%) with peak incidence occurring during June (n=34; 24.46%) i.e. mostly at the verge of onset of rainy season (Graph 4). Majority of snake bite were caused by BANDI (viper) (Graph 3) (n=95; 68.8%) effecting lower limb (n=104; 75.4%) mostly during early morning i.e. 5a.m to 8a.m and during late evening hours. i.e. 7p.m to 9p.m (n=83; 60.1%) correlating with agriculture workers time of arriving or returning to their field. Definitive fang marks were noted in most of patients (n= 127; 92%) whereas 11 patients among whom no fang mark were noticed were admitted based on relevant history or sign of envenomation. Most of the snake bite patients (n=108) were reported at hospital within 24 hours and out of them 94 were from rural area while all urban area patients (n=14) were reported to hospital within 24 hours of snake bite. Twelve patients reported within 24-48 hours and 2 patients reported within 49-72 hours. In present study, 16 patients were reported at hospital after 72 hours. In present study out of 138 patients 103 (74.6%) patients had positive 20 min WBCT indicating more incidence of haemorrhagic snake bite. 61% of the patients presented with features of pain, swelling and bleeding from site of injury (n=85). Other features were hematuria, ecchymosis, ptosis, renal failure, respiratory failure and intracranial bleed (table no 1).

Table 1: Presentation of Victims

Presentation	No of patients	Percentage
Pain, swelling and local bleed	85	61.5%
Hematuria	53	38.4%
Renal failure	41	29.7%
Ptosis	10	7.24%
Respiratory failure	10	7.24%
Intracranial bleed	3	2.1%

Other blood parameter including coagulation profile is demonstrated in the table no 2

Table 2: Blood profile parameters

Blood parameter	Percentage	No of patients
Increased counts	63.7%	88
Reduced platelets	48.55	67
Raised BT	24.6%	34

Raised CT	31.1%	43
Raised PT	19.5%	27
Raised APTT	6.5%	9

All the patients in whom it was decided to give ASV were premedicated with chlorpheniramine maleate. Intracutaneous testing was carried out. All patients who showed any reaction were given further dose of chlorpheniramine, hydrocortisone and started on ASV infusion. Neostigmine was administered to all patients with neuromuscular paralysis till reversal of neurotoxic manifestations. Blood transfusion, respiratory assistance and dialysis were carried out as and when indicated. Out of total 138 patients, cobra bite was found in 15 patients and their mean ASV was 20.67±12.23 vials, 28 patients had unknown bite and their mean ASV was 24.64±14.78 vials while maximum patients had viper bite (n=82) and their mean ASV was 43.78±30.41. details are mentioned in the table below (table 3).

Table 3: ASV Consumption

Consumption of ASV	Type of Snake Bite						Total	
	Cobra		Unknown		Viper		No.	%
	No.	%	No.	%	No.	%		
≤ 20	8	6.4	22	17.6	23	18.4	53	42.4
21-40	7	5.6	3	2.4	40	32.0	50	40.0
41-60	0	-	3	2.4	6	4.8	9	7.2
>60	0	-	0	-	13	10.4	13	10.4
Total	15	12.0	28	22.4	82	65.6	125	100
Mean	20.67		24.64		43.78			
SD	12.23		14.78		30.41		P value:<.001	

Most of the patient recovered with no or minimal residual deformity. Out of total 109 males 3 (2.8%) died while out of total 29 females 5 (17.2%) were died. Mortality in viperidae bite was 8 out of total 95 patients and elapsidae bite no death was reported. Most common cause of death was acute renal failure where 5 (12.2%) death were found out of total 95 renal failure patients despite repeated dialysis and other renoprotective intervention, while 3 (100%) deaths were observed due to ICH. All the death were observed in patients whose time to reach hospital were >72 hours. The mortality rate of our study was 5.8 %.(Table no 4)

Table 4: Mortality statistics

Particulars	No of patients	Percentage
No of deaths	8/138	5.79%
Mortality and snake species		
Viperidae	8/95	8.4%
Elapsidae	0/15	0%
Cause of death		
ARF	5/41	12.2%
ICH	3/3	100%
Time elapsed b/w bite and mortality		
<72hrs	0/122	0%
>72hrs	8/16	50%

5. Discussion

In the present study the overall incidence of snake bite is 945.2/100000 admission in general medicine wards. In India the incidence of snakebite is 66-163/100000 total hospital admission (WHO Bulletin OMS 1998). Banerjee and Siddiqui also observed an incidence of 133/100000 patients

⁽⁷⁾ in his study. In our area higher incidence is probably due to large area covered by our institute and because we took only the patients who were admitted in medicine ward. Almost all age groups were affected from snake bite, occurring most commonly among young adults as they are most active population group. Farmers are more prone to accidental contact with snakes while working in the field barefooted, which is a common phenomenon observed in India ^(8,9) and globally ⁽¹⁰⁾. The incidence varies in different regions of India due to various factors mainly among them being the rainfall, rainy season, pattern of agricultural activity. In our study most of the snakebite cases were reported in June and July, the high incidence corresponds to month of rainy season when rain water compels the snake to come out of dwellings, this also coincides with the season of busy agricultural activity. These bites were mostly due to accidental stamping on a snake while working, an observation that is common to similar studies. Upper limb bites usually occur during harvesting due to accidental exposure to snakes while holding onto grass. In our study most of snake bite patients (78.3%) were reported in hospital within 24 hours. Out of them 94 were from rural while all urban area patients reported to the hospital within 24 hours of snake bite, 16 (11.6%) patients were reported at hospital after 72 hours post bite. In our study out of 138 patients, haemorrhagic manifestations 123(89%) were noticed more frequently than neurotoxic and paralytic features 15(10.9%). Our findings similar to Hayat and Khan¹¹ in which haemorrhagic manifestation 95% and neurotoxicity occur 5% of cases. Other presenting manifestation were hematuria (includes both microscopic as well as gross) 38.4%, renal failure 29.7%, ptosis 7.3%, respiratory paralysis 7.3% and intracranial bleeding 2.2%. No cardio toxicity was reported in our study. It was due to the fact that relative prevalence of toxic varieties of snakes could vary in different region of country depending of prevalence and distribution of snakes. Fang marks were absent in 8% however they later developed systemic features of toxicity within 12 to 24 hours of admission thus emphasizing the role of keeping the patient under observation for minimum 12-24hrs irrespective of presence or absence of fang marks. ASV is the only effective and specific treatment available for snakebite envenomation. Specific ASV treatment was given in the majority of cases. 1 ml of polyvalent ASV neutralizes 0.6 mg, 0.45 their mg, 0.6 mg and 0.45 mg of venom of common cobra, krait, Russell's viper and saw-scaled viper, respectively. Freeze dried (lyophilized) polyvalent ASV is reconstituted with 10 ml of sterile water and 0.1 ml of it is given intra-dermally as a test dose. The patient is then carefully observed for allergic manifestations for half an hour. The reconstituted venom is then diluted in 500 ml of isotonic saline and infused at a constant rate over a period of about one hour. Polyvalent ASV infusion is continued until bleeding tendency is controlled. If there are allergic reactions in the form of fever, itching or urticaria, polyvalent ASV administration is withheld and continued after the administration of corticosteroids and antihistaminic. A wide regional variation in the composition of venom has been reported¹² hence, it is recommended to use an indigenously developed ASV that is particular to that region so as to avoid treatment failure. Soft tissue infections are a major complication of snakebites with local evenomation. The proteolytic properties of snake

venom cause extensive tissue destruction and devitalisation, which predisposes the wound to secondary infection predominantly anaerobic. Although bacteria are a major cause of wound infection in snakebite patients, the role of prophylactic antibiotics to prevent their formation is debatable. Cellulitis was reported in a large number of patients in our study. This higher rate may be related to the local treatment which the patient received either from quacks or ojhas at their locality. The uses of unclean instruments, sucking and cutting on the wound are other common risk factors for infection. Also the venom effects of swelling and blistering are commonly mistaken for bacterial infection. No fatal outcome was reported in the victims admitted within 24 hours of snake bite, thus suggesting the effectiveness of early specific treatment. 8 fatalities that were reported in our study were among the patient who reported 72 hrs post bite. Delays in admission could be attributed to a lack of awareness regarding the hazards of snakebites among the general public, an unrelenting belief in the traditional system of medicine, a lack of proper primary healthcare system and difficulties encountered in transportation of the victim. All the patients who died were in the age group of 20-40 years, out of the 8 patients who died 3(2.8%) were male and 5(17.2%) were females. Thus out of 109 males 3(2.8%) died and out of 29 females 5(17.2%) died. Mortality rates were more or less similar to other studies conducted at Haryana¹³, West Bengal¹⁴ and Jammu¹⁵. All the deaths were among the patients bitten by viperidae and no death occur by elapsidae. The cause of death among 3 patients was intracranial bleed due to severe coagulopathy whereas 5 patients died due to renal failure. Hence, prompt hospital admission and administration of ASV to a snakebite victim is vital.

6. Conclusion

Snake bite remains to be one of the common medical emergencies being more frequent in rural agricultural and farm workers. Viper bites are more common than elapsidae bite in our area. Various preventive measures can be adopted in reducing the incidence of snake bites in rural communities. The use of protective footwear and proper illumination at night could reduce the incidence of snakebites. Deep vegetation and grassy embankments in the fields must be approached cautiously, especially after the rains. The areas surrounding human dwellings should be kept free from weeds, an ideal shelter for snakes. Blocking crevices and effective rodent control around residential premises would prevent the entry of snakes into human dwellings. Morbidity rates were proportional to the time elapsed in administration of ASV. Antisnake venom is the boon for snakebite patient if it is given in appropriate time. Though associated with anaphylactic reactions it remains safe and effective tool in preventing the morbidity. Most of the patients required less than 40 vials of ASV. Duration of ASV administered was from 4 hours (single dose) to 3 days. Administration of ASV beyond 40 vials didn't showed any mortality benefits and sometime even resulted in anaphylactic reaction thus increasing the duration of hospital stay of the patients. Another important observation of our study was the need for development of monovalent ASV specific to particular snake family along with Polyvalent

ASV which would be helpful in preventing unnecessary side effects and also more effective neutralizing specific venom.

7. Future Scope

Snake envenomation is a neglected tropical disease. It predominantly affects rural people in remote communities, where access to health care is very limited and people usually rely on traditional treatment. The incidence of snake venomation varies widely across various geographical regions. It's a big health issue in this part of country as living condition is ideal for snakes. Viper envenomation in this area is predominated by local viper species termed bandi. Haemorrhagic manifestation predominates the clinical picture and its severity increases proportionately to the delay in receiving health care. This delay is mostly contributed equally to the lack of education as well as prevalence of myths among rural community. Most of envenomation respond well to polyvalent antsnake venom available at healthcare centre, however various case reports have come to light in recent time when either patient developed life threatening complication or failed to respond to this antsnake venom so its high time to develop monovalent antsnake venom specific to snake species prevalent in particular geographic area.

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