

## Original Research Article

# Clinical profile of snake bite patients in tertiary care hospital in Himachal Pradesh: a prospective study

Madan Kaushik<sup>1\*</sup>, Vikas Banyal<sup>2</sup>, Sachin Sondhi<sup>3</sup>, Manish K. Thakur<sup>1</sup>, Aseem Kaushik<sup>1</sup>

<sup>1</sup>Department of Medicine, I. G. Medical College, Shimla, Himachal Pradesh, India

<sup>2</sup>Department of Medicine, RPGMC, Kangra, Himachal Pradesh, India

<sup>3</sup>Department of Cardiology, I. G. Medical College, Shimla, Himachal Pradesh, India

**Received:** 08 May 2018

**Accepted:** 31 May 2018

### \*Correspondence:

Dr. Madan Kaushik,

E-mail: [madankaushik2002@yahoo.com](mailto:madankaushik2002@yahoo.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** To study clinical profile of snake bite patients in tertiary care hospital in Indra Gandhi Medical College at Shimla, Himachal Pradesh of North India.

**Methods:** Hospital based prospective observational study was conducted in the Department of Medicine, for the duration of one year from 1<sup>st</sup> June 2013 to 31<sup>st</sup> May 2014.

**Results:** A total of 78 patients were admitted with mean age of 38.46 years with male to female ratio of 1:1.6. Seasonal variation with peak incidence during rainy season was seen. Most common snake identified was green coloured and peak timing of snake bite was between 07:00am-04:00pm. There was delay in admission of more than 6 hours in 66.67% of cases. Hemotoxicity was predominant manifestation seen in 62.82% of cases and persistence of coagulopathy was most common complication (51.02%) despite giving optimal ASV. There was paucity in ASV administration seen in only 59.46% of referred patients. Mean ASV vials used were 23.41 vials  $\pm$  8.72 vials.

**Conclusions:** Mass education is required at both general population and health professional levels to improve snake bite management and monovalent ASV against Green pit viper is more practical option to manage cases in this region.

**Keywords:** Anti snake venom, Green pit viper, Snake bite

## INTRODUCTION

Snake bite is a major health problem throughout the world, more so in tropical and sub-tropical countries. With rapid urbanization and deforestation, snake bite cases form a significant group of hospital admissions and it continues to impose a tremendous cost of suffering and chronic disability on many of the world's poorest communities<sup>1</sup>

In a predominantly agricultural country like India with its rich ophi- fauna, the encounter between snake and humans is a frequent occurrence. Romulus Whitaker pointed out the four most common venomous snakes

found in India are cobra (*Naja naja*), the common krait (*Bungarus caeruleus*), the Russell's viper (*Daboia russelii*) and the saw scaled viper (*Echis carinatus*).<sup>2</sup> He called them the "Big Four" and attributed them for majority of mortality due to snake bites in India. This concept of the "Big Four" has further restricted the development of effective snake antivenoms as the widely available polyvalent snake antivenom available in India is effective against these four snakes while there are many regions in India where snakes other than the "Big Four" causes majority of bites and no effective antivenom is available for such cases. Snakes bite millions of people annually creating a major but often neglected health problem of the tropics due to lack of antivenoms. Further

the deficiencies in the management of complications, transportation, hospital equipment's and public knowledge of appropriate first aid, results in a mortality rate which is one many fold higher than in developed countries.<sup>3</sup>

Snake bite constitutes important cause of morbidity and mortality in the hills due to abundant vegetation, long rainy season, scattered population using forest paths for farming and collecting fodder for livestock makes people living in these areas particularly prone to snake bite. Further ignorance, use of indigenous medicines and delay in transportation due to the hilly terrain prevent patients from reporting in time to the health centres where snake antivenom is available. The sub-species in the sub Himalayan region are often different from rest of country, so response to snake antivenom and outcome varies.

In spite of high prevalence there are not many studies about the clinical profile and management of snake bite.

## METHODS

The prospective observational study was conducted in the Department of Medicine, Indra Gandhi Medical College Shimla for the duration of one year from 1<sup>st</sup> June 2013 to 31<sup>st</sup> May 2014.

All the patients admitted in Department of Medicine with history of snake bite were followed up from the time of admission throughout their stay in hospital. After obtaining consent the data was collected on pre designed and structured proforma by interviewing the study subjects who were hospitalized during the study period or the accompanying persons. The data was then processed using Microsoft Excel and results were analysed and compared with similar studies done earlier in our country.

### Inclusion criteria

The patients included in the study were

- Those with a history of snake bite and
- Age more than 18 years.

### Exclusion criteria

Patients with history of trauma, insect bite or thorn prick were excluded from the study.

## RESULTS

A total of 78 patients were admitted and studied in our study. Mean age was 38.46±13.06 years with male to female ratio of 1:1.6. Majority of patients were from rural background (88.46%) and were bitten while working in fields (71.80%). Most of the admissions (60.25%) were during rainy season that is from July to September and there were no admissions in January and February. The most common time of snake bite observed in our study,

n=27 was from 7:00 am-12:00 pm (34.62%). The most common site of bite seen in patients was in foot (44.88%) and was closely followed by hand (43.59%). Most of the bites n=27 were by green coloured snake (34.61%) and in 25 cases colour of snake could not be identified. The most common time of snake bite observed in study n=27 was from 7:00 am-12:00 pm (34.62%) followed by 12:01pm-04:00pm (24.36%). Sixty-one patients (78.20%) in our study were having fang marks. 33.33% were admitted within 6 hours of snake bite.

The 41 patients (52.56%) were new and they directly came to IGMC while 37 patients (47.44%) were referred. In this study out of 37 referred patients, only 22 received ASV (59.46%). 57 patients had local and systemic envenomation (73.07%), 12 patients had local envenomation (15.39%), 04 patients had systemic envenomation only (5.13%) and 05 patients did not show any envenomation (06.41%) and were discharged after observation. Majority of patients n=49 had raised WBCT at presentation (62.82%) and 28 patients had normal WBCT at presentation (35.90%). It was not done in one patient. Most patients (74.36%) presented with pain and swelling of affected limb. The most common complication observed in the study was persistence of coagulopathy and was seen in 51.02% of patients. Out of 78 patients, 70 were discharged (89.74%), 03 patients died (3.85%) and 05 patients either left against medical advice (LAMA) or were discharged on request (DOR). The number of ASV vials used ranged from 1-40 vials. Mean ASV vials used were 23.41 vials ±8.72 vials.

**Table 1: Epidemiological profile of snake bite patients.**

Age group (yrs)	No. of patients	Percentage
18-30	27	34.61%
31-40	22	28.20%
41-50	12	15.39%
51-60	12	15.39%
>60	5	6.41%
Sex distribution	Male	Female
	38 (38.46%)	40 (61.54%)
Domicile	Rural	Urban
	69 (88.46%)	09 (11.54%)
Occupation	Agriculture	Other
	56 (71.80%)	22 (28.20%)
<b>Month wise distribution</b>	<b>No. of patients</b>	
Jan- Mar	01 (1.28%)	
Apr-June	20 (25.64%)	
July- Sep	47 (60.26%)	
Oct- Dec	10 (12.82%)	
<b>Time of bite</b>	<b>No. of patients</b>	
07:01am- 12:00pm	27 (34.62%)	
12:01-04:00pm	19 (24.36%)	
04:01pm-08:00pm	14 (17.95%)	
08:01pm-07:00am	18 (23.07%)	

**DISCUSSION**

**Age**

Age of victims ranged from 19 years to 65 years. Mean age was 38.46yrs±13.06 yrs and majority of the snake bites occur in the age group of 18-40 years (62.81%) which was in concordance with findings observed by other authors.<sup>4-7</sup>

**Sex**

In the present study, out of 78 patients, 30 (38.46%) were males and 48 (61.54%) were females. The male to female ratio was 1:1.6. A study by Francis N P Monterio et al, most victims were females (60%), male-female ratio being 1:1.5 but many authors reported male predominance.<sup>4-9</sup> It is because in this region females are involved more in agricultural activities than men.

**Domicile and occupation**

Rural population (88.46%) and agriculturists (71.79%) are more commonly affected as observed in other studies.<sup>4,9,10</sup>

**Seasonal variation**

There is also a seasonal variation with peak incidences in rainy season i.e. from July to September (60.25%) as observed in other studies as natural habitat of snakes is flooded and wander in search of shelter.<sup>4,10,11</sup>

**Time of bite**

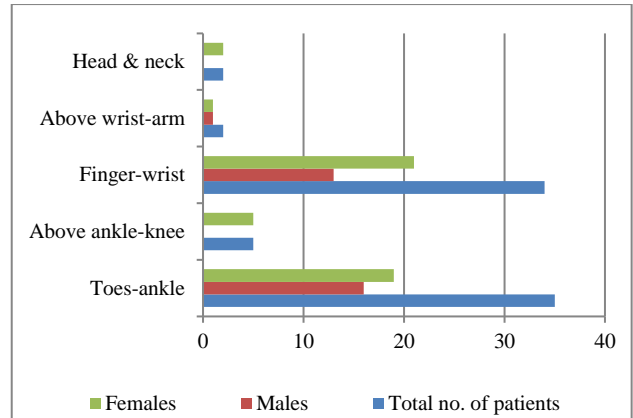
The most common time of snake bite observed in the study was from 7:00 am-12:00 pm (34.62%) followed by 12:01pm-04:00pm (24.36%). This trend was also observed in studies by Hayat AS et al, and by Bawaskar HS et al.<sup>12-13</sup>

However, Anjum et al, observed peak incidence of snake bite between 6:00 PM to midnight (30.2%), followed by midnight to 6:00 AM (24.9%).<sup>10</sup> In our study, peak timing of snake bites coincided with peak outdoor activity hours when people are more prone to have contact with snakes.

**Site of bite**

The most common site of bite seen in patients was in feet (44.88%) and was closely followed by hands (43.59%) as seen in other studies.<sup>4,11</sup>

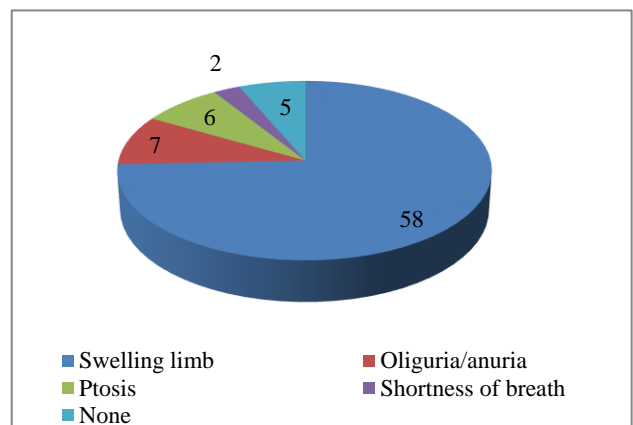
However, few authors observed increased incidence of lower limb involvement than upper limb. In our study comparatively, increased incidence of bites over hands may be because women in the hills cut grass for fodder and the left hand is used for holding the grass which may provoke the snake hiding in the grass.



**Figure 1: Site of bite.**

**Presentation of patients**

74.36% of patients (n=58) had pain and swelling limb, 8.98% (n=7) had AKI (oliguria / anuria), 7.69% (n=6) were having ptosis, 2.56% patients (n=2) had shortness of breath and 6.41% (n=5) had no complaints other than snake bite. This was in close concordance with a study by Radewad N et al.<sup>14</sup> Another study by Raina S et al, in Himachal Pradesh observed more cases with neuroparalytic manifestations (29.28%), haematological complications were observed in 28.5% patients and acute kidney injury observed in 11% of patients.<sup>5</sup> The preponderance of haemotoxic manifestations could be due to widespread distribution of green pit viper in Shimla and adjoining districts which is known for predominant local signs in the form of pain, marked swelling, bruising and bleeding. Elapids and kraits are found less commonly in this region.



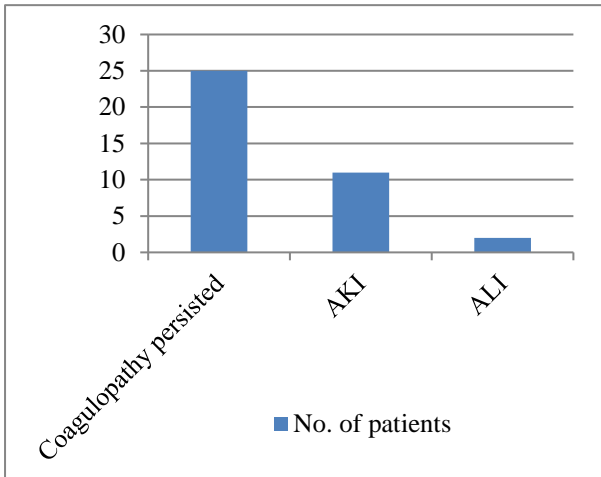
**Figure 2: Presentation of patients.**

**Treatment before referral**

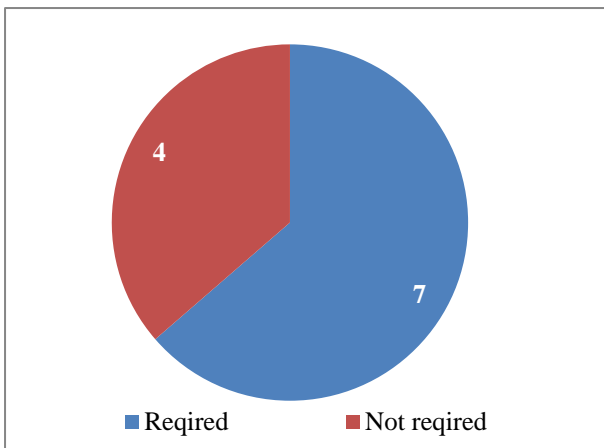
Out of 78 patients, 37 patients had an initial contact with local health facility but only 22 patients (59.46%) received ASV which is contrast to study by Radewad N et al, where 92.6% received ASV at primary health centre level.<sup>14</sup> It may be because of non availability of ASV or

underestimating the morbidity or mortality by snake bites or fear of adverse reactions after giving ASV.

There is also a long delay between snake bite and contact with health professionals due to difficult terrain and transportation in hills with 66.67% of patients admitted after 6 hours of bite.



**Figure 3: Complication haemodilysis.**



**Figure 4: Patients needing.**

**Fang marks and envenomation**

Sixty one patients in our study were having fang marks (78.20%), while 17 patients did not have fang marks (21.80%). Also, in our study 73 patients (93.59%) showed signs of envenomation. Out of 61 patients having fang marks, 57 patients (93.44%) had envenomation and from 17 patients who did not have fang marks, 16 had envenomation (94.12%). So, it is clear from our study that absence of fang marks does not rule out snake bite and it is imperative to keep the patients under observation to see for development of envenomation.

Most common snake identified was green in colour i.e. Himalayan green pit viper. Hemotoxicity was more common among symptomatic patients, seen in 62.82% of

cases determined by raised WBCT, which is in contrast to other studies from north India showing neurotoxicity as predominant manifestation which suggests predominance of different species of snake in this region.<sup>4,5,11</sup>

**Complications**

The most common complication observed in the study was persistence of coagulopathy and was seen in 25 patients (51.02%) out of 49 patients having raised WBCT, despite giving maximum recommended dose of ASV as per National snake bite management protocol 2008 (India). This is because the polyvalent ASV available does not contain antiserum against green pit viper venom, widely prevalent in this region. 11 patients had AKI (14.1%) and 07 patients (08.97%) needed haemodialysis. Incidence of AKI was almost similar to what was observed in study by Raina S et al (11%) but in the study by Radewad N et al, AKI was observed in 43.3% of cases due to different types of snakes in that region.<sup>5,14</sup>

**CONCLUSION**

Snake bite is an important cause of morbidity and mortality among the poor, rural tropical population and management of medical emergencies like snake bite in mountainous terrains is a challenge in itself. Mass education programmes are required at both general population and health professional levels to break the myths and regarding timely management of snake bites. haemotoxicity was the predominant manifestation seen in this study and persistence of coagulopathy as the most common complication even after giving ASV. Possibly the polyvalent ASV available is not effective against the snake venoms which are prevalent in this region. Further studies on venom biochemistry and suitable antidote are warranted and effective monovalent ASV may be practically and economically a better choice in this region.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

**REFERENCES**

1. Warrell DA, Gutiérrez JM, Calvete JJ, Williams D. New approaches & technologies of venomics to meet the challenge of human envenoming by snakebites in India. Ind J Med Res. 2013;138(1):38.
2. Whitaker R. When a Cobra strikes: Close-up. The Hindu magazine. 2007. Available at: <http://www.hindu.com/mag/2004/06/13/stories/2004061300400200.htm>.
3. McGain F, Limbo A, Williams D, Didei G, Winkel KD. Snake bite mortality at Port Moresby General Hospital, Papua New Guinea 1992-2001. Med J Aust. 2004;181:687-91.

4. Sharma N, Chauhan S, Faruqi S, Bhat P, Verma S. Snake envenomation in a north Indian hospital. *Emerg Med J.* 2005;22:118-20.
5. Raina S, Raina S, Kaul R, Chander V, Jaryal A. Snakebite profile from a medical college in rural setting in the hills of Himachal Pradesh, India. *Indian J Crit Care.* 2014;18(3):134-8.
6. Wanje SD, Gadekar RD. Clinical profile of snake bite cases in Marathwada, India. *Ind J Fundamental App Life Sci.* 2011;1(4):93-9.
7. Alirol E, Sharma SK, Bawaskar HS, Kuch U, Chappuis F. Snake bite in South Asia: a review. *PLoS Negl Trop Dis.* 2010;4(1):e603.
8. Monteiro FN, Kanchan T, Bhagavath P, Kumar GP. Epidemiology of cobra bite in Manipal, Southern India. *J Ind Acad Forensic Med.* 2010;32(3):224-7.
9. Sharma SK, Chappuis F, Jha N, Bovier PA, Koirala S. Impact of snake bites and determinants of fatal outcomes in South Eastern Nepal. *Am J Trop Med Hyg.* 2004;71(2):234-38.
10. Anjum A, Husain M, Hanif SA, Ali SM, Beg M and Sardha M. Epidemiological Profile of Snake Bite at Tertiary Care Hospital, North India. *J Forensic Res.* 2012;3:146.
11. Bhardwaj A, Sokhey J. Snake bites in the hills of North India. *National Med J India.* 1998;11:6:264-5.
12. Hayat AS, Khan AH, Shaikh TZ, Ghouri RA, Shaikh N. Study of snake bite cases at Liaquat University Hospital Hyderabad/Jamshoro. *J Ayub Med Coll Abbottabad.* 2008;20(3):125-7.
13. Bawaskar HS, Bawaskar PH, Punde DP, Inamdar MK, Dongare RB, Bhoite RR. Profile of Snakebite Envenoming in Rural Maharashtra, India. *JAPI.* 2008;56:88-95.
14. Redewad N, Bhaisare SD, Bansod YV, Hire R. Management and outcome study of snake bite cases in central India. *Sch J Appl Med Sci.* 2014;2:435-41.

**Cite this article as:** Kaushik M, Banyal V, Sondhi S, Thakur MK, Kaushik A. Clinical profile of snake bite patients in tertiary care hospital in Himachal Pradesh: a prospective study. *Int J Res Med Sci* 2018;6:2444-8.