

A study on the clinical, epidemiological profile and the outcome of the snake bite victims in kashmir valley

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ABSTRACT

Background: India is estimated to have the highest snakebite mortality in the world. In India, around 250,000 incidents of snake bite are reported annually with 50,000 deaths. There are about 236 species of snakes in India, most of which are nonpoisonous. Most snakes found in Kashmir valley are nonvenomous of colubridae family (ptyas mucosus or grass snake). **Materials and Methods:** This Hospital-based retrospective and prospective study was conducted at Sher-i-kashmir Institute Of Medical Sciences Srinagar, a multispeciality teaching hospital having clinics for various medical and surgical specialities. All snake bite patients admitted in department of Emergency Medicine, other specialities, and critical care medicine were taken in this study over a period of 3 years. **Results:** Among a total of 108 cases of snake bite, majority were males (57.40%) and mostly 20 to 50 years of age (68.51%). Majority of victims were from rural areas (93.5%) and most of the bites occurred during day time (87.96%) mainly on the lower limbs (63.88%). Highest number of cases occurred from May to October (98.14%). Most of the victims were farmers. Bleeding was present in 13.88% patients and coagulopathy (International normalized ratio (INR)>1.2) in 63.88% of patients. Neuroparalytic features were present in 8.33% patients. Mortality in our study was 2.8%. **Conclusion:** Snake bite in our valley is an occupational hazard affecting working class engaged in farming in fields, fruit orchards, and forests in rural areas. There is seasonal variation with most envenomations occurring in peak months of agricultural activities. Non recommended first aid measures like tourniquet and incision are commonly encountered. Regular public health programmes regarding prevention, prehospital management (first aid), and immediate transfer to hospital should be emphasized.

Keywords: ASV, envenomation, orchards, snake bite

Introduction

Snake bite is a common cause of morbidity and mortality worldwide, especially in tropical countries. India is estimated to have the highest snake bite mortality in the world. In India, around 250,000 incidents of snake bite are reported annually with 50,000 deaths.^[1] However, the true scale of mortality and morbidity in India remains uncertain.^[2] There are about 236 species of snakes in India, most of which are nonpoisonous.^[2] Their bites, apart

from causing panic reaction and local injury, do not harm the patient. However, there are 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.^[3] Most snakes found in Kashmir valley are nonvenomous of colubridae family (*ptyas mucosa* or grass snake). The poisonous ones include^[4]: Levantine viper (*Macroviperalebetina*) locally known as Gunas and is haemotoxic and Himalayan Pit viper (*Gloydius Himalayanus*) which is also haemotoxic. Most commonly affected people are agricultural workers.^[5] Lack of knowledge among rural people leads to use of inappropriate first aid measures, increasing mortality, and complications in snake

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bite victims.^[5] As majority of bite occur in rural areas, primary care physicians should be well versed with management of snake bite patients to decrease morbidity and mortality associated with snake bite envenomation. This study was carried to know clinical profile, epidemiology, and outcome of snake bite patients admitted to tertiary care hospital.

Material and Methods

This Hospital-based retrospective and prospective study was conducted at Sher-i-kashmir Institute Of Medical Sciences Srinagar, a multispeciality teaching hospital having clinics for various medical and surgical specialities.

All snake bite patients admitted in the department of Emergency Medicine, other specialities, and critical care medicine were taken in this study over a period of 3 years.

Data were collected from snake bite case record sheets retrieved from Medical Record Section for retrospective cases. For prospective cases, data were collected from patient record register during hospital stay. Data were entered into standardized intake forms.

The Statistical Package for the Social Sciences software (version 20.0, IBM Corp, New York, USA) was used for statistical analysis. All the continuous variables of the study were shown in terms of frequency and percentages. The standard statistical tests like Chi-square and the Fischer test was used to analyze the data of categorical pattern. A *P* value < 0.05 was considered statistically significant.

Results

A total of 108 cases of snake bite patients were studied over a period of 36 months. Out of the 108 cases, 62 (57.40%) were male and 46 (42.59%) were female; 10 (9.2%) patients were aged less than 10 years, 50 were 10 to 30 years old (46.29%), and 48 (42.59%) were >30 years. None of the patient was aged more than 65 years.

We received 106 (98.14%) patients with snake bite mainly from May to October, while only 2 (1.8%) of patients presented in other 6 months. Majority of patients were from rural areas (101 patients), with only 7 cases from urban areas. Out of the 108 cases of envenomings, 72 (66.66%) occurred in field, 18 (16.6%) in orchards, 12 (11.11%) in courtyard, and 6 (5.55%) in forests. Most of the snake bites occurred during day time (6 am to 6 pm), 95 (87.96%), as compared with 13 (12%) in night (6 pm to 6 am). Out of the 108 cases of snake bite, 68 were identified as viper bites (commonly referred as gunas), while snake remained unidentified in rest of 40 cases.

Site of bite: maximum number of bites were seen on lower limbs, 69 (63.88%), followed by upper limbs, 34 (31.48%), and 5 (4.62%) had bites at other sites (penis, face, and back). First

aid: measures like tourniquet was present in 62 (57.40%) patients and incision was present in 12 (11%) [Figure 1]. Some even used leeches for blood sucking [Figure 2].

Definitive Fang marks were present in 62 (57.40%) cases [Figure 3]. Local symptoms/signs included pain, swelling, tenderness, blisters [Figure 4], and lymphadenopathy [Table 1]. Neuroparalytic features were present in 9 cases [Table 2].

Haematotoxic manifestations [Table 3]: 10 patients had ecchymosis [Figure 5], 5 cases presented with bleeding from bitten sites, one each patient had GI bleed, hemoptysis, and IC bleed, and coagulopathy (INR >1.2) was present in 69 cases (63.88%).

Anti-Snake Venom (ASV) was used in 105 patients, mean ASV required in patients was 100 ml. In patients with Haematotoxic features, mean ASV required was 110 ml and mean ASV of 195 ml in patients with neuroparalytic features.

Complications: 11 patients developed compartment syndrome, all requiring fasciotomy and improved. Renal failure developed in 5 cases. One patient developed intra cranial haemorrhage (ICH).

Out of 108 patients, 3 patients died, 2 had renal failure, and 1 developed ICH, with mortality of 2.8% in the study.

Discussion

In our study, out of 108 cases, 57.40% were male and 42.59% were female. Males are affected more often than the females, as they constitute the working majority who are actively engaged

Table 1: Symptoms/signs at bite site

Symptoms/signs	Number of patients (n)
Pain	105
Swelling	97
Tenderness	99
Blisters	15
Lymphadenopathy	5

Table 2: Haematotoxic manifestations

Symptoms/signs	Number of patients (n)
Bleeding from bite site	5
Ecchymosis	10
GI bleed	1
Hemoptysis	1
ICH	1
Coagulopathy	69

Table 3: Neurotoxic manifestations

Symptoms/signs	Number of patients (n)
Ptosis [Figures 6 and 7]	5
Ophthalmoplegia [Figures 8 and 9]	2
Bulbar weakness	2



Figure 1: Incision over bite site used as first aid



Figure 2: Multiple bite sites caused by leech used as first aid



Figure 3: Fang marks, two in number on ankle



Figure 4: Ruptured blister with redness following snake bite



Figure 5: Ecchymosis following snake bite on upper limb



Figure 6: Bilateral ptosis after snake bite

in farming and other outdoor activities. Our findings concurred with those of earlier studies.^[6,7] In our study, 46.29% of patients were aged between 10 and 30 years, followed by 42.59% aged greater than 30 years, and 9.2% of patients were less than 10 years of age. Majority of the patients were aged between 20 and 50 years (68.51%) probably due to their ambulant nature and working class in fields. Halesha *et al.*^[2] conducted study involving 180 cases of snake bite with majority of patients in age group of 20 to 40 years.

Majority of patients we received from May to October was 98.14% as compared with 1.8% in other 6 months coinciding with farming season in rice fields and fruit orchards, and probably during the winter months, the reptiles go into their hibernation period and hence the incidences are less.^[8] Most of the snake bites

occurred during day time (6 am to 6 pm), 87.96%, attributed to working in fields and fruit orchards. Similar observations were seen in other studies.^[9,10] Out of 108 cases of envenoming, 66.66% occurred in field, 16.6% in orchards, 11.11% in courtyard, and 5.55% in forests. In our study, all bites occurred outdoors. People working in fields were frequently exposed, in contrast to studies from other parts of India where significant bites occurred indoors.^[11] Most snake bites occurred in rural areas, concurrent to other studies.^[12,13]

In our study, out of 108 cases of snake bite, 68 (62.96%) were bitten by viper identified by patients, rest being by unknown



Figure 7: Improvement in ptosis after ASV therapy



Figure 8: Ophthalmoplegia in 16 year old boy bitten by snake on right foot



Figure 9: Patient improved after treatment with ASV

snakes. Poisonous snakes found in Kashmir valley are Levantine viper locally known as Gunas and is haematotoxic. Cobra which is commonly found in other parts of India has not been reported in our valley.^[4]

In our study, maximum number of bites were seen on lower limbs 63.88%, followed by upper limbs 31.48%, and 4.62% had bites at other sites (penis, face, and back), as limbs are frequently exposed during working in fields. This was comparable with other studies.^[14]

First aid measures like tourniquet was present in 57.40% patients and incision in 11% of patients, depicting lack of public awareness about recommended first aid measures. Halesha and colleagues reported tourniquet and incision in 50.55% and 13.33%, respectively.

Neurotoxicity was present in 9 patients out of 108 (8.33%) cases. It showed no statistical significance with age, sex, and bite site. Haemotoxicity was found in 63.88% of patients.^[15]

In 108 patients of snake bite, ASV was required in 105 patients. Mean ASV required in all patients was 100 ml. This was in par with Asif *et al.*,^[16] who reported similar mean effective dose of ASV as 120ml. Patients with coagulopathy required mean ASV of 110 ml, while in patients with neurotoxicity mean ASV of 195 ml was required. Our usage of ASV in neurotoxic envenomation parallels with Pramiladevi *et al.*,^[9] (180 ml), while it was more than reported by Bawaskar^[17] (150 ml).

In our study, 10.18% of patients developed compartment syndrome. In patients with tourniquet applied, 17.7% developed compartment syndrome as compared with none with no tourniquet applied, it was statistically significant (*P* value 0.0010). The use of tight ligatures and arterial tourniquets in the first-aid treatment of snakebite has been universally condemned by modern snakebite experts due to the increase of potential adverse effects and the lack of effectiveness.^[18-20] Out of the 108 cases of snake bite, 5 developed renal failure (4.62%). There was no statistical significance of Acute Kidney Injury with age, sex, bite site, and use of tourniquet.

In our study of snake bite patients, mortality was 2.8%. It was comparable with other Indian studies which reported mortality of 3% to 10.1%. In our study, we found no statistical significance on comparing mortality with age, sex, bite site, use of first aid measures like tourniquet and incision, and hypotension.^[21,22] Complications like coagulopathy, neurotoxicity, and compartment syndrome did not affect mortality significantly. Mortality was higher (40%) in patients who developed renal failure. It was statistically significant (*P* value 0.005). Although results were significant, only 5 patients out of 108 developed renal failure, which is too small to comment fully its effects on mortality. Primary care physicians should use Antivenom appropriately when indicated, counsel masses about harm of unscientific methods used by local population after snake bite, and referral to appropriate centers in view of complications.

Conclusion

Snake bite in our valley is an occupational hazard affecting working class engaged in farming in fields, apple orchards,

and forests in rural areas. There is seasonal variation with most envenoming occurring in peak months of agricultural activities and with diurnal variation as most bites occur during day time. Bites are commonly seen on extremities due to their exposure during work. Non recommended first aid measures like tourniquet and incision are commonly encountered. Only snake we could identify was Levantine viper, other species responsible for bites remained unknown. The mortality in our study was 2.8%, it was high in patients with renal failure but only few number of patients developed renal failure in our study. The immobilization and urgent transport of snake bite victim to hospital along with prompt administration of ASV remains the cornerstone to reduce the morbidity and the mortality associated with snake bites. ASV required in patients with neurotoxicity is high, repeat doses of ASV are required and should be carefully observed. There is an urgent need to educate the rural population about the hazards and the treatment of snake bite.

Take home message

There is need of awareness in general public about urgent shifting of snake bite patients to hospital and avoid unscientific methods for treatment, resulting in more harm than good.

Declaration of patient consent

Written informed consent was obtained from each patient for this study including images.

Ethical approval

The study was approved by the Institutional Ethics committee.

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Conflicts of interest

There are no conflicts of interest.

References

- Simpson ID, Norris RL. Snakes of medical importance: Is the concept of big four still relevant and useful? *Wilderness Environ Med* 2007;18:2-9.
- Halesha BR, Harshavardhan L, Lokesh AJ, Channaveerappa PK, Venkatesh KB. A study on the clinico-epidemiological profile and the outcome of snake bite victims in a tertiary care centre in Southern India. *J Clin Diagn Res* 2013;7:122-26.
- Warrell DA. WHO/SEARO guidelines for the clinical management of snakebite in the Southeast Asian Region. *Southeast Asian J Trop Med Public Health* 1999;30:1-85.
- Gopalakrishnakone P, Faiz A, Fernando R, Gnanathanan C, Habib A, Yang CC, editors. *Clinical Toxinology in Asia Pacific and Africa*. Toxinology. Vol. 2. Dordrecht: Springer; 2015.
- Warrell DA. WHO/SEARO guidelines for the clinical management of snakebite in the Southeast Asian region 2010.
- Bhat RN. Viperine snake bite poisoning in Jammu. *J Indian Med Assoc* 1974;63:383-92.
- Saini RK, Sharma S, Singh S, Gupta VK, Pathania NS. Primary pathological fibrinolysis insaw-scaled (*Echis carinatus*) viper bites. *J Assoc Physicians India* 1984;32:391-3.
- Patel S, Patel A, Ganjiwale J, Patel D, Nimbalkar S. The study of clinical profile and outcome of patients with snakebite in a rural community. *J Family Med Prim Care* 2021;10:1661-5.
- Pramiladevi R, Goornavar SM, Shreeram K, Umakanth B. Clinical profile of snake bite - 5 year study from North Karnataka, Bagalkot. *Int J Med Health Sci* 2012;1:61-70.
- Bruna G, Sashidhar RB. Epidemiological profile of snake-bite cases from Andhra Pradesh using immunological approach. *Indian J Med Res* 2007;125:661-8.
- Sharma S, loutan L, Koirala S, Chappuis F, Jha N, Bovier P. Impact of snake bites and determinants of fatal outcomes in Southeastern Nepal. *Am J Trop Med Hyg* 2004;71:234-8.
- Hayat AS, Khan AH, Shaikh TZ, Ghouri RA, Shaikh N. Study of snake bite cases at Liaquat University Hospital Hyderabad/Jamshoro. *Ayub Med Coll Abbottabad* 2008;20:125-7.
- Gutiérrez J, Williams D, Fan H, Warrell D. Snakebite envenoming from a global perspective: Towards an integrated approach. *Toxicon* 2010;56:1223-35.
- Bhoi S, Gupta V, Goel A, Singh J. Clinical profile of venomous snake bites in North Indian military hospital. *J Emerg Trauma Shock* 2008;1:78-80.
- Rao KV, Ramesh G, Acharya A. Clinicoepidemiology, clinical profile and outcome of venomous snake bite in children in Konaseemaregion of Andhra Pradesh, India. *Int J Contemp Pediatrics* 2019;6:625.
- Bhatti AR, Satti AI, Khalid MA. Department of medicine, DHQ Teaching Hospital Rawalpindi. Snake bite: Clinical profile and evaluation of effective anti-snake venom dose. *Journal of Rawalpindi Medical College (JRMC)* 2010;14:22-5.
- Bawaskar H, Bawaskar P. Profile of snakebite envenoming in western Maharashtra, India. *Trans R Soc Trop Med Hyg* 2002;96:79-84.
- Amaral CF, Campolina D, Dias MB, Bueno CM, Rezende NA. Tourniquet ineffective-ness to reduce the severity of envenoming after *Crotalus durissus* snake bite in Belo Horizonte, Minas Gerais, Brazil. *Toxicon* 1998;36:805-8.
- Pugh R, Theakston R. Fatality following use of a tourniquet after viper bite envenoming. *Ann Trop Med Parasitol* 1987;81:77-8.
- Watt G, Theakston R, Padre L, Laughlin L, Tuazon M. Tourniquet application after cobra bite: Delay in the onset of neurotoxicity and the dangers of sudden release. *Am J Trop Med Hyg* 1988;38:618-22.
- Ahmed SM, Nadeem A, Islam MS, Agarwal S, Singh L. A retrospective analysis on the snake victims in Northern India, who were admitted to a tertiary level institute. *Anaesthesiol Clin Pharmacol* 2012;28:45-50.
- Punde DP. Management of snake-bite in rural Maharashtra: A 10-year experience. *Natl Med J India* 2005;18:71-5.