

# Clinico-Epidemiological Profile and Outcome of Snake Bite Cases Admitted at a Tertiary Hospital in Nepal

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## ABSTRACT

**Introduction:** Snake bite among adults is an important public health and clinical problem in many tropical and subtropical countries like Nepal. There are limited studies found on snake-bite using the WHO snake-bite management guidelines. This study assessed the clinico-epidemiological profile and their outcome in snake bite cases among adults using the WHO/SEARO Guidelines for the management of snake-bites.

**Materials and methods:** This is a descriptive study among 128 adults admitted in Medical Department of Western Regional Hospital from July 2018 to June 2019 with the presentation of snake bite for management.

**Results:** Around half (51.6%) of the cases were female and the mean age was 39.3 years with standard deviation of 16.6 years. Of the 128 patients, 7% presented to hospital in first day, 32.8% in second day, 31.3% in third day, and 17.2% on fourth day and rest within ninth day of snake bite. Common site of bite were left hand (38.3%) followed by left leg (28.1%). Of the cases 81.3% developed symptoms within first hour, 8.6% within sixth hour and rest afterwards. Local site pain and swelling was observed as most common sign/symptoms, but there was no neurotoxic manifestations. Only one (0.8%) patient needed Anti Snake Venom, two (1.6%) needed injection Vitamin K and 22(17.2%) needed Fresh Frozen Plasma (FFP) transfusion for management of complication in addition to other supportive measures. The case fatality rate was nil.

**Conclusion:** Using WHO Guideline for management of snake bite in adults showed zero case fatality rate in Western Regional Hospital. However further studies need to be done by using national and WHO guidelines among larger population and area for better output and recommendation.

**Key words:** anti-snake venom, case fatality rate, fresh frozen plasma, snake bite.

## INTRODUCTION

Early in 2009, snake bite was included in the WHO's list of neglected tropical diseases confirming the experience in many parts of South East-Asia region that snake-bite is a common occupational hazard of farmers, plantation workers and others, resulting in tens of thousands of deaths each year and many cases of chronic physical handicap.<sup>1</sup> Much is known about the species of venomous snakes responsible for these bites, the nature of their venoms and the clinical effects of envenoming in human patients.

Accordingly in 2017 the 10<sup>th</sup> meeting of the strategic and Technical Advisory Group for Neglected Tropical Diseases received proposal for the addition of disease and, pursuant to the required procedure, snakebite envenoming have been added to the NTD portfolio.<sup>2</sup> NTD a diverse group of communicable disease that prevail in tropical and subtropical condition in 149 countries affect more than one billion people and cost developing economies billions of dollars every year. Population living in poverty, without adequate sanitation and in close contact with infectious vectors and domestic animals and livestock are worst affected.

Among 3,500 species of snakes identified in the world 500 are poisonous.<sup>3</sup> Out of 250 species of snakes found in South East Asia, only 60 species are known to be poisonous. In Nepal, out of 77 species of identified snakes, 21 are poisonous, and distribution is largely dependent upon geography and climate.<sup>4,5</sup> According to an epidemiological study by Department of Health Services, Zoonotic Diseases Control Section, and the four species of Krait eg. *Bungarus caeruleus* (Common Indian Krait), *Bungarus fasciatus* (Banded Krait) and three species of Cobra eg. *Naja Naja* (Common Cobra), *Ophiophagus Hannah* (King Cobra) were reported poisonous in Nepal. Other species include 11 species of green pit vipers, one species each of mountain pit Viper, *Agkistrodon himalayanus* (Himalayan Pit Viper) and *daboia russeli* (Russell's viper).<sup>5,6</sup> Envenomation by Viper snakes result more in haematological disturbances like haemorrhage from various sites like recent wound, fang marks, skin, urinary and GI tract etc. They also induce prominent local signs, eg. edema, blistering, necrosis, shock, acute kidney injury. Neurological involvement like increased salivation, ptosis, respiratory and generalized paralysis with Elapidae bites.<sup>5</sup>

Snakebite envenoming is a potentially life-

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threatening disease caused by toxins in the bite of a venomous snake. Envenoming can also be caused by having venom sprays into the eyes by certain species of snakes that have ability to spit venom as a defence measure.<sup>7</sup>

Available data show that 4.5 to 5.4 million people get bitten by snakes annually of this, 1.8 to 2.7 million develop clinical illness and 81,000 to 138,000 die from complications.<sup>8</sup> In Asia there are two million envenomation each year.

During Fiscal Year 2017-2018, there were 5605 cases of snake bite have been reported with 20 deaths due to snakebite in Nepal.<sup>9</sup>

High risk groups include rural agricultural workers, herders, fisherman, hunters, working children, people living in poorly constructed houses and those with limited access to education and healthcare. Morbidity and mortality occur most frequent among young people and children suffer higher case fatality. Furthermore, women experience increased barriers to accessing medical care in some cultures and pregnant women are extremely vulnerable.

After the implementation of the National Protocol in 2007, India has resulted in lowering the morbidity and treatment expenditure related to snake bite.<sup>10</sup> The WHO/SEARO Guidelines for the management of snake-bite has been released for use by countries in the region.<sup>11</sup> Studies reporting on the use of WHO guidelines for snakebite among adults was not found in context of Nepal. Hence this study was conducted to assess the clinico-epidemiological profile and evaluate the outcome of snake bite poisoning with the use of WHO 2010 guidelines in WRH.

## MATERIALS AND METHODS

This was a cross-sectional study among adults presenting in the emergency department of Western Regional Hospital (WRH), a tertiary referral hospital in Western Nepal. Data was taken over a period of one year from July 2018 to June 2019 admitted in Medical Department of WRH. Ethical approval was taken from the management of the hospital prior to data collection and study. The total snakebite reporting to ER was 152. Out of which 128 snake bitemedically adult (age  $\geq 15$  years) patients were admitted to medical ward and treated for care and management. The snakebite patients were evaluated based on history, inspection of bite-wound, clinical signs/symptoms as found. A pro-forma was built and pre-tested for validity. Verbal and written informed

consent was taken from study participant patient or his/her guardian. Clinico-demographic information, clinical history and presentations, relevant systemic examination and investigation findings for each of the admitted snake bite patients were collected in the pro-forma. Patients were followed in the medical ward treatment and up to the discharge time.

Collected data was entered and analysed by SPSS ver 20 software. Frequency tabulation of age and sex, time and place of bite, signs at presentation, vitals, required treatment (given) and outcome were calculated and analysed on descriptive way.

## RESULTS:

Of the 128 patients, 48.4% were male and 51.6% female. The mean age was 39.3 years with the standard deviation of 16.6 years, with the age range of 60 years ranging from 15 to 75 years. Out of the 128 snakebite patients, 9(7%) presented on first day, 42(32.8%) on second day, 40(31.3%) on third day, 22(17.2%) on fourth day, 10(7.8%) on fifth day, 2(1.6%) on sixth day, one (0.8%) on eighth day, two (1.6%) on ninth day to the hospital.

**Table 1:** District wise presentation of snakebite patients.

Name of District	Number of Snake Bite Cases	Percentage
Kaski	61	47.65
Syanja	31	24.22
Tanahu	14	10.94
Parbat	8	6.25
Baglung	6	4.69
Lamjung	4	3.13
Myagdi	3	2.34
Gorkha	1	0.78
Other	0	0
Total	128	100

Occupation wise snakebite patients were 45.3% farmers followed by 31.3% housewives, 12.5% students, 0.8% teacher, 3.9% businessmen and 6.3% others. Most snakebite 64.1% occurred during daytime, 21.9% during night time and 14.1% during dusk/dawn.

**Table 2:** Place of snakebite

Place of Bite	Frequency	Percent
field	69	53.9
house	10	7.8
road	25	19.5
garden	11	8.6
forest	8	6.3
others	4	3.1
Missing System	1	0.8
Total	128	100.0

Out of those 128 cases, 81.3% snakebite were in front part, 15.6% in backside and rest 3.1% in other part.

**Table 3:** Site involved in snake bite (n = 128)

Site involved	Frequency	Percent
left leg	36	28.1
right leg	23	18.0
left hand	49	38.3
right hand	20	15.6
Total	128	100.0

In this study, 59.4% of snakebite was identified as due to Viper, 28.1% unknown and not seen in 12.5% of cases based on history. Seventy five percent of the patients visited other places (Faith healer, Private Hospital, Health Posts) before coming to this hospital. Of them 10.2% visited to faith-healer, 43% to government healthpost or hospital and 23.4% to private hospital. Of them 14.8% used soap and water, 10.2% used incision and drainage and 10.2% used phenol, vinegar etc. as local treatment to the bite whereas 82% used tourniquet as safe measure. Only 2.3% cases had history of snake bite earlier.

**Table 4:** Mode of Transport (n=128)

Mode of Transport	Frequency	Percent
Ambulance	7	5.5
Jeep/Van/Car	59	46.1
Motorcycle	41	32.0
Others	21	16.4
Total	128	100.0

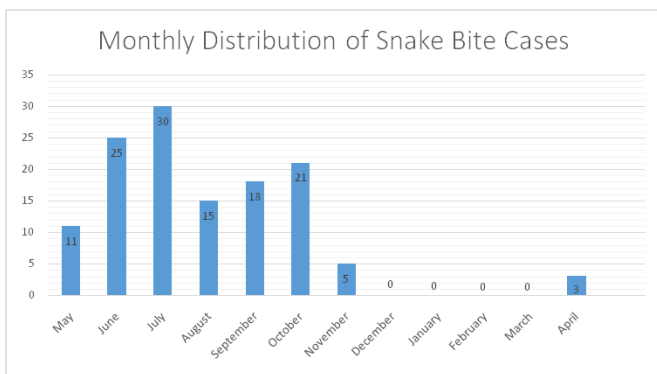
Of the 128 snakebite patients 81.3% developed symptoms within first hour, 81.3% within sixth hour and rest later. One patient needed Anti-snake Venom (total 10 vials). There was definite bite-mark

in 42.2%, scratch mark in 32.8% and no marks in rest (25%) of the patients. Twenty minute bedside clotting test was positive in 1.6% cases.

Supportive measures used were use of intra venous fluids (5%Dextrose,Ringer Lactate, Normal Saline) in 14.1%, injection avil in 3.9%, injection hydrocortisone in 3.9%, injection ketorolac in 1.6%, injection ranitidine in 28.9%, antibiotics in 48.4%, injection vitamin K in 1.6%, Injection FFP in 17.2% of the patients.

**Table 5:** Outcome of snakebite treatment (n=128)

Outcome	Frequency	Percent
Improved	127	99.2
Referred	1	0.8
Total	128	100



**Figure 1:** Monthly Distribution of Snake bite

**DISCUSSION**

Snakebite among adults in this study has the mean age of 39.3 years with the standard deviation of 16.6yrs. This finding is similar to other studies.<sup>12</sup> In this study, the highest incidence of snakebite poisoning was seen during the months of June, July, August, September and October which is the rainy season in Nepal. This is a hot season and snakes come out of their shelter due to increased temperature and humidity. This seasonal pattern of snakebite was seen in other studies as well.<sup>13</sup>

The study found that the most common site of snake bite were left hand (38.3%), left leg (28.1%), followed by right leg (18%) and right hand (15.6%). This might be because in the rural part farmers mostly grasp the grass with left hand and cut it with right hand. Most of the bites (81.3%) were in-front side of body and 15.6% were in back-side of body

Medical Journal of Pokhara Academy of Health Sciences Vol. 4 Issue 1 and rest in other side (head and neck). This might be due to some parts of the front-side is usually open and backside is closed.

Most of the patients were from Kaski (47.7%, Syangja (24.2%) and Tanahu (10.9%) districts. This is due to the close vicinity of the hospital. The victims were farmers (45.3%), women (31.3%) and students (12.5%). Others were business-men, teacher, and foreign employment worker. Though snakebite occurred throughout the day, more than 64% of cases occurred in daytime (6am to 6 pm), followed by nighttime 21.9% and dawn/dusk (5-6 am and 5-6 pm) because of more outdoor activities (farming, travelling, grass cutting etc.) in daytime.

In 59.4% of cases the snake was found to be Viper, in other 40.6% cases either it was not seen or identified. This result was in contrast to the result of other studies done in Terai which had shown the most common bite being the Krait.<sup>5,13</sup> There was a history of previous snake-bite in 2.3% of cases. Eighty two percent of the snakebite victims used tourniquet. Among the snakebite victims 42.2% had definite bite-marks, 32.8% had scratch mark and rest had no marks. As a primary treatment 14.2% used soap and water, 10.2% incision and drainage in bite-site and 10.2% used other methods eg. Phenol, acetic acid, while rest did nothing. Before coming to the hospital 75% visited other places, of them, 10.2% visited faith-healer, 23.4% visited private hospitals, 43% government health posts/hospitals before coming to this hospital. It signifies the people still believe on traditional faith-healer for snake-bite treatment. The victims were transported to hospital by car/van/jeep/taxi in 46.1%, motorcycle in 32.0%, ambulance in 5.5% of cases, and rest travelled on foot or other methods.

Snakebite patients develop symptoms within one hour in 81.3%, within 6 hours in other 8.6% and late in other cases. Only one patient needed Anti-snake Venom (10 vials). This is comparable to a study by UN et al.<sup>14</sup> Literature has mentioned 40% dry bite but we found no exact data.<sup>15</sup> Only 1.6% patient needed Vitamin K whereas 17.2% patients were given Fresh Frozen Plasma (FFP). Other supportive measures were antibiotics (48.4%), injection avil (3.9%), injection hydrocortisone (3.9%), and injection ranitidine (28.9%) of the patients.

The epidemiological profile of current study is almost consistent with the results of study conducted by Timsinha et al<sup>16</sup> at Manipal Teaching Hospital Pokhara.



The snake-bite patients improved in 99.2% and one (0.8%) was referred to Kathmandu which was also improved. So in this study, the mortality and late complication was nil. This might be due to less poisonous snake species, timely approach to facility, more people awareness, and good management in hospital following WHO protocol.

## CONCLUSION

Good outcome was seen in snakebite cases at WRH using WHO guidelines. However, further studies need to be done by using national and WHO guidelines among larger population and area for better output and recommendation.

**Conflict of interest: none**

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