EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 2
Issue: 3
227-241
Year: 2015

PROFILE OF SNAKE BITE IN PATIENTS PRESENTING TO THE MEDICAL COLLEGE CATERING MOSTLY HILLY AND RURAL POPULATION

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Article Received on 10/05/2015 Article Revised on 07/06/2015 Article Accepted on 01/07/2015

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ABSTRACT

Snakebite is a common medical emergency faced by rural population in tropical and subtropical countries. India has the highest number of deaths due to snake bites in the world with 35,000–50,000 people dying every year.[1] There is no study regarding clinical profile, morbidity and mortality pertaining to snake bite cases in Himachal Pradesh to the best of our knowledge. The purpose of the present study is to find out the clinical presentation and complications in the patients of snake bite which will guide the health care facilities in formulating management guidelines as snake bite is a common problem in our area and early treatment improves the prognosis. The study was conducted for a period of 12 months. CONCLUSION Majority of the bite victims were females with 52% and males with 48%. Female to male ratio was 1.08:1.Observed snake bite in 73.2% cases and nonobserved in 26.8% cases.Majority of bites

(67.6%) occur during outdoor activities and foot was most common site of bite (38.6. Neurotoxic envenomation was most common (37.8%) followed by hemotoxic (30%).Most common neurotoxic feature was ptosis (89%) .Majority of Hemotoxic bites occur during daytime (42.1%) and of Neurotoxic bites occur during sleep (45.8%). Majority of envenomations were Neurotoxic (37.7%) and majority occur during sleep (45.8%).Most common complication was bleeding from other site of bite (hematemesis, melena, bleeding from nose, mouth and frank hematuria) with 11.8%.AKI was observed in 8.6%. Respiratory Failure was observed in 9.4%. ASV is the only life saving treatment. Most common cause of death was cardiorespiratory arrest.

KEYWORDS: hemotoxic, neurotoxic, snake bite.

INTRODUCTION

Snakebite is a common medical emergency faced by rural population in tropical and subtropical countries. In India about 20, 00,000 snake bite cases are reported annually. The annual death rate due to snake bite in India is estimated to be 4.1 per 1, 00,000 population. India has the highest number of deaths due to snake bites in the world with 35,000–50,000 people dying every year.[1] The Registrar-General of India's "Million Death Study" 2001-2003 is expected to provide reliable evidence of substantial mortality (exceeding 50,000 per year) as it is based on Representative, Re-sampled, Routine Household Interview of Mortality with Medical Evaluation (RHIME).[2] According to Government of India data, there were 61,507 snake bites with mortality of 1124 in 2006; 76,948 bites and 1359 deaths in 2007. In the state of Maharashtra an average of 1,224 deaths per year (2.43 deaths per 1,00,000 per year) were reported between 1974 and 1978. A report by the hospitals of Government of India, from all states except six documents just 1,364 deaths due to snakebites in 2008, believed to be gross under reporting; as rural victims seek traditional treatment.[3] Its public health importance has been largely ignored by medical science. The WHO has included snake bite in its list of neglected tropical conditions in 2009.[4] In India about 216 species of snakes have been identified but only 52 are poisonous; the common krait (Bungarus caeruleus), Indian cobra (Naja naja), Russell's viper (Daboia russelii), and saw-scaled viper (Echis carinatus) are the most poisonous ("the big four").[6]

Existence of venomous snakes like *Trimeresurus albolabris* (white lipped pit viper), *Gloydius himalayanus* (himalayan pit viper) and *Naja oxiana* (black cobra) has been documented in the state of Himachal Pradesh. Snake venom is a mixture of 20 enzymes and polypeptide toxins.

Elapid snake venom contains bungarotoxin, a neurotoxin, which blocks the nerve transmission at the neuromuscular junction (akin to d-tubocurarin). Death following Elapid snakebite envenomation is typically due to respiratory paralysis or depression. Poorly informed rural populations often apply inappropriate first-aid measures as rural people have more faith on local treatment and vital time is lost before the victim is transported to a health care facility. This is because victims initially approach traditional healers for treatment and even many are not registered in hospital, where cost of treatment can constitute an additional hurdle.

The principle systemic effects of the envenomation are on the nervous system, kidneys, heart and blood coagulation and locally at the site of bite. Acute Kidney Injury (AKI) is mainly observed following bites by the viperidae group, sea snakes and the colubridae group. Most cases are due to the VIPERIDAE family of snakes which includes Pit viper, Rattle snake, Russell viper, Saws cale viper. The bleeding diathesis by viperine envenomation can be successfully reversed with anti-snake venom.

The incidence of acute kidney injury (AKI) following poisonous snakes varies from 13-32% following Echis carinatus or Russell's viper bite. The mortality of snake bite induced acute kidney injury was found to be 15.5%. Acute kidney injury which occurs after the snake bite can be prevented if the patient is hospitalized, monitored and renal complications are detected and treated at an early stage which will improve the prognosis in snake bite cases. The purpose of the present study is to find out the clinical presentation and complications in the patients of snake bite which will guide the health care facilities in formulating management guidelines as snake bite is a common problem in our area and early treatment improves the prognosis.

AIMS AND OBJECTIVES

To study the profile of snake bite in patients presenting at Dr. RPGMC, Tanda.

MATERIAL AND METHOD

Study was conducted in Dr. Rajendra Prasad Government Medical College, hospital Kangra at Tanda. The study was conducted for a period of 12 months including data collection, data organization, presentation, data analysis and data interpretation. All patients within this duration fulfilling our inclusion criteria were included in the study. It was an observational study.

INCLUSION CRITERIA

All the patients with history of snake bite with at least one of the following features:

1. Definite fang marks are noted.
2. Suspected snake bite with features of envenomations.
3. Observed snake bite.

EXCLUSION CRITERIA

Patients with history of suspected bite, where there were no features of envenomation.

METHODOLOGY

All the patients with history of snake bite or suspicion of snake bite were included in the study and subjected to detailed history, clinical examination and laboratory investigations. Bed side tests like 20 WBCT and ECG (Electrocardiogram) were done. In addition CBC (Complete blood count), RFT (Renal function test), LFT (Liver function test), urine R/E (Routine examination) and M/E (Microscopic examination) were also done. The biochemical parameters were done at R.P.G.M.C. by Erba Mannheim XL-300 fully automaticanalyzer.

The 20-minute whole blood clotting test (20 WBCT)

The 20 WBCT is a simple bedside test of coagulopathy to diagnose viper envenomation and rule out elapid bite. It requires a new clean, dry test tube made up of simple glass. About 2 milliliters of fresh venous blood is drawn and left undisturbed in the test tube for 20 min; the tube is then tilted gently. If the blood is still liquid after 20 min, it is evidence of coagulopathy and confirms that the patient has been bitten by a viper. Cobras or kraits do not cause antihemostatic symptoms.[4]

STATISTICAL ANALYSIS

Data were analyzed using standard statistical methods applicable.

RESULTS

An Observational study of 127 patients of snake bite from 1 January 2013 to 31 December 2013 for a period of 12 months was done to know the profile of snake bite in patients presenting at Dr. RPGMC, Kangra at Tanda. Maximum incidence of snake bite occurred in the age group of 20 to 39 yrs (44.9%) followed by 40 to 59 years (32.3%). Both these groups constitute 77.2% of total cases. Maximum of 35(27.6%) cases were recorded in month of July followed by 26 (20.5%) in August and 25 (19.7%) in September. Not a single case was

recorded from December to February. Majority were females with 52% and males with 48%. Female to male ratio was 1.08: 1. Most cases were bitten in lower limb with 59 (45.9%) cases than upper limb with 50 (39.4%) cases and foot happened to be the most common site with 49 (38.6%) cases followed by hand with 41 (32.3%) cases.

Maximum cases of bite occur during working with 44 (34.6%) cases followed by sleeping with 42 cases (33.1%) and walking with 40 (31.5%) cases. Working and walking constitute 86 (67.6%) of total cases. Most cases occur during evening with 35(27.6%) cases from 12Noon-6PM and 35(27.6%) cases from 6PM-12AM. Both these constitute 70 (55.2%) of total cases. Most Hemotoxic bites occur from 6PM-12AM with 16 (42.1%) cases and Neurotoxic bites occur from 12AM-6AM with 22(45.8%) cases.

Most cases present<1 hour with 33(26%) cases but complications were more who present late with >12 hours with 7(24.1%) cases. Most cases apply Tourniquet with 78 (61.4%) cases. But it has no bearing on preventing envenomation as 54 (69.2%) suffered from envenomation Most cases do not take any treatment before hospitalisation with 39/127(30.1%) cases while mortality was more who approached religious healers with 4/34(11.8%) cases.

Table 1: Clinical Presentation of Patients

	Frequency	Percent	Valid Percent	Cumulative Percent
NO	36	28.3	28.3	28.3
LOCAL	12	9.4	9.4	37.8
HEMOTOXIC	19	15.0	15.0	52.8
NEUROTOXIC	40	31.5	31.5	84.3
LOCAL+HEMOTOXIC	12	9.4	9.4	93.7
LOCAL+NEUROTOXIC	1	.8	.8	94.5
LOCAL+HEMOTOXIC+NEUROTOXIC	2	1.6	1.6	96.1
HEMOTOXIC+NEUROTOXIC	5	3.9	3.9	100.0
Total	127	100.0	100.0	

Most of patients present with features of envenomation which is 71% (91/127) and nonenvenomation 29% (36/127). Neuroparalysis was the most common presentation(Table-1) and was seen in 52.7% (48/91) followed by hemotoxic which was seen in 41.7% (38/91) in symptomatic patients.

Table 2: Neurological manifestations.

Neurotoxicity n=48								
	ptosis	**opthalmoplegia**	**Pharyngeal Paralysis**	**Respiratory paralysis**	**Limb paralysis**	**Diplopia**	**Chowking sesation**	**Pain throat**
Frequency	43	12	42	12	27	3	27	7
Percentage	89.6	25	87.5	25	56.3	6.3	56.3	14.6

Table 3: complications.

Complications 31/127	**AkI**	**Bleeding**		**Infection**	**MODS**	**Respiratory Failure 12/31**	**shock**
		Ic bleeding	**Bleeding from other site**				
frequency	11	1	15	27	2	12	3
percentage	35.5	3.2	48.4	87.1	6.5	38	9.7

In neurotoxic features ptosis was most common presentation with 89% (43/48) cases and diplopia was least common presentation with 6.3% (3/48) cases. Respiratory paralysis was observed in 25% (12/48) cases. Atypical presentation in the form of pain in throat was observed in 14.6% (7/48) cases(Table -2).

Complications (Table-3)were observed in 24.4% (31/127) of total cases. Most common complication was infection with 87% (27/31) of total complications followed by Respiratory Failure 38% (12/31) and AKI 35% (11/31).Out of 11 patients with AKI 4 (36%) received RRT out of which 1 (25%) recovered and 3 (75%) died. Out of 48 patients with neurotoxic features 12 (25%) require Mechanical Ventilation out of which 12 (50%) recover and 12 (50%) died.

Table 4: Asv * Outcome

			OUTCOME		**Total**
			COMPLETE RECOVERY	**DEATH**	
ASV	YES	Count	86	7	93
		% within ASV	92.5%	7.5%	100.0%
		% within OUTCOME	71.7%	100.0%	73.2%
	NO	Count	34	0	34
		% within ASV	100.0%	.0%	100.0%
		% within OUTCOME	28.3%	.0%	26.8%
Total **P VALUE = .100**		Count	120	7	127
		% within ASV	94.5%	5.5%	100.0%
		% within OUTCOME	100.0%	100.0%	100.0%

Table 5: Dose of Asv (In Ml)

ENVENOMATION	N	Mean	Std. Deviation	Minimum	Maximum
NO	2	35.00	21.213	20	50
LOCAL	12	70.00	65.366	20	250
HEMOTOXIC	19	248.42	107.510	50	440
NEUROTOXIC	40	221.25	100.286	20	400
LOCAL+HEMOTOXIC	12	233.33	83.485	50	300
LOCAL+NEUROTOXIC	1	200.00	.	200	200
LOCAL+HEMOTOXIC+ NEUROTOXIC	2	250.00	70.711	200	300
HEMOTOXIC+NEUROTOXIC	5	290.00	124.499	100	400
Total	93	208.92	112.419	20	440

All envenomated 91 (100%) and 2 (2%) nonenvenomated patients received ASV out of which 86 (92.5%) recover and 7 (7.5%) died(Table-4). Average dose for local, hemotoxic and neurotoxic envenomation was 70, 248, 221 ml respectively(Table-5). 1(2.8%) nonenvenomated and 8 (8.8%) envenomated patients suffered from reaction to ASV but all recovered fully.Maximum patients 59.3% (54/127) remained for 3-4 days in hospital. Out of 127 patients 36 (28.3%) were nonenvenomated and 91 (71.7%) suffered envenomation out of which 84 (92.3%) recovered and 7 (7.7%) die. Most common cause of death was cardiac arrest and respiratory failure 57.1% (4/7).

DISCUSSION

The state of Himachal Pradesh in the northwestern Himalayas extends between 32°22'-33°12'N and 75°45'-79°04'E covering an area of 56,090 km^2. Topography of the state is dominantly mountainous with the altitudinal range of 350-6975 m. The state has an estimated forest cover of 13,880 km^2 which is 25% of the total geographic area of the state[20] and a total population of 68,56,509 and 90.2% people live in rural setup which has an ideal environment for the different species of reptiles.[20] Probability of human beings coming in contact with snakes is very high. Reptilian fauna in this region is somewhat different from that of other parts of India. Venomous snakes inhabit the foothills and mountainous ranges. Attempts to record reptilian fauna of Himachal Pradesh has revealed presence of venomous snakes like *T. albolabris* (white lipped pit viper), *G. himalayanus* (Himalayan pit viper) and *N. oxiana* (black cobra) in addition to the common "Big 4" - the Indian cobra (*N. naja*), the common krait (*B. caeruleus*), the Russell's viper (*D. russelii*) and the saw-scaled viper (*E.*

carinatus). It is important that snakes belonging to Viperidae group have been abundantly found up to an altitude of 4850 m.[41]Antivenom is the only specific treatment for snake bite envenoming, but existing products cover only the "Big 4" i.e., limited number of medically significant species. This diversity of venomous species questions the effective coverage of Indian polyvalent ASV. Deaths due to snake bite occur predominantly in rural areas (97%) and majority of them happen outside areas with access to health care facilities.

Age distribution: Our study showed maximum incidence of snake bite occurred in the age group of 20 to 39 yrs (44.9%) followed by 40 to 59 years (32.3%). Both these groups constitute 77.2% of total cases. Raina et al[18] showed age 16-45 years (71%). Bhardawaj et al[9] showed age 11-40 years (73.7%). Singh et al[11] showed median age 24 years. Suchitra et al[15] showed age 31-50 year. Ha et al[16] showed median age 33 years. The outcome of our study was at par with the study conducted by Raina et al[18] and Bhardawaj et al[9] which were also conducted in hills of Himachal Pradesh.

Gender Distribution: Our study showed female preponderance with female 52% male 48%. Raina et al[18] showed male 59% female 41%. Bhardawajet al[9] showed female preponderance (3.5 times higher). Sharma et al[7] showed male to female ratio 4.25:1. Monteiro et al[12] showed male preponderance. Suchitra et al[15] showed male 58% female 42%. Ha et al[16] showed male 71% female 29%. Sawai et al[26] showed male 66% female 34%. Banerjee et al[6] showed male 75% female 25%. The outcome of our study was at par with the study conducted by Bhardawajet al[15] which was also conducted in lower hills of HIMACHAL PRADESH. Female preponderance was due to involvement of women in hills in cutting grass for fodder more frequently.

Seasonal Variations: Our study found that all the cases were recorded from March to November which corresponds with summer, monsoon and the harvesting season in this region, all ideal for snakebites. Maximum of 35(27.6%) cases were recorded in month of July in the rainy season, when vegetation is abundant and people are involved in intense agricultural activities followed by 26 (20.5%) in August and 25 (19.7%) in September. Not a single case was recorded from December to February. This distinct seasonal pattern with peaks in the warm and rainy months has been observed in the state of Himachal Pradesh, as in other parts of the country. This observation is important from the prevention aspect as this is the time when maximum vigil is required to guard against the snake bites. Raina et al[18] found that all the cases recorded presented in the months of April to November. Maximum

25% patients were recorded in the month of August. Not a single case was recorded from December to March. Bhardawaj et al[28] found that seasonal variations in snake bites were seen with a peak in the months of August and September. No bites were recorded in December, January and February. Singh et al[11] found that all cases were reported between june and October 2002. Monteiro et al[12] found that highest number of cases occurred during daytime in the months of September and October. The outcome of our study was at par with the study conducted by others.

Site of bite: Our study found that most cases were bitten in lower limb with 45.9% (59/127) cases than upper limb with 39.4% (50/127) cases and foot happened to be the most common site with 38.6%(48/127) cases followed by hand with 32.3% (42/127) cases. Raina et al[18] found that lower limbs were the commonest site of bite in 55% (110/200) patients and foot was involved in 61% (68/110) cases. It was followed by upper limbs out of which hand and fingers accounted for 22.5% (45/200). Bhardawaj et al[9] found that 84% of the bites were on the hands and feet (up to the ankle). Lower limb was site of bite in 62.4% in a study conducted by Banerjee et al[6] and 67.8% in a study conducted by Sawai et al.[8] Our findings were same as found in study conducted by Raina et al.[18] Our study showed that we can prevent a large number of snake bites by protecting our feet.

Act of person at the time of bite: Our study found that maximum cases of bite 67.6% (86/127) occurred during working and walking which was close to observation of Bhardawaj et al[9] who found in his study that 75.3% of bites occurred while the person was cutting grass, working in the fields or walking up in the hills. Sharma et al[7] found that 60.6% of the cases of snakebite occurred when the patient was asleep. Our observation was statistically important (p=.002). These bites can be prevented if person is more vigilant during outdoor activities.

Time of bite: Our study showed that most Hemotoxic bites occur from 6PM to 12 AM with 16(12.5%) cases and Neurotoxic bites occur from 12AM-6AM with 22(17.3%) cases (p=.000). Monteiro et al[12] also found that hemotoxic snake bites occurred during daytime.

Time lag in hospitalisation: Our study showed that most cases present <1 hour with 33(26%) cases but complications were more who present late i.e >12 hours of 7(24.1%) cases. Raina et al[18] observed that only a few (13.5%) of the patients attended hospital within the 1st hour of bite and the majority (64%) attended between 1st and 6th hour. Twenty two

(11%) patients arrived at this hospital after 12 hours of bite. Early hospitalisation can prevent morbidity.

Treatment before hospitalisation: Our study found that most cases do not take any treatment before hospitalisation with 39/127(30.1%) cases whereas Raina et al[18] found that majority has applied herbal medicines. We found in our study that mortality was more who approached religious healers with 4/34(11.8%) cases. Patient should take allopathic treatment and avoid alternative medicine and religious healers to prevent morbidity and mortality.

Tourniquet Application: Our study found that most cases apply Tourniquet with 78(61.4%) cases. But it has no bearing on preventing envenomation as 54(69.2%) suffered from envenomation. Raina et al[18] found that 58% (116/200) applied tourniquet which resulted in local signs and did not prevent envenomation. So tourniquet application should be discouraged as it has no bearing in preventing envenomation as found by both studies.

Clinical Features: Our study found that most of patients present with features of envenomation which is 71% (91/127). Neurotoxic was the most common presentation and was seen in 52.7% (48/91) among symptomatic patients followed by hemotoxic which was seen in 41.7% (38/91) patients. In neurotoxic features ptosis was most common presentation with 89.6% (43/48) cases and diplopia was least common with 6.3% (3/48) cases. Respiratory paralysis 25% (12/48), Opthalmoplegia 25% (12/48), Pharyngeal paralysis 87.5% (42/48), Limb paralysis 56.3% (27/48), Choking sensation 56.3% (27/48) and also Pain in throat 14.65% (7/48). Raina et al[18] study revealed that most of the patients presented with features of envenomation 57% (114/200). Neuroparalysis was the most common presentation and was seen in 46% (53/114) patients among symptomatic patients. Among patients with neuroparalysis early morning syndrome occurred in 26.4% (14/53) patients. Sharma et al[7] found that 67.7% (86/127) elapid bites presented with neuroparalytic symptoms and 40.9% (52/127) viper bites presented with haemostatic abnormalities. Singh et al[11] found that 67.7% (21/31) were envenomated. All of the envenomations were neurotoxic in nature. Abdominal pain (91%), headache (86%), dysphagia (86%), ptosis (77%), diplopia (72%), blurred vision (72%), dyspnea (67%), and vomiting (62%) were the predominant clinical presentation. Bawaskar et al[14] also found primarily neurotoxic manifestations of snakebite in the form of ptosis, respiratory muscle weakness, ophthalmoplegia and limb weakness. Bhardawajet al[9] found that Non-poisonous snakes were the most common (90.5%). Kraits caused 60% of bites with envenomation.

The outcome of our study was at par with study conducted by Raina et al.[18] However in our study the pain in throat was an atypical presentation of neurotoxic features observed in 14.65% (7/48) and patients responded to ASV.

Complications: In our study most common complications (hematemesis, melena, bleeding from nose, mouth and frank hematuria.) were observed in 48.3% (15/31) of total complications i.e 24.4% (31/127) of total cases. Other complications were I/C Bleed 3.2% (1/31), Infection 12.9% (4/31), MODS 6.5% (2/31), Shock 9.7% (3/31). The outcome of our study was at par with study conducted by Raina et al[18], Bawaskar et al[14] and Singh et al.[11]

AKI was observed in 8.6% (11/127) of total bite victims in our study. Out of 11 patients with AKI 4(36.3%) were given RRT out of which 1 (25%) recovered and 3 (75%) died. Raina et al[18] found that Acute Kidney Injury was observed in11% patients and they belonged to the hemotoxic or the hemotoxic with local symptoms and signs group. Sharma et al[7] found that 21.2% cases had AKI. Srilatha et al[19] found 34% cases had AKI. Chugh et al[21] found that 28.8% suffered from AKI. In India, the overall incidence of AKI varies from 13-32% following viper bite.[43] The decreased incidence of AKI in our study as compared to study conducted by others was due to early administration of ASV.

Respiratory Failure was observed in 9.4% (12/127) of total bite victims in our study. All were put on mechanical ventilation out of which 50% (6/12) recovered and 50% (6/12) died. Raina et al[18] found that 53 patients with neuroparalytic features, 20 patients required mechanical ventilation. Sharma et al[13] found that 75% of all elapid bites required assisted ventilation.

ASV: In our study all envenomated 91 (100%) and 2 (5.6%) nonenvenomated patients received ASV out of which 86 (92.5%) recover and 7 (7.5%) died. Average dose for local, hemotoxic and neurotoxic envenomation was 70 (range 2o-250), 248 (range 50-440), 221 (range 20-400) ml respectively. Our study showed that 2.8% (1/36) nonenvenomated and 8.8% (8/91) envenomated patients suffered from reaction to ASV but all recovered fully. In a study by Raina et al[18] Antivenom was given to all the 114 symptomatic patients. Dose used was 292.69 ± 196.27 ml (range: 50-950 ml). Adverse reactions in the form of early anaphylactic reactions to antivenom were seen in 7% patients, but there were no deaths. Antivenom reactions are known in more than 10% who receive antivenom. Bawaskar et al[10] found that early administration of anti-snake venom (ASV), endotracheal intubation, timely

intervention by manual ventilation with Ambubag and anticholinesterase treatment for Elapidae (krait and cobra) envenoming are crucial for Saving lives. Punde et al[13] found that dose of ASV for treating neurotoxicity was 40-320 ml and for hemotoxicity 20-250 ml. Suchitra et al[15] found that those who received ASV late had a higher risk of developing Acute Kidney Injury. National snake bite management protocol 2008 (India) has recommended a maximum dose for hemotoxic and neurotoxic bites as 30 vials (300 ml) and 20 vials (200 ml) respectively. We need to look into the reasons for higher dose required in our cases. One of the observations was higher dose used to reverse the effects of persistent coagulopathy in our patients. Also ASV should be given after confirming features of envenomation as it is costly and injudicious use of ASV should be avoided as it can increase morbidity and mortality as 2 non envenomated cases were given ASV outside before presentation to hospital and 1 suffered from reaction. ASV is mainstay of treatment in saving lives of snake bite victims.

Duration of hospital stay: In our study Maximum patients 59.3% (54/127) remained for 3-4 days in hospital. Raina et al[18] found that mean of total admission days was 2.52 ± SD1.688. Srilathaet al[19] found mean time of hospitalisation about 15.6 days.

Outcome: In our study Out of 127 patients 28.3% (36/127) were nonenvenomated and 71.7% (91/127) suffered envenomation out of which 92.3% (84/91) recovered and 7.7% (7/91) died. Overall mortality in our study was 5.5%. Mortality in other studies was Raina et al[18] (5%), Sharma et al[7] (3.5%), Bawaskar et al[10] (11%), Monteiro et al[12] (6.5%), Punde et al[13] (5.4%), Suchitra et al[15] (3%), Ha et al[16] (7%). The outcome of our study was at par with the study conducted by others.

Cause of death: In our study most common cause of death was cardiorespiratory arrest 57% (4/7) followed by cardiac arrest 43% (3/7). In a study conducted by Raina et al[18] most common cause of death was due to ventilator-associated pneumonia.

SUMMARY AND CONCLUSION

Snake bite is common in Himachal Pradesh and is a neglected tropical disease affecting poor villagers in rural areas.Majority of the bite victims were females with 52% and males with 48%. Female to male ratio was 1.08:1.Majority of bites (67.6%) occur during outdoor activities and foot was most common site of bite (38.6%). So proper protection of feet may prevent large number of snake bites.Majority of the patients had signs of envenomation

(71.6%) and a small number had no signs of envenomation (28.4%). Neurotoxic envenomation was most common (37.8%) followed by hemotoxic (30%).Most common neurotoxic feature was ptosis (89%) and least common was diplopia (6.3%) whereas atypical presentation in the form of pain in throat was observed in 14.5% of neurotoxic bite victims. Majority of bites occur during July (27.6%) followed by August (20.5%) and September (19.7%). However none was recorded from December to February. So one should be more vigilant during these months. Majority of cases do not take any treatment before hospitalisation (30.1%) but mortality was more who approached religious healers (11.8%). So there is need to educate community regarding in time allopathic treatment.Majority of Hemotoxic bites occur during daytime (42.1%) and of Neurotoxic bites occur during sleep (45.8%). Majority of envenomations were Neurotoxic (37.7%) and majority occur during sleep (45.8%). So one should keep things aside from bed, keep beds at higher level and do not sleep on ground. Most common complication was bleeding from other site of bite (hematemesis, melena, bleeding from nose, mouth and frank hematuria) with 11.8%.AKI was observed in 8.6% out of which 36.6% were given RRT. Respiratory Failure was observed in 9.4%. All were put on mechanical ventilation out of which 50% survived and 50% died. All envenomated patients received ASV. Average dose for local, hemotoxic and neurotoxic envenomation was 70, 248, 221 ml respectively. 8.8% of patients suffered from reaction to ASV but all recovered fully. Out of total envenomated patients 92.3% recovered and 7.7% died. ASV is mainstay of treatment, so it should be available to every PHC.Dose of ASV was more in patients with hemotoxic manifestations with mean dose 248 ml (range 50-440 ml). ASV is the only life saving treatment hence should be used judiciously after confirming features of envenomation as it will reduce cost of treatment and untoward reactions which may be fatal. Most common cause of death was cardiorespiratory arrest.Clinical outcome was good in patients with early hospitalisation and early administration of ASV.

Conflict of interest: None

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