Clinical Profile and Outcome in Patients with Snake Bite in a Tertiary Care Centre in Kerala

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ABSTRACT

BACKGROUND

The clinical profile and outcome of snake bite varies from place to place and depends on a number of factors including the type of snake bite, place of snake bite, time of bite, season, and duration of presentation after bite. The clinical profile, factors affecting the outcome and the outcome have not been previously well studied.

METHODS

This is a cross-sectional observational study conducted for a duration of six months from January 2021 to June 2021. Subjects meeting inclusion criteria were enrolled in the study group after obtaining written consent. Patients were evaluated based on the standard pro-forma with detailed history and clinical examination. All relevant investigations to assess systemic envenomation, treatment and outcome were documented in all the patients.

RESULTS

In the study, 204 (68 %) were male patients and 96 (32 %) were female patients. 108 (36 %) were admitted with venomous snake bite and 192 (64 %) were with non-poisonous snake bite. 52 patients had snake bite on the upper extremities, 234 had snake bite on the lower extremities, 8 patients had snake bite on the trunk whereas 6 patients had bite on other areas of the body. 202 patients had swelling at the bite site, 222 had pain at the site of bite, 86 patients had oozing of blood and 6 patients had vague somatic symptoms. 132 patients had local oedema, 148 had local tenderness, 66 patients had skin necrosis and 16 patients developed blisters at the site of bite. 124 patients had systemic manifestations of which 24 patients had vomiting, 12 patients developed abdominal pain, 10 patients developed anuria/oliguria, 14 patients developed hypotension, 12 patients developed bleeding manifestations, 10 patients developed neurological symptoms and 2 snakebite patients had syncope. Complications and mortality in poisonous snake bite due to renal failure was observed in 38 patients with a mortality of 1 patient, 10 patients developed intravascular haemolysis, 8 patients developed unexplained hypotension, 18 patients developed secondary infection, 4 patients developed intra-cerebral bleeding and 15 patients developed neurotoxity with a mortality of 2 patients.

CONCLUSIONS

Snake bite is a common problem encountered in tertiary care centres and the most common encountered type of snakebite was haemotoxic bite. Pain at the bite site was the commonest symptom and tenderness at bite site was the commonest sign in patients with snake bite. Mortality in venomous bite was 3.7%. Prolonged bite to needle time, development of renal failure, leukocytosis, neurotoxicity and severe degree of coagulopathy were factors associated with adverse outcome.

KEYWORDS

Clinical Profile, Outcome, Snake Bite, Tertiary Care Centre

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BACKGROUND

Snake bite is a common emergency seen in all parts of India and in Kerala. Most of the bites are due to non poisonous snakes and among the bites by poisonous snakes - viper, cobra and krait bites are common. The course and outcome of the bite by poisonous snakes is erratic and varies from species to species and from region to region. Snake bite is a medical emergency that not only involves the local site but involves multiple organ systems leading to a high percentage of morbidity and mortality. Conservative sources estimate that the number of snake bites reach up to ten lakhs globally with 6,00,000 envenomations and about 20,000 deaths annually.

In India, approximately 2,00,000 cases are reported annually and 15,000 to 20,000 people die annually.[1] The states with large no of snake bite involve Kerala, Tamil Nadu, West Bengal and Uttar Pradesh. 2907 cases were reported over a period of three and half years from a teaching institute in North Kerala with occurrence of 41 deaths within a period of 12 hours following snake bite.[2] Seasonal peaks in the incidence of snake bites are associated with agricultural activities and during the periods of flooding. This is produced by close proximity between humans and snakes which leads to increased frequency of bites in Nepal, Burma and India.

Depending on the type of snake bite and victims, the seriousness of clinical picture varies.[3] Snake venom can cause haemostatic effects in different ways by the procoagulant enzymes which are sereane proteases that activate the blood clotting cascades at various sites. The local changes are the earliest manifestations of snake bite other than the psychological changes and trauma which occur with snake bite.[4] The local manifestations of snake bite include tingling and numbness over mouth, scalp, tongue and parasthesia around the wound which is seen in viper bites.[5] It has been reported that regional lymphadenopathy is an early sign of systemic poisoning. As far as neurotoxicity is concerned, ptosis is the earliest neuroparalytic manifestation followed by opthalmoplegia. Complications of snake bite include shock, respiratory arrest, massive bleeding, acute pulmonary oedema, acute respiratory distress syndrome (ARDS), acute renal failure, pulmonary complications like pneumonia and acute renal failure.[6]

Need and Significance of the Study

There are only few studies on the clinical features, epidemiology, course and outcome of snake bite and hence the need of the study. The findings of the study will be of great help to critical care specialists, physicians and medical personnel involved in the management of snake bite patients. The research findings of the study will help in early recognition of the symptoms. Recognizing of complications earlier helps in better management of the patients which in turn will decrease the mortality and morbidity associated with snake bite.

Objectives of the Study

1. To study the clinical profile of snake bite patients in and around the study centre.
2. To analyze the outcome in various types of snake bites.
3. To find the predictors of outcome in snake bite.

METHODS

All patients with snake bite who had registered in the Department of General Medicine, Government Medical College, Kottayam from January 2021 to June 2021 and were willing to participate in the study were included in the study. After getting the ethical clearance (IRB NO: 121/2020), subjects meeting the inclusion criteria were included in the study (after getting a written consent). Patients were evaluated based on the standard pro-forma with detailed history (including circumstances of the bite, whether the snake was identified or not, location of the bite, time of bite, whether tourniquet was applied, whether received treatment from outside, if so, mode of treatment etc.) and clinical examination. All relevant investigations to assess the systemic envenomation were done in all patients and special investigations like arterial blood gas analysis, CT brain etc were done wherever necessary. 12 lead electrocardiogram (ECG) and chest X ray was taken for all patients. The treatment given in each case was carefully documented. Patients were monitored for development of any complication during treatment and were managed accordingly. The end point of the study was recovery and discharge; discharge against medical advice or death. All patients were examined for features of envenomation - Local, regional or systemic at the time of presentation, the response to treatment was assessed periodically and the patients were closely monitored for development of symptoms. Patients with venomous bites were reassessed after the initial dose of anti snake venom (ASV) and there after every 4 hours, or more frequently if patient developed symptoms, till they are completely asymptomatic.

Statistical Analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS) 16 Software, T test was done for independent samples and chi- Square test was done for nominal level measurement. Odds ratio was calculated for statistically significant variables and a P value of .05 or less was considered significant and P value less than .01 was considered as highly significant.

Inclusion Criteria

All patients with snake bite attending Department of Medicine who gave consent to take part in the study at Government Medical College, Kottayam during a period of 6 months were included.

Exclusion Criteria

Patients with coagulopathy, neuromuscular disease, patients on anti-platelets and anticoagulants were not included in the study.

RESULTS

Gender	Number	Percentage
Male	204	68 %
Female	96	32 %
Type of snake bites	Number	Percentage
Unidentified	186	62 %
Viper	67	22.33 %
Cobra	35	11.665
Krait	12	4 %
Site of bite	Number	Percentage
Upper extremities	52	17.33 %
Lower extremities	234	78 %
Trunk	8	2.66 %
Other areas	6	2 %
Time of snake bite	Number	Percentage
6 am -12 pm	12	4 %
12 pm - 6 pm	8	2.66 %
6 pm – 12 am	194	64.66 %
12 am – 6 am	86	28.66 %
Occupation	Number	Percentage
Manual labourer	228	76.00 %
House wife	16	05.33 %
Office workers	24	08.00.%
Others	32	10.66 %
Educational Status		
Illiterate	8	2.66 %
1-10 standard	186	62 %
Above 10th standard	106	35.33 %
Residential Status		
Rural	222	74 %
Urban	78	26 %
Place of bite		
Outdoors	264	88 %
Indoors	36	12 %

Table 1. Demographic Parameters of Patients with Snake Bite

Poisonous Snake Bite		Non-Poisonous Snake Bite		Total
(36 %) 108		(64 %) 192		300
Male	Female	Male	Female	
71 (65.74 %)	37 (34.25 %)	138 (71.87 %)	54 (28.12 %)	

Table 2. Type of Snake Bite

Symptoms	No. of Cases	Percentage
Swelling	202	67.3 %
Pain at bite site	222	74 %
Oozing of blood	86	28.66
Others	6	2 %
Signs	**No. of Cases**	**Percentage**
Local oedema	132	44
Tenderness	148	49.33
Skin necrosis	66	22
Blistering	16	5.33

Table 3. Symptoms and Local Signs Observed in Patients with Snake Bite

Swelling at the site of bite was the commonest symptom (67.3) and other non-specific symptoms were the least (2%). Tenderness was the commonest local sign (49.33 %) followed by local oedema (44 %), skin necrosis (22 %) and blistering (5.33 %) in the study population with snake bite.

	No. of Cases	Percentage
Nil	186	62
Present	124	41.33
Vomiting	24	8
Abdominal pain	12	4
Oliguria/anuria	10	3.33
Hypotension	14	4.66
Bleeding manifestations	12	4
Neurological	10	3.33
Pre-syncope / syncope	2	.66

Table 4. Systemic Manifestations in Patients with Snake Bite

Of the 124 patients who had systemic manifestations, vomiting was the commonest (8 %), followed by hypotension (4.66 %), abdominal pain, bleeding manifestations (4 %) oliguria (3.33), neurological symptoms (3.33 %) and (.66 %) had syncope.

Complications	Number of Patients	Percentage	Mortality
ARF	38	35.18	1
Intravascular haemolysis	10	9.25	-
Unexplained hypotension	8	7.40	-
Secondary infection	18	16.66	-
Intra cerebral bleed	4	3.70	1
Neurotoxicity	15	13.88	2
Ventricular tachycardia	1	.92	-
ARDS	4	3.70	…-…

Table 5. Complications and Mortality in Poisonous Snake Bite Patients

The most common complication which developed in patients with poisonous snake bite was renal failure (35.18 %) followed by secondary infection (16.66 %) followed by neurotoxicity (13.88 %) intra vascular haemolysis (9.25 %), unexplained hypotension (7.40 %), Intra cerebral (IC) bleeding (3.70 %), ARDS (3.70 %) and ventricular tachycardia (.92 %).

Mortality was highest in patients with neurotoxicity (2) followed by intra cerebral bleeding (1) and renal failure. There was no mortality in patients with other complications.

Predictors of Outcome in Poisonous Snake Bite	P Value < .001	Odds	CI
Bite to needle time	<.001	5.58	2.42 - 12.8
Leukocyte count	< .001	5.6	2.38 - 13.5
Coagulopathy	<.001	9.1	13.63 - 22.7
Renal failure	<.001	7.5	3.13 - 17.9
Neurotoxicity	<.001	2.653	.877 - 8.025

Table 6. Predictors of Outcome in Poisonous Snake Bite

In the study, 204 (68 %) were male patients and 96 (32 %) were female patients. 108 (36 %) were admitted with venomous snake bite and 192 (64 %) were with non-poisonous snake bite. 186 (62 %) snake bites were due to unidentified snakes, 67 (22.33 %) viper bites, 35 (11.66 %) cobra bites and 12 (4 %) krait bite. Of the 300 patients with snake bite, 52 patients had snake bite on the upper extremities, 234 had snake bite on the lower extremities, 8 patients had snake bite on the trunk whereas 6 patients had a bite on other areas of the body. Regarding the time of snakebite, 12 bites occurred during 6 am to 12 pm, 8 during 12 pm to 6 pm, 194 snake bites occurred during 6 pm to 12 am and the time of occurrence in rest of the 86 patients was between 12 am – 6 am. Of all the 300 patients with snakebite involved in the study, 222 (74 %) came were residents of rural areas and 78 (26 %) resided in the urban areas.

A. Bite TO Needle Time and Complications				
Complications	Bite to Needle Time >6 Hours	<6 Hours	Total	
Yes	32 69.56%	18 29.03%	50 46,29%	Chi square-15.86 P value <.0001
No	14 30.43%	44 70.96%	58 53.70%	OR- 5.58 Ci 2.42-12.8
Total	46 100%	62 !00%	108 100%	
B. **Total Leucocyte Count and Complications**				
Complications	TLC >10,000	<10,000	Total	
Yes	28 70%	20 29.41%	48 44.44%	Chi square 15.2 P value <.0001
No	12 30%	48 70.58%	60 55.55%	OR -5.6 CI-2.38-13.15
Total	40 100%	68 !00%	108 100%	
C. **Complications and Coagulopathy**				
Complications	Coagulopathy Present	Absent	Total	
Yes	26 72.2%	16 22.22%	48 44.44%	Chi square- 23.19 P value <.0001
No	10 27.77%	56 77.77%	60 55.55%	OR- 9.1 CI 13.63-22.7
Total	36 100%	72 !00%	108 100%	
D. **Complications and Renal Failure**				
Complications	Renal Failure Present	Absent	Total	
Yes	28 73.68%	20 28.57%	48 44.44%	Chi square-21.11 P value <.0001
No	10 26.31%	50 71.42%	60 55.55%	OR- 7.50 CI - 3.13-17.9
Total	38 100%	70 !00%	108 100%	
E. **Complications and Neurotoxicity**				
Complications	Neurotoxicity Present	Absent	Total	
Yes	8 53.3%	28 30.10%	36 33.33%	Chi square- 3.14 P value <.01398
No	7 46.55%	65 69.89%	72 66.66%	OR- 2.653 CI - .877-8.025
Total	15 100%	93 !00%	108 100%	

Table 7. Predictors of outcome and Complications

Regarding the site of occurrence of the event, 264 (88 %) of the snake bites occurred outdoors and 36 bites occurred indoors (12 %). Of the patients involved in the study, 202 patients had swelling at the bite site, 222 had pain at the site of bite, 86 patients had oozing of blood and 6 patients had vague somatic symptoms. Of the 300 patients involved in the study patients 132 had local oedema, 148 had local tenderness, 66 patients had skin necrosis and 16 patients developed blisters at the site of bite. 186 patients with snake bite had no systemic manifestations whereas 124 patients had systemic manifestations of which 24 patients had vomiting, 12 patients developed abdominal pain, 10 patients developed anuria/oliguria, 14 patients developed hypotension, 12 patients developed bleeding manifestations, 10 patients developed neurological symptoms and 2 snakebite patients had syncope. Complications and mortality in poisonous snake bite due to renal failure was 14 patients with a mortality of 1 patient, 10 patients developed intravascular haemolysis, 8 patients developed unexplained hypotension, 18 patients developed secondary infection, 4 patients developed intra-cerebral bleeding and 15 patients developed neurotoxicity with a mortality of 2. Of the patients with poisonous snake bite, 1 patient developed ventricular tachycardia and 4 patients develop ARDS. Clotting time, bleeding time and prothrombin time were raised in all poisonous haemotoxic bites. In the present study, out of the 108 patients with poisonous snake bite, 104 patients were discharged, 4 patients died and among the patients with non-poisonous bite, 156 patients were discharged. 36 patients left the treatment centre against advice and there was no mortality among non-poisonous bite patients. The predictors of adverse outcome (worsening of the clinical condition, development of complications or death) in the study were - the bite to needle time, the degree of coagulopathy, leucocytosis, development of renal failure, development of neurotoxicity.

DISCUSSION

In the study 204(68%) were male patients and 96(32%) were female patients and this finding was in line with the findings of study done in Maharastra where 66% were male patients and 34% were female patients[7] whereas an incidence of 7:3(Male/ Female) was reported in a study by Bhat et al.[8].Similar observation of increased occurrence of snake bite in males have been seen in other studies.[9,10] This may be due to the fact that males are more involved in outdoor agricultural activities. In the present study 86% of the patients were admitted in a period of 6 hours and 90% of patients within a period of 24 hrs from time of bite and the low mortality and complications may be due to the fast access to treatment as indicated in studies by S K Sharma et al.[11] The most common site of snake bite was the lower extremities which was similar to the finding of Sharma et al[12] and most of the snake bites occurred in the group 28-48 and similar observation was made by Kalantri S etal where majority of snake bites were observed in young patients.[13] The reason may be that majority of the young patients are involved in agricultural activities, manual labour and outdoor activities which makes them more susceptible to snake bite. Findings in the present study regarding the time of bite was that majority of bites (81%) occurred during night as was observed by Viramani et al.[14] In the present study 202 patients had swelling at the bite site, 222 had pain at the site of bite, 86 patients had oozing of blood and 6 patients had vague somatic symptoms and a similar symptom profile was observed in a study conducted by Suchitra et al.[15]In the study 44% of patients with snake bite had local edema and 92% of patients with viper bite had local edema as was observed in the study by Gaurav et al where 95.23% of the patients with viper bite had local edema. The mortality in the present studyof all patients with snake bite was 1.33% whereas it was 1.94 % in a study by Patil et al[16] and 4.7 % in a study by punde DP et al.[17] In the present study, Clotting time, bleeding time and prothrombin time was raised in all poisonous haemotoxic bites and similar observations were made by Saini et al.[18] %. Prolonged bite to needle time, development of renal failure, leukocytosis, neurotoxicity and severe degree of coagulopathy were factors associated with adverse outcome. This is in line where several studies have shown important contribution in death to prolonged bite to hospital,[19,20] acute renal failure[21,22] and presence of severe coagulopathy.[23] Early recognition of predictors of adverse outcome will be helpful in addressing the problems in those patients more seriously which can lead to a decrease in the mortality in snake bite.

The number of deaths in the study among poisonous snake bite was 4 (3.7 %) whereas there were no deaths in the other 192 patients with non-poisonous snake bites. A higher mortality rate has been reported by Inamdar[24] and Ahmed.[25] The low level of mortality in the study population would be due to the better availability of treatment facilities in Kerala, higher level of literacy and better awareness regarding management strategies among the masses.

CONCLUSIONS

Snake bite is a common problem encountered in tertiary care centres and the most common encountered type of snake bite is haemotoxic bite. The most common type of snake identified was viper and mortality in venomous bite was 3.7 % with mortality in neurotoxic bite being 1.85 % and mortality in haemotoxic bite being 1.85 %. Bites were usually on the lower limbs followed by those on upper limb, trunk and other parts of the body. Pain at the bite site was the commonest symptom and tenderness at bite site was the commonest sign in patients with snake bite. Among the complications that patients with poisonous snake bite developed include secondary infection, renal failure, intravascular haemolysis and neuroparalytic events and mortality was highest in patients with neurotoxicity. The predictors of adverse outcome in the study were delay in starting treatment development of renal failure, leukocytosis, development of neurotoxicity and the presence of coagulopathy in patients.

Limitation of the Study

1. Not all patients with snake bite in the study area will report to the study centre where this study is being conducted as many patients with snake bite are going to resort to other primary, secondary treatment centre and indigenous practitioners in and around the study centre
2. Involvement of a small number of patients in the study. Larger samples and multi-centric studies are required to give a clear picture of the clinical profile, outcome and predictors of outcome of snake bite in the region.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.
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