ORIGINAL RESEARCH

A Hospital Based Prospective Study to Assess the Outcome of Acute Kidney Injury (AKI) in Snake Bite Patients at Newly Established Medical College

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ABSTRACT
Background: Snake envenomation is a serious medical crisis, wherein the spectrum of injury can vary from local tissue damage to involvement of almost all vital organs of the body. Hence, the need to recommend the most effective first aid to the victims bitten by snakes and to recommend effective steps in the management of this problem. The aim of this study to find out the incidence of acute kidney injury in snakebite patients.
Materials and Methods: This is a hospital-based prospective observational study in 50 consecutive patients, with history of poisonous snakebite, admitted to Government Medical College & Hospital, Barmer, newly established tertiary referral centre in western Rajasthan, India during one-year period. Snakebite and species identification was confirmed by a reliable history from patients, patient's relatives, specimen brought and presence of fang marks and signs of local and systemic envenomation. All patients were interviewed using a standardized questionnaire to maintain a record of patient's history relevant to snakebite envenomation. All these analyses were performed using a commercially available software Statistical Package for the Social Sciences (SPSS) 21 version on personal computer.
Results: In our study, mean age group of AKI was 40.7 ± 13.21 years, incidence of AKI was 60% in male and 40% in female and it was found to be 94% in rural population and 6% in urban population. Only in 4% of cases, snakes were identified. Incidence of AKI was found to be 30%.33.33% (N=1/3) of the patients with AKI had neurotoxicity (p>0.05). Thus, not significant. None of the patients with AKI had brown or black coloured urine. 75 % of patients with AKI had whole blood clotting time more than 20min (p-0.000), thus highly significant. AKI developed in 62.5% patients with bite to ASV interval <= 2hours and 37.5% with interval >2 hours (p>0.05), thus not significant.
Conclusion: Snakebites are still a common medical emergency encountered, especially in rural areas. Timely treatment is the mainstay for reduction of morbidity and mortality. Recognition of predictor signs is essential for clinical management and early referral which could lead to a significant decrease in morbidity and mortality. Further long-term studies might help to assess predictors of renal failure in snake bite envenomation.
Keywords: Snake Bite, AKI, Envenomation, Local Tissue Damage.

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INTRODUCTION

Snake envenomation is a serious medical crisis, wherein the spectrum of injury can vary from local tissue damage to involvement of almost all vital organs of the body. Clinico - toxicologically, nature of snake envenomation is categorized into hemotoxic, neurotoxic, and myotoxic syndromes. Most snakebites are harmless and are caused by non-poisonous species. Nonetheless, of the 3,000 different species of snakes, about 450 are found to be dangerous for humans worldwide, 52 snakes are poisonous out of 216 Indian snakes. Major poisonous species are Russell's viper, krait, cobra and saw scaled viper.[1]

Snake charmers carry snakes especially cobra, door to door for worship. At every house the snake's mouth is forced open and some milk is poured down in its throat though milk is not snake food. It is also believed that snakes bite people who harmed them in their previous birth. When snakes are killed, people offer special prayers and bury them. People also believe that snakes take revenge against those who harmed them.

In view of their strong beliefs and many associated myths, people resort to magico-religious treatment for snake bite thus causing delay in seeking proper treatment. As a result, valuable time is lost in some of the deserving cases. It is poignant to note that some of the cinema and TV serial stories even now propagate non-scientific ideas on snakes and snakebites and display traditional treatment. Furthermore, wrong/erroneous identification of the snake species also leads to inappropriate/inadequate treatment and outcomes. At presentation, a snake-bitten victim can be promptly diagnosed and treated if the clinical syndrome of snakebites is well-defined and pre-distinguished based on analysis of a series of reliably identified bites.[2]

World health organization (WHO) has recognized snakebite as neglected public health problem. According to the same WHO report, the global annual incidence of envenoming and resulting deaths ranges from a minimum of 421,000 to a maximum of 1,841,000 and 20,000 to 94,000, respectively. Also, it is mentioned that the greatest number of snakebites occur in sub-Saharan Africa and South Asia. India has the highest incidence of snakebite resulted mortality, ranging from 13,000 to 50,000 cases annually.[3]

Hence, the need to recommend the most effective first aid to the victims bitten by snakes and to recommend effective steps in the management of this problem. The aim of this study to find out the incidence of acute kidney injury in snakebite patients.

MATERIALS & METHODS

This is a hospital-based prospective observational study in 50 consecutive patients, with history of poisonous snakebite, admitted to Government Medical College & Hospital, Barmer, newly established tertiary referral centre in western Rajasthan, India during one-year period. A written informed consent was obtained from each subject included in the study.

Methods

Snakebite and species identification was confirmed by a reliable history from patients, patient's relatives, specimen brought and presence of fang marks and signs of local and systemic envenomation. All patients were interviewed using a standardized questionnaire to maintain a record of patient's history relevant to snakebite envenomation.

Following clinical features and history were found out

1. Local swelling at the site of bite and increasing swelling with time.
2. Bleeding from the bite sites.
3. Black or brown urine. Because black or brown urine suggests generalized intravascular hemolysis. The black or brown urine which was positive for RBC or Hb, was included.
4. Time interval between snakebite and administration of antisnake venom.

5. Twenty minutes whole blood clotting test (20 min WBCT).
6. Total amount of anti-snake venom serum (ASV) given. ASV was given to the snakebite patients with one or more of the following criteria:
   • 20 min WBCT > 20 min.
   • Presence of ptosis / external ophthalmoplegia / dysphagia / paralysis.
   • Local swelling involving more than half of the bitten limb.
   • Rapid extension of swelling.
   • Spontaneous bleeding from bite site.
7. Presence of neurological signs (glossopharyngeal palsy, ptosis, ophthalmoplegia, dysphagia and generalized flaccid paresis).
8. History of diabetes and hypertension.

Criteria for diagnosis of hypertension and diabetes:
1. Hypertension is diagnosed when a patient had received medicine for hypertension, or had systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg after taking 5 min rest.
2. Plasma glucose will be measured by a "glucose oxidaseperoxidase" method. Diabetes was diagnosed according to "American Diabetes Association" when a previous or current 12h fasting glucose level is 7 mmol/l or greater (≥ 126 mg %).

Statistical Analysis:
Multivariate linear regression analysis with 95% confidence intervalϖ (CI) was done for statistical analysis. Data are expressed in mean ± SE (Standard Error). P value<0.05 was taken as statistically significant. All these analyses were performed using a commercially available software Statistical Package for the Social Sciences (SPSS) 21 version on personal computer.

RESULTS
In our study, mean age group of AKI was 40.7 ± 13.21 years, incidence of AKI was 60% in male and 40% in female and it was found to be 94% in rural population and 6% in urban population. Only in 4% of cases, snakes were identified. Incidence of AKI was found to be 30% in our study [Table 1].
In our study it was found that 44.11% of patients with AKI had local swelling, 58.82% of patients with AKI had bleeding from bite site (p<0.05* & p<0.05* respectively). Thus, it is statistically highly significant.
33.33% (N=1/3) of the patients with AKI had neurotoxicity (p>0.05). Thus, not significant. None of the patients with AKI had brown or black coloured urine. 75 % of patients with AKI had whole blood clotting time more than 20min (p-0.000). Thus, highly significant. AKI developed in 62.5% patients with bite to ASV interval <= 2hours and 37.5% with interval >2 hours (p>0.05). Thus, not significant [Table 2].

Table 1:Patients distribution according to demographic variables

Demographic variables	No. of patients	Percentage of patients
Age (yrs)		
Mean±SD	40.7±13.2	
Sex		
Male	30	60%
Female	20	40%
According to locale		
Urban	3	6%

Rural	47	94%
Snake identified		
Yes	2	4%
No	48	96%
Incidence of AKI		
No	35	70%
Yes	15	30%

Table 2: Clinical manifestation correlate with AKI

Clinical manifestation		AKI		P-value
		No (N=35)	Yes (N=15)	
Local swelling	Yes	19	15	<0.05*
	No	16	0	
Bleeding from bite site	Yes	7	10	<0.05*
	No	28	5	
Neurotoxicity	Yes	2	1	>0.05
	No	33	14	
Brown urine	Yes	0	0	1.00
	No	35	15	
WBCT>20 min.	Yes	4	12	<0.05*
	No	31	3	
Interval between bite & ASV	≤2 hour	3	5	>0.05*
	>2 hour	32	10	

Chi-square test

DISCUSSION

World health organization (WHO) has recognized snakebite as neglected public health problem. Snake bites contribute to health problem in India and continue to be a major medical concern. India alone contributes to 81,000 envenomations and 11,000 deaths annually. Based on the above statistics, it appears that every 10 seconds one individual is envenomed and one among four dies due to snake bite. Many deaths occur before the victim reaches the hospital.

Incidence of Acute kidney injury (AKI) was found to be 30% in our study. It is similar to study conducted by Mrudul et al,[4] where incidence was found to be 30.96% and Ali et al,[5] found incidence of 17%.

In our study, mean age group of AKI was 40.7±13.2 years. Similar results found by Mrudul et al,[4] and Paul et al,[6] 36.14 ± 14.64 years & 40.47 ± 1.19 years respectively. Athappan et al,[3] found that AKI patients were older than non-AKI patients (39.1 vs. 35.4 years, P = 0.03).

AKI was found to be 60% in male and 40% in female in our study. Bawaskar et al,[7] found that 63% were males and 37% were females. Other study done by Kulkarni et al,[8] found that males and females constitute 68.40% and 31.60% respectively.

AKI was found to be 94% in rural population and 6% in urban population in our study. Urban to rural ratio was found to be 1:4.7 in study by Sharma et al.[9] Another study done by Kalantri et al,[10] found 84% incidence in rural population.

92% patients with AKI had cellulitis in study by Mrudul et al,[4] 57.30% patients had local swelling in study by Paul et al.[6] Which was consisted with our results 44.11% of patients with AKI had local swelling.

It was found that 58.82% of patients with bleeding from bite site developed AKI. It has a p value of 0.05*, which is highly significant. Sharma et al,[9] found out that 27 out of 52 viper bite cases with haemostatic abnormalities developed AKI.

In our study, none of the patients with AKI had brown or black coloured urine. Van holder et al,[11] demonstrated that urine colour was strongly related to renal failure.

In our study,75 % of patients with whole blood clotting time more than 20 minutes developed.

AKI with p value of 0.000, which is highly significant. Paul and Dasgupta et al,[6] found that 54.45% patients developed AKI.

Athappan et al,[3] found that, "Bite to needle time more than 2 hours was an independent risk factor for the development of AKI". Mean bite to hospital time was 7.63 ± 9.26 hours. AKI developed in 62.5% patients with bite to ASV interval <= 2hours and 37.5% with interval >2 hours (p>0.05), thus not significant in present study.

CONCLUSION
Snakebites are still a common medical emergency encountered, especially in rural areas. Timely treatment is the mainstay for reduction of morbidity and mortality. Recognition of predictor signs is essential for clinical management and early referral which could lead to a significant decrease in morbidity and mortality. Further long-term studies might help to assess predictors of renal failure in snake bite envenomation.

REFERENCES

1. Kasturiratne A, Wickremasinghe AR, de Silva N, Gunawardena NK, Pathmeswaran A, Premaratna R, et al. The global burden of snakebite: A literature analysis and modelling based on regional estimates of envenoming and deaths. PLoS Med. 2008;5:e218.
2. Ali G, Kak M, Kumar M, Bali SK, Tak SI, Hassan G, et al. Acute renal failure following echiscarinatus (saw-scaled viper) envenomation. Indian J Nephrol. 2004;14:177–81.
3. Athappan G, Balaji MV, Navaneethan U, Thirumalikolundusubramanian P. Acute renal ailure in snake envenomation: A large prospective study. Saudi J Kidney Dis Transpl. 2008;19:404–10.
4. Mrudul, Patil TB, Bansod YV. Snake bite-induced acute renal failure: A study of clinical profile and predictors of poor outcome. Ann Trop Med Public Health. 2012;5:335–9.
5. Ali G, Kak M, Kumar M, Bali SK, Tak SI, Hassan G, et al. Acute renal failure following echiscarinatus (saw-scaled viper) envenomation. Indian J Nephrol. 2004;14:177–81.
6. Paul J, Dasgupta S. Early Prediction of acute kidney injury by clinical features of snakebite patients at the time of hospital admission. N Am J Med Sci. 2012;4:216–20.

7. Bawaskar HS, Bawaskar PH, Punde DP, Inamdar MK, Dongare RB, Bhoite RR. Profile of snakebite envenoming in rural Maharashtra, India. J Assoc Physicians India. 2008;56:88–95.
8. Kulkarni ML, Anees S. Snake venom poisoning: Experience with 633 cases. Indian Pediatr. 1994;31:1239–43.
9. Sharma N, Chauhan S, Faruqi S, Bhat P, Varma S. Snake envenomation in a north Indian hospital. Emerg Med J. 2005;22:118–20.
10. Kalantri S, Singh A, Joshi R, Malamba S, Ho C, Ezoua J, et al. Clinical predictors of in-hospital mortality in patients with snake bite: A retrospective study from a rural hospital in central India. Trop Med Int Health. 2006;11:22–30.
11. Vanholder R, Sever MS, Erek E, Lameire N. Rhabdomyolysis. J Am SocNephrol. 2000;11:1553–61.