

Treatment outcome of snake bite patients: A prospective observational study at tertiary care hospital

Shital Rathod¹, Arvind Chavhan², Deepika Ramrao Dharmkare^{3*}, Koustubh Bavdhankar⁴

{¹Associate Professor, ^{3,4}JR3 Medicine, Department Of Medicine} {²Associate Professor, Department Of Paediatrics}
Dr. Shankarrao Chavhan Government Medical College, Nanded, INDIA.

Email: deepikadharmkare@gmail.com

Abstract

Background: Snake-bite is one of the most life-threatening bio-weapon system in the nature which may cause local to systemic complication. **Aim:** To analyse the outcome of AKI after snake-bite. **Material and Methods:** A total of 200 patients of either gender with age >12 years having history of snake bite with signs of envenomation were investigated and treated in a tertiary care hospital. Outcome was analysed. **Results:** Anti-snake venom was given to all cases in the study. Antibiotics, fresh frozen plasma, whole blood and platelets was given to 48%, 19%, 9% and 7.5% cases respectively. Mortality rate among snake bite cases in present study was reported as 2%. and due to snake bite induced AKI was 19%. **Conclusion:** Mortality rate among snake bite cases was reported as 2% and due to snake bite induced AKI was 19%. Lapse of time in presenting to the hospital is the predictors of poor outcome in snake bite induced acute kidney injury. Early ASV administration and proper supportive management after ASV administration is of utmost importance, for a good patient outcome.

Keywords: Snake bite, anti-snake venom, acute kidney injury, mortality

*Address for Correspondence:

Dr Deepika Ramrao Dharmkare., JR3 Medicine, Department Of Medicine, Dr. Shankarrao Chavhan Medical College, Nanded, INDIA.

Email: deepikadharmkare@gmail.com

Received Date: 29/11/2019 Revised Date: 22/01/2019 Accepted Date: 04/02/2020

DOI: <https://doi.org/10.26611/10211524>

This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/). 

Access this article online

Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 22 August 2020

INTRODUCTION

Snake-bite is one of the most life-threatening bio-weapon system in the nature which may cause local to systemic complication in the form of neurotoxicity or hematotoxicity. It is a common medical emergency and an occupational hazard especially in tropical countries like India. It is a common occupational hazard mainly in farmers, plantation workers, herders and laborers leading

to significant morbidity and mortality that remains largely unreported. The true global burden of snake bite is unknown due to lack of standardized and underreporting. Most snake bites and fatalities occur in Asia, south east, and sub-Saharan Africa, with India reporting the highest mortality due to snake bites.¹ Acute kidney injury (AKI) is an important complication of snake bite and a major cause of mortality. AKI is common after bites from myotoxic or haemotoxic snakes. These snakes are Russell's viper, saw scaled viper, hump nosed pit viper, green pit viper, and sea snake. Hemorrhage, hypotension, disseminated intravascular coagulation (DIC), intravascular hemolysis, and rhabdomyolysis enhance renal ischaemia leading to AKI.² This study was conducted at tertiary care centre in western Maharashtra, which is one of the fast-growing agricultural areas. The present study was conducted to analyse the outcome of AKI after snake-bite.

MATERIAL AND METHODS

The present prospective observational study was conducted in the wards of Department of General medicine at a tertiary care hospital in Maharashtra. All the patients with history of snake bite who fulfilled the inclusion and exclusion criteria, getting admitted at the tertiary care hospital.

Sample size

A total of 200 snake bite patients were selected by consecutive type of non-probability sampling method.

Inclusion criteria

- Patients of either gender with age >12 years having history of snake bite with signs of envenomation.
- Progressive elevation of serum creatinine >0.3 mg/dl from baseline, a percentage increase in the serum creatinine concentration of >50% or oliguria of less than 0.5 ml/kg/hr for more than 6 hours.

Exclusion Criteria

- The patients with source of bite not identified.
- Patients with pre-existing renal disease with history of snake bite.
- Patients discharged against medical advice.
- Patients with risk factors for developing renal disease with history of snake bite (diabetes, hypertension, connective tissue diseases and chronic infection).
- Exposure to nephrotoxic drugs/ toxins.

Methodology

Data was collected using a pretested proforma meeting the objectives of the study. Detailed history, physical examination and necessary investigations were undertaken. The purpose of the study was explained to the patient and informed consent was obtained. Using non-invasive methods acute kidney injury in snake bite patients who fulfil the inclusion criteria is assessed. Acute Kidney Injury (AKI) was defined as an “abrupt (within 48 hours)

absolute increase in the serum creatinine concentration of ≥ 0.3 mg/dl from baseline, a percentage increase in the serum creatinine concentration $\geq 50\%$ or oliguria of 0.5 ml/kg/hr >6 hours. All the patients were managed as per standard hospital protocol and outcome as alive or dead was noted. Laboratory investigations done were Haemoglobin, Total leukocyte count, Platelet count, Whole Blood Clotting Time, Bleeding Time, Blood Urea, Serum Creatinine, Urine Microscopy and Prothrombin Time. USG Abdomen and X-ray Chest were also done whenever necessary.

Statistical Analysis

The quantitative data was represented as their mean \pm SD. Categorical and nominal data was expressed in percentage. The t-test was used for analysing quantitative data, or else non parametric data was analyzed by Mann Whitney test and categorical data was analyzed by using chi-square test. Pearson correlation co-efficient was used for computing correlation between quantitative variables. The significance threshold of p-value was set at <0.05 . All analysis was carried out by using SPSS software version 21.

RESULTS

Incidence of Acute Kidney injury among snake bite cases in present study was reported as 13.5%. In only 4 cases (2%), we were able to identify snake and in all the cases, it was viper snake. Mean age of the study cases was 36.39 years with maximum number of cases i.e. 63% were in active age group of 21-40 years of age. Male predominance was seen in present study with 53% cases as compared to 47% females. Most common occupation among study cases was farming (53%). Most common urinary complaints were hematuria, oliguria (16%) and reduced urinary output (15.5%). Hematological conditions reported in present study were raised PT/ INR (15.5%) and leucocytosis (11.5%). Other conditions seen were anemia (5.5%) and thrombocytopenia (6.5%).

Table 1: Urinary and hematological complaints

Complaints	No. of patients	Percentage
Urinary complaints		
Hematuria	32	16%
Oliguria	32	16%
Anuria	22	11%
Reduced urine output	31	15.5%
Hematological complaints		
Anaemia	11	5.5%
Thrombocytopenia	13	6.5%
Leucopenia	1	0.5%
Leucocytosis	23	11.5%
Raised PT/INR	31	15.5%

RBCs in Urine and raised WBCT were seen in 17% and 18% cases respectively. Raised blood urea at baseline was reported in 11% cases which increased to 15.5% by the end of 24 hours. Mean blood urea was 24.52 mg% at baseline which

increases to 28.06 mg%, 31.58 mg% and 34.37 mg% by the end of 24, 48 and 72 hours respectively. Raised serum creatinine at baseline was reported in 14% cases which increased to 16% by the end of 48 hours. Mean s. creatinine was 0.99 mg% at baseline which increases to 1.28 mg%, 1.66 mg% and 2.04 mg% by the end of 24, 48 and 72 hours respectively. Mean urine output was 1533.67 ml at baseline which decreases to 1449 ml by the end of 48 hours. The urine output increases afterward and reached 1608 ml by the end of 72 hours.

Table 2: Laboratory investigations in study subjects

Investigations	Mean±SD	P value
Blood urea		
Baseline	24.52±9.94	<0.01
24 hrs	28.06±15.80	Significant
48 hrs	31.58±22.42	
72 hrs	34.37±28.19	
Sr. creatinine		
Baseline	0.99±0.39	<0.01
24 hrs	1.28±1.07	Significant
48 hrs	1.66±2.01	
72 hrs	2.04±3.03	
Urine output		
Baseline	1533.67±411.69	
24 hrs	1494.72±486.53	<0.01
48 hrs	1449.75±411.69	Significant
72 hrs	1608.44±387.85	

A total of 18% cases reported to hospital within 3 hours after snake bite while 57% reported within 4 to 6 hours. In 3% cases delay was more than 12 hours. Before coming to hospital, 3% cases received anti-snake venom.

Table 3: Distribution of study subjects as per management

Management	N	%
ASV	96	48.0%
Antibiotics	96	48.0%
FFP	38	19.0%
Platelets	15	7.5%
Whole Blood	18	9.0%

Anti-snake venom was given to all cases in the study. Antibiotics, fresh frozen plasma, whole blood and platelets was given to 48%, 19%, 9% and 7.5% cases respectively. Mortality rate among snake bite cases in present study was reported as 2%.

Table 4: Distribution of study subjects as per Final Outcome

Outcome	No. of patients	Percentage
Alive	196	98.0%
Death	4	2.0%
Total	200	100.0%

DISCUSSION

Mortality rate among snake bite cases was reported as 2% and mortality among cases with AKI was 19% in the present study. Incidence of Acute Kidney injury among snake bite cases in present study was observed as 13.5%. Asian continent has the highest incidence and in Thailand, Sri Lanka and India, snake bite was complicated by AKI in 5%,³ 27%,⁴ and 13–32%, which is in accordance with the findings of the present study.^{5,6} The prevalence of AKI in Menon JC *et al.*⁷ was 21%, which is slight higher than present study which can attributed to snake species and regional variation. However, results of the present study are comparable to the other reported series in India which

are in the range of 13–32%.^{8,9} Comparable data are available from several other countries as well wherein, the incidence of acute renal failure is ~11%, 6.2%, 5% and 27% in Nigeria, Middle East, Thailand and Ceylon, respectively.¹⁰ It has been long believed that Russell's viper and the saw scaled viper were the species causing AKI in snakebite. Recently, H. hypnale has also reported to be a common cause of AKI by some authors but present study could not evaluate this association as species was identified in only 4 cases although all of the four cases were vipers and also vipers are very commonly found in region of study. In addition to early detection of clinical signs and symptoms of snakebite, early administration of

anti-snake venom (ASV) is known to reduce the morbidity and mortality. Anti-snake venom was given to all cases in the study. Antibiotics, fresh frozen plasma, whole blood and platelets was given to 48%, 19%, 9% and 7.5% cases respectively. Indrani D *et al.*¹¹ ASV was given to 87.88% of cases. In the study of Mahajan and Mhaskar,¹² which is in accordance to the present study. 50.66% patients received ASV; whereas in other two other studies,^{13,14} ASV was given to 90% and 91.7% of patients respectively. Harshavardhana H *et al.*⁴ reported that ASV was given to 100% of the cases. Menon JC *et al.*⁷ reported (85%) of victims needed ASV and others did not require it and antibiotics, fresh frozen plasma and other treatment was given to patients as required, as in present study. Mortality rate among snake bite cases with AKI was 19% in the present study. Our results are in accordance with Dineshkumar T *et al.*¹⁵ the mortality reported in their study is 15.5% and the risk factors were the presence of coagulopathy and uraemic encephalopathy.

CONCLUSION

Mortality rate among snake bite cases was reported as 2% and due to snake bite induced AKI was 19%. Lapse of time in presenting to the hospital is the predictors of poor outcome in snake bite induced acute kidney injury. AKI is an important complication of snake bite that may lead to mortality. Early ASV administration and proper supportive management after ASV administration is of utmost importance, for a good patient outcome.

REFERENCES

1. Snake bite, key facts. Available at http://www.who.int/neglected_diseases/en/. Retrieved on 24/12/19.
2. Mohapatra B, Warrell DA, Suraweera W, Bhatia P, Dhingra N, *et al.* Snakebite mortality in India: a nationally representative mortality survey. *PLoS Negl Trop Dis.* 2011;5:1018.
3. Kanjanabuch T, Sitprija V. Snakebite nephrotoxicity in Asia. *Semin Nephrol* 2008;28: 363-372.
4. Harshavardhana H, Pasha I, Srinivas Prabhu N, Ravi P, Amira N. A study on Clinico-Epidemiological profile of snakebite patients in a tertiary care centre in Bangalore. *Global J of Med and Pub Health.* 2014;3(2):1-6.
5. Visuvaratnam M, Vinayagamoorthy C, Balakrishnan S. Venomous snake bites in North Ceylon – A study of 15 cases. *J Trop Med Hyg* 1970;73:9-14.
6. 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.
7. Menon JC, Joseph JK, Jose MP, Dhananjaya BL, Oommen OV. Clinical profile and laboratory parameters in 1051 victims of snakebite from a single centre in Kerala, South India. *J Assoc Physicians India.* 2016 Aug;63:22-9.
8. Kumar V, Sabitha P. Inadequacy of Present Polyspecific Anti Snake venom- A Study from Central Kerala. *Indian J Pediatr* 2011;78:1225-1228.
9. Lal P, Dutta S, Rotti SB, *et al.* Epidemiological Profile of Snakebite cases admitted in JIPMER Hospital. *Indian J Community Med* 2001;26:36-38.
10. Chippaux JP. Snake-bites: appraisal of the global situation. *Bull World Health Organ* 1998; 76:515–524.
11. Indrani D, Pragnadyuti M, Rahin M, Srabani G, Balaram G, Rabindranath D. Clinical and Epidemiological Profile of Snake Bite Cases in a Tertiary Care Medical College and Hospital in Eastern India. *Saudi Journal of Medical and Pharmaceutical Sciences* 2017 May;3(5):408-413.
12. Mahajan S, Mhaskar D. A study of clinical profile of snake bite at a tertiary care centre. *International J of recent scientific research.* 2015;6(9):6065-6068.
13. Joseph JK, Simpson ID, Menon NC, Jose MP, Kulkarni KJ. First authenticated cases of life-threatening envenoming by the hump-nosed pit viper (*Hypnalehypnale*) in India. *Trans R Soc Trop Med Hyg.* 2007;101: 85-90.
14. Ghosh S, Maisnam I, Murmu BK, Mitra PK, Roy A, Simpson ID. A locally developed snakebite management protocol significantly reduces overall anti snake venom utilization in West Bengal, India. *Wilderness and environmental medicine.* 2008 Dec 1;19(4):267-74.
15. Dineshkumar T, Dhanapriya J, Muruganath S, Surendar D, Sakthirajan R, Rajasekar D, Balasubramanian T, Gopalakrishnan N. Snake envenomation-induced acute interstitial nephritis. *Journal of Integrative Nephrology and Andrology.* 2018 Jan 1;5(1):14.

Source of Support: None Declared
Conflict of Interest: None Declared

Policy for Articles with Open Access:

Authors who publish with MedPulse International Journal of Medicine, Print ISSN: 2550-7583, Online ISSN: 2636-4751 agree to the following terms: Authors retain copyright and grant the journal right of first publication with the work simultaneously licensed under a Creative Commons Attribution License that allows others to share the work with an acknowledgement of the work's authorship and initial publication in this journal. Authors are permitted and encouraged to post links to their work online (e.g., in institutional repositories or on their website) prior to and during the submission process, as it can lead to productive exchanges, as well as earlier and greater citation of published work.