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STUDY OF ASSOCIATION OF EARLY ALBUMINURIA AND THROMBOCYTOPENIA WITH SNAKE BITE ASSOCIATED AKI IN A TERTIARY CARE HOSPITAL IN INDIA.

Internal Medicine

Dr. J. Sudhakaran Assistant Professor, Department Of Internal Medicine, Thanjavur Medical College And Hospital, Thanjavur

Dr. K. Rajkanth Assistant Professor, Department Of Internal Medicine, Thanjavur Medical College And Hospital, Thanjavur

Dr. B. Kavitha Assistant Professor, Department Of Internal Medicine, Thanjavur Medical College And Hospital, Thanjavur

Dr. M. Nivedhan* III Year Post Graduate, Department Of Internal Medicine, Thanjavur Medical College And Hospital, Thanjavur *Corresponding Author

ABSTRACT

Background: Snake bites cause substantial mortality and morbidity in India. Acute kidney injury (AKI) is as important cause of mortality in patients with vasculotoxic snake bite. **Methods:** Fifty patients of snake envenomation who got admitted in the Department of Internal medicine of a tertiary care centre for a period of six months formed the study group. Out of these 25 patients were controls and other 25 patients were cases, they were assessed for progression to AKI and various clinical and biochemical parameters were analysed. **Results:** It was found that the mean platelet count was lower in the patients with elevated renal parameters.The proportions of patients with albuminuria and thrombocytopenia are higher in the cases. The commonest snake bite was Russell's Viper and mortality was 6% in our study. **Conclusion:** Albuminuria and thrombocytopenia were associated with acute kidney injury and are important early predictors of acute kidney injury.

KEYWORDS

Albuminuria, Acute kidney injury, Thrombocytopenia, Snake bite

INTRODUCTION:

Venomous snakebites are an important medical problem and occupational hazard in India. Russell's viper is the major cause of snakebite leading to increased morbidity and mortality causing acute kidney injury AKI [1]. The annual mortality is around 30,000 most of them from South-East Asia and West Africa.

Approximately, 10,000 deaths occur in India. An incidence of renal involvement with snakebite envenomation of 1.4-28% has been reported in various series, and incidence of ARF is 10-32%. Among multifactorial cause for the pathogenesis of snakebite-induced AKI[2,3,4,5,6] (SAKI), elevated oxidative, and carbonyl stress (CS) leading cause of kidney injury.

A recent report from South India indicates that nearly 20% of poisoning cases are due to envenomations. By correlating the association of albuminuria and thrombocytopenia on presentation and acute kidney injury in snake bite victims we can reduce the morbidity and mortality. The knowledge of these novel predictors of acute kidney injury will help in early detection of critical patients and thereby contributes to rapid treatment course and survival of the patients.

AIMS AND OBJECTIVES:

1. To correlate the association of albuminuria on presentation and acute kidney injury.
2. To correlate the association of thrombocytopenia on presentation and acute kidney injury.
3. To follow up the cases after they progress to acute kidney injury.

MATERIALS AND METHODS:

This observational study was carried out in the Department of Internal Medicine of a tertiary care centre for a period of six months with a sample size of 50 (25cases and 25 controls).The cases were the subjects who developed the elevated renal parameters after snake bite and controls were the subjects with normal renal parameters after snake bite.

Inclusion Criteria:

Patients with snake bite developing Acute Kidney Injury.

Exclusion Criteria:

1) Known medical disorders like Hypertension and diabetes.
2) Chronic history of intake of NSAIDS or nephrotoxic drugs
3) Past history of renal disease.

After obtaining institutional ethical committee approval and application of inclusion and exclusion criteria willing participants were taken up after getting a written informed consent from them.All the cases and controls were subjected to careful history taking and physical examination and biochemical parameters were done on the day of presentation . A thorough physical examination was done to look for local and systemic features of envenomation. The parameters analysed included blood urea, serum creatinine, urine albumin and platelet count and treatment given and outcomes.The statistical analyses were performed using SPSS trial version 20 software and was expressed as absolute numbers with percentage for describing the frequency of the parameters in case and control groups.The unpaired 't' test was used to compare means between the case and control groups for normally distributed and non-normally distributed data, respectively.Fisher's exact test was used to find the statistical difference between the proportions.$P<0.05$ was considered statistically significant difference.

RESULTS:

In our study, the mean age of the control group is 41.5 years and the case groups mean age is 41.9 years.The proportion of males 76 % (n = 19) was higher than the females 24 % (n=6)in the case group. Similarly, in control groups males 68 % (n=17) were more than the females 32 % (n=8).

In our study of 50 subjects, the unknown snake bite was 24 % (n=12.) Among the known snake bite, the snake bite by Russell's Viper had highest frequency (n=18, 36%),followed by common krait bite (n=9, 18%) and Saw scaled Viper bite (n=7, 14%). In our study, the cobra bite had least frequency of 8% (n=4) as represented in figure-1.

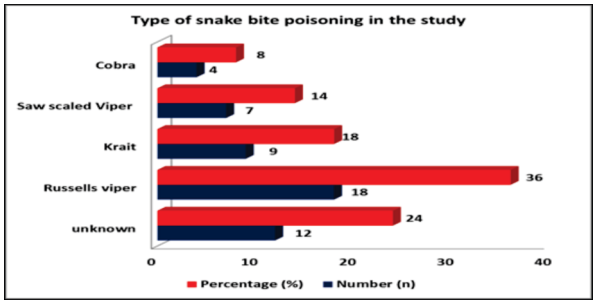

Figure 1: Frequency distribution of type of snake bite poisoning in the study population

The outcome of the patients in the control group, 84% (n=21) were

managed conservatively. The remaining 16% (n=4) of subjects underwent for dialysis.In the case group, 12% (n=3) expired during the study period. In the remaining patients, 32% (n=8) were managed conservatively and 56% (n=14) needed dialysis.

The mean blood urea in controls and cases (29.4 mg/dl vs 77.8 mg/dl) on application of unpaired t test was statistically significant with p value <0.0001. The mean serum creatinine value of case groups is numerically higher than the mean serum creatinine value of control group (2.8 mg/dl Vs 0.86 mg/dl) which was statistically significant with unpaired t test.(p<0.05). In the same way, mean platelet count value of case groups is numerically lower than the mean platelet count value of control group (1.12 mg/dl Vs 1.7 mg/dl) which was statistically significant with p value <0.0001.

Table 1: Comparison of different biochemical parameters between cases and controls

S.No	Biochemical parameters	Cases (n=25)		Controls (n=25)		P Value
		Mean	SD	Mean	SD	
1	Blood Urea (Mg/dl)	77.8	10.8	29.4	5.61	<0.0001*
2	Serum Creatinine (mg/dl)	2.8	1.03	0.86	0.14	<0.0001*
3	Platelet count (Lakhs/cc)	1.12	0.38	1.7	0.37	<0.0001*

The frequency distribution of urine albuminuria between cases and control groups are summarized in table 2.

Table 2 : Comparison of frequency distribution of urine albuminuria between case and control groups

S.No	Type of urine albuminuria	Cases (n=25)		Controls (n=25)	
		n	%	n	%
1	Nil	1	4	9	36
2	Trace	6	24	10	40
3	1 plus	8	32	6	24
4	2 plus	10	40	0	0

In both cases and control groups, the urine albumin Nil and Trace category were clubbed together as "Albuminuria Absent'. The remaining groups, albumin 1 Plus and albumin 2 plus were clubbed together as 'Albuminuria Present' group and the statistical difference between these proportions was tested by Fisher's Exact test and the p value obtained was 0.0015 (statistically significant). The relative risk obtained is 2.78 with 95% confidence interval of 1.41 to 5.4.

Table 3: Comparison between the cases and controls in regards to the development of albuminuria .

S.No	Parameter		Cases (n=25)		Controls (n=25)		P Value	Relative risk (95% CI)
			n	%	n	%		
1	Albuminuria	Present	18	72	6	24	0.0015*	2.78 (1.41 to 5.4)
		Absent	7	28	19	76		

Similarly, the patients with platelet count less than 1.5 lakhs/cc was taken as 'Thrombocytopenia Present' and the patients with platelet count above 1.5 lakhs/cc was taken as 'Thrombocytopenia[22] absent' and the statistical was tested by Fisher's Exact test and the p value obtained was 0.0016 (statistically significant). The relative risk obtained is 2.92 with 95% confidence interval of 1.4 to 6. The data are summarized in the table 4

Table 4: Comparison between the cases and controls in regards to the thrombocytopenia.

S. No	Parameter		Cases (n=25)		Controls (n=25)		P Value	Relative risk (95% CI)
			n	%	n	%		
1	Thrombocytopenia	Present	19	76	7	28	0.0016*	2.92 (1.4 to 6)
		Absent	6	24	18	72		

DISCUSSION:

Our study aimed to determine the early prediction of acute kidney injury in the patients with snake bite by urine albuminuria and thrombocytopenia. The studies conducted by Chugh KS[7] et al , Pinho F M[8] et al , Naqvi R [9] et al and Mukhopadhyay P[10] et al found that the mean age in snake bite varied from 24 years to 43 years. Our study also has the mean age of patients with snake bite fall under the similar category.In both case and control groups, the males have the higher frequencies of snake bite poisoning than the female. This could be due to the fact that, being a male gender, the probability of going to work outside the home is higher than the female and hence the chances of accidental bite from the snake is higher in males.

The most common type of snake bite seen in our study is due to Russell's viper. This is in concordance with the study conducted by Warell DA et al, Swaroop S et al, N. Suchitra [11] et al and G. Ali et al.The mortality rate observed in our study due to snake bite poisoning was 6%. Similar studies which aimed to estimate the mortality rate due to snake bite poisoning in India such as Viramani1[12] SK et al , Bawaskar HS [13] et al , Brunda G[14] et al and Majumder D[15] et al reported that the mortality rate as higher values ranging from 40% to 80%. However in our study we observed only 6% mortality rate.

Acute kidney injury is the most dreaded complication which can develop in the hemotoxic snake bite.The proportion of patients underwent dialysis following AKI is higher in case groups than the control groups (56% Vs 16%). In our study, when the proportion of development of thrombocytopenia was compared with those who did not develop in case and control group, the relative risk obtained was 2.92 (95% confidence interval of 1.4 to 6; p value of 0.00016). Hence it could be noted that the patients who developed thrombocytopenia after snake bite will have 2.92 times higher risk of having acute kidney injury. Hence, from the above results it could be inferred that the albuminuria and thrombocytopenia are strongly associated with development of acute kidney injury.

CONCLUSION:

From this study, it is concluded that in patients with snake bite, albuminuria and thrombocytopenia are associated with development of Acute kidney injury.The presence of thrombocytopenia and albuminuria can predict the occurrence of Acute Kidney Injury at the earlier stage.Acute kidney injury (AKI) is as important cause of mortality in patients with vasculotoxic snake bite. Our findings highlight the importance of best supportive care, including high-level ICU care where needed and available, and dialysis when required for AKI. Follow-up for CKD surveillance, detection and management of renal risk factors is critically important in the long-term medical care of these patients.

Summary:

The important clinical features in snake bite victims are cellulitis, AKI, neuroparalysis, coagulopathy and hypotension. Acute kidney injury (AKI) due to snake bite is an important cause of community acquired tropical AKI.The presence of thrombocytopenia and albuminuria can predict the occurrence of Acute Kidney Injury at the earlier stage. The limitation of our study is smaller sample size and patients of snake bite envenomation were not followed up for development of tubulointerstitial disease in future.

Declarations:
Funding: Nil.

Conflict of interest: None declared.

Ethical committee approval: This study is registered with Institutional ethical committee.

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