Original Article

Study of prevalence of renal failure and outcome in snake bite patients in tertiary care hospital

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Abstract

Introduction: Snake bite may be the earliest and most common poison known to human being. Snake bite is a common cause of morbidity and mortality worldwide, especially in tropical countries. The global incidence of snake en-venomations could exceed 5 million per year, with an associated mortality level of 1, 25,000 persons per year. **Aims and Objectives:** To Study of Prevalence of Renal Failure and Outcome in Snake Bite Patients in Tertiary Care Hospital **Methodology:** The present study was done at a tertiary care hospital in the urban settings. The study period was 2 years. (December 2012 to November 2014), Prospective Observational-Analytical study Study population consisted of patients diagnosed as case of snake bite induced renal failure. Chi-square test and Fisher Exact test were used for statistical analysis. **Result:** The Renal Failure was more in the patients with bleeding manifestation. As per Chi square test, p-value is 0.00694 (< 0.05) Hypotension was more in renal Failure Group than non-renal failure group. As per Chi square test, p-value is 0.008405 (< 0.05) which is statistically significant < 20min 47.71% ; > 20min 52.29% Coagulopathy was more in renal failure group as compared to non-renal failure group. As per Chi square test p-value is 0.001798 (< 0.05) which is statistically significant. Mortality in present study was 23.33% in renal failure group and no deaths were recorded from non-renal failure group which statistically Significant Fisher Exact test- p<0.0001. **Conclusion:** Factors which predisposes to Renal Failure are Bleeding manifestations Hypotension, WBCT> 20 minutes, Coagulopathy and renal failure is having worse prognosis with 23.33% mortality.

Keywords: Renal Failure, Outcome in Snake Bite Patients.

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INTRODUCTION

Snake bite may be the earliest and most common poison known to human being. Snake bite is a common cause of morbidity and mortality worldwide, especially in tropical countries. The global incidence of snake en-venomations could exceed 5 million per year, with an associated mortality level of 1, 25,000 persons per year[1]. Clearly in developing countries, where snake-bites are most prevalent, none of the required conditions for their correct management is fulfilled. In most of the developing countries, lack of medical attention, especially antivenin therapy, leads to high mortality levels.[1] In many parts of Southeast Asian region, snake bite is a familiar occupational hazard of farmers, plantation workers and others, resulting in tens of thousands of deaths each year and innumerable cases of chronic physical handicap[2]. Of the 2500-3500 species of snakes, only 500 are considered to be venomous3. There are three important groups (families) of venomous snakes in Southeast Asia: 1) Elapidae have short permanently erect fangs. This family includes the cobras, king cobra, kraits and coral snake. 2) Viperidaehave long fangs which are normally folded up against the upper jaw but, when the snake strikes, are erected. There are two subgroups, the typical vipers (Viperinae) and the pit vipers (Crotalinae)[2]. 3) Hydrophiidae (sea snake): Sea snakes are found in the vicinity of the seacoast. They have a small head and a flattened tail that helps them swim. Though venomous,

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they seldom bite. The concept of the "Big 4" snakes of medical importance in India are- the Indian cobra (*Najanaja*), the common krait (*Bungaruscaeruleus*), the Russell"s viper (*Daboiarusselii*) and the saw-scaled viper (*Echiscarinatus*)[4, 5]. The principal systemic effects of the envenomation are on the nervous system, kidneys, heart and blood coagulation and locally at the site of bite. Renal failure complicates 5.5% to 26.0% of all poisonings from snakes. Most cases are due to the Viperidae family of snakes, which includes pit viper, rattlesnake, Russell's viper, saw scale[6]. Tubular necrosis and cortical necrosis are the main causes of ARF [7]. The complications related to kidneys are observed in majority of patients with snake bite admitted to a hospital and is an important cause of morbidity and mortality. The onset of renal failure in these patients is signalled by the development of oliguria or anuria. This acute renal failure is largely a preventable complication. So the patients with snake bites should be hospitalized and monitored for early detection of renal complications. Early treatment improves survival in snake bite victims. This prompted us to undertake a study evaluating the clinical profile of acute renal failure in snake bite patients and identifying predicting factors and outcome.

MATERIAL AND METHODS

The present study was done at a tertiary care hospital in the urban settings. The study period was 2 years. (December 2012 to November 2014), Prospective Observational-Analytical study Study population consisted of patients diagnosed as case of snake bite induced renal failure. 1) Definitive history of snake bite. 2) Clinical picture consistent with vasculotoxic snake bite such as presence of fang marks or cellulitis or coagulopathy. 3) Presence of Acute Renal Failure, defined as an abrupt (within 48 hours) absolute increase in the serum Creatinine concentration of ≥ 0.3 mg/dL from baseline value measured after admission to our hospital or elsewhere after snake bite, before referral to our hospital, or a percentage increase in the serum Creatinine concentration of ≥ 50% above baseline, or oliguria of less than 0.5 mL/kg per hour for more than six hours, or serum Creatinine more than 1.5 mg/dl. were included into study while 1) Patients with pre-existent renal disease (Serum Creatinine> 1.5 mg/dL prior to snake bite or ultrasonography of abdomen suggestive of bilateral small kidneys/loss of corticomedullary differentiation / obstructive nephropathy/other renal pathology). 2) Diagnosed cases of hypertension/diabetes mellitus. 3) Exposure to Nephrotoxic drug / toxin. (Based on history) 4) Patients less than 12 years of age excluded from study. Chi-square test and Fisher Exact test were used for statistical analysis.

RESULT

The study was conducted from November 2012 to October 2014. Total 153 patients of vasculotoxic snake bite were admitted. Among them, 30 patients developed acute renal failure (19.61%)

Table 1: Comparison of bleeding manifestation in renal and non-renal failure group

Bleeding manifestation	Renal failure group (30)	Non renal failure group (123)
Present	8 (26.67%)	9 (7.3%)
Absent	22 (73.33%)	114 (92.7%)

The Renal Failure was more in the patients with bleeding manifestation. As per Chi square test, p-value is 0.00694 (< 0.05) which is statistically significant.

Table 2: Comparison of hypotension in renal and non-renal failure group

Hypotension	Renal failure group (30)	Non renal failure group (123)
Present	6 (20%)	5 (4.1%)
Absent	24(80%)	118(95.9%)

Hypotension was more in renal Failure Group than non-renal failure group. As per Chi square test, p-value is 0.008405 (< 0.05) which is statistically significant< 20min 47.71%; > 20min 52.29%

Table 3: Comparison of WBCT in renal and non-renal failure group

WBCT >20 minutes	Renal failure group (30)	Non-renal failure group (123)
Present	23(76.67%)	57 (46.34%)
Absent	7(23.33%)	66(53.66%)

WBCT >20 minutes was more in Renal failure group as compared to Non-renal failure group. As per Chi square test, p-value is 0.005473 (< 0.05) which is statistically significant.

Table 4: Coagulopathy in renal failure and non-renal failure group

Coagulopathy	Renal failure group (30)	Non-renal failure group (123)
Present	8(26.67%)	7(5.7%)
Absent	22(73.33%)	116(94.3%)

Coagulopathy was more in renal failure group as compared to non-renal failure group. As per Chi square test p-value is 0.001798 (< 0.05) which is statistically significant.

Table 5: Distribution of the Patients as per Outcome

	Renal failure group	Non-renal failure group
Survived	23(76.67%)	123(100%)
Died	7(23.33%)	0
Total	**30**	**123**

Mortality in present study was 23.33% in renal failure group and no deaths were recorded from non-renal failure group which statistically Significant. Fisher Exact test-p<0.0001

DISCUSSION

Snake bite is a well-known occupational hazard amongst farmers, plantation workers, and other outdoor workers and results in much morbidity and mortality throughout the world. This occupational hazard is no more an issue restricted to a particular part of the world; it has become a global issue. There are about 3500 species of snakes on earth. Out of these 500 are venomous.[8] There are about 216 species of snakes identifiable in India out of which 52 are known poisonous.[9] Pathogenesis of Acute Renal Failure [10, 11, 12]: The exact pathogenesis of ARF following snakebite in not well established. This is due to the lack of a reproducible animal model. Hypotension: Bleeding either into tissues or externally and loss of plasma into the bitten extremity can produce hypotension and circulatory collapse. This is caused by venom metalloproteinase that degrade basement membrane proteins surrounding the vessel wall, leading to loss of integrity. Haemorrhagic toxins have been isolated from venom of many snakes of Viperidae and Crotalinae families. Additionally, vasodilatation and increased capillary permeability, both because of direct and indirect effects of venom, can aggravate the circulatory disturbances of shock. Irrespective of the cause, hypotension and circulatory collapse set in motion a chain of hemodynamic disturbances, which are known to culminate in ischemic ARF. Intravascular-haemolysis[13]Another factor thought to have pathogenic significance in snake-bite induced ARF is intravascular haemolysis. Haemolysis results from the action of phospholipases A2 which is present in almost all snake venoms and a basic protein called "direct lytic factor", found only in elapid venoms. Phospholipase A2 causes haemolysis by direct hydrolysis of red blood cell membrane phospholipids or indirectly via the production of the strongly haemolyticlysolecithin from plasma lecithin. Disseminated intravascular coagulation.[14,15] The human haemostatic system is regulated via a number of critical interactions involving blood proteins, platelets, endothelial cells, and sub-endothelial structures. Snake venom proteins and peptides are known to activate Direct nephrotoxicity [16, 17] The experimental studies performed on rabbits with venom did provide important clues to the evolution of glomerular lesions occasionally seen in human snakebite victims, but these do not seem to be relevant to patients developing renal failure, as most of them show histological changes of acute tubular or cortical necrosis. The strongest evidence supporting direct nephrotoxicity is a dose-dependent decrease in inulin clearance and an increase in fractional excretion of sodium in the isolated perfused rat kidney, following Russell's viper envenomation. Incidence of renal failure in present study is 19.61%. This is similar to studies done by Tushar B Patil *et al*[20], G Ali *et al*[18] and Harshavardhan L *et al*[21] showing incidence of renal failure 20.48%, 17.22% and 14.6% respectively. Mortality in renal failure group was 23.33% while no deaths were recorded in non-renal failure group. Studies done by Harshavardhan L *et al* [21] and G. Ali *et al* [18] also recorded similar results with 22.5%, 22.3% and 25% mortality respectively. Bleeding manifestations were present in 26.7% of renal failure cases and only in 7.3% of non-renal failure cases which is statistically significant with p-value of 0.00694 (< 0.05). It indicates strong relationship in between bleeding manifestations and renal failure. Similar results were obtained in studies done by Tushar B. Patil *et al*[20], Harshavardhan L *et al*[21] In present study hypotension was recorded in 20% cases in renal failure group and only in 4.76% cases in non-renal failure group. Similar results were recorded in studies done by Mrudul V Dharod *et al* [22] (19.54% and 3.09%). This correlation is statistically significant with p value of 0.008405 (<0.05) indicating strong association of hypotension with renal failure.

CONCLUSION

Factors which predisposes to Renal Failure are Bleeding manifestations Hypotension, WBCT> 20 minutes, Coagulopathy and renal failure is having worse prognosis with 23.33% mortality.

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