Original Research Article

Correlation of platelet count with outcomes in snake bite victims with systemic envenomation

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Abstract

Background: Laboratory parameters such as activated partial thromboplastin time, prothrombin time and serum creatinine are needed to assess snake bite victim. In hospitals or health centres, where the above parameters are not available, platelet count may be useful. **Objective:** To identify the pattern of association between clinical and laboratory parameters with platelet count among patients admitted and treated for systemic envenomation in the emergency division of one of the tertiary care medical college hospital in South India. **Materials and Methods:** A prospective hospital based observational study was conducted in patients with history of snake bite and features of systemic envenomation admitted in medicine wards and intensive medical care unit at a tertiary care teaching hospital. Only those patients who witnessed the offending snake and with any one of the following conditions: snake bite patients in whom the WBCT > 20mins, snake bite patients who have features of neuro-paralysis and presence of cellulitis in the area of snake bite were included for the study. The platelet count was estimated at the time of admission, on day 3 and day 5. Patients were followed up during their stay in hospital and final outcome was observed. **Results:** A total of 78 patients with a history of snake bite were included. Two third of the patients (67.9%) had features of cellulitis. Similarly, three fourth (75.6%) of the patients had WBCT >20 mins. More than one third (38.5%) of the patients had thrombocytopenia (platelet<50,000). Patients with presence of cellulitis, WBCT>20 mins, raised prothrombin time >17 secs and APTT >36 secs were significantly more likely to be presented with day 1 thrombocytopenia. Similarly, patients with abnormal renal function tests such as raised serum creatinine and low albumin had significantly high proportions of thrombocytopenia compared to patients who had normal renal function tests. Platelet count measured on day 3 correlated well with day1 platelet (spearman rank correlation=0.85) compared to day 5 platelet counts (spearman rank correlation 0.59) **Conclusion:** Platelet count was associated with outcomes in snake bite victims with systemic envenomation and hence can be used as marker for severity of systemic envenomation.

Key Words: snake bite, envenomation, platelet count, thrombocytopenia.

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INTRODUCTION

Since 2009, snake bite has been included under Neglected Tropical Diseases.[1,2] Globally 5.7 million people are bitten by snakes every year and around 50% of the bites are envenoming in nature.[3] India contributes to a maximum number of snake bite fatality in absolute numbers.[4] Though there is not enough evidence to report the actual burden on incidence of snake bites,[5,6] rural population especially farmers are most vulnerable to get affected by this.[4,5,7,8] As per the Millennium Deaths Study,0.47% of deaths in India are attributed to snake bites. This study estimated an annual mortality of 45900 per year and 97% deaths to happen in rural India.[5] Majority of the snake bite cases are not reported either due to people's preference towards the alternate health care providers or the imminent mortality occurs due to neuroparalysis.[4,9] Delay in treatment seeking is also not uncommon as a result of self-medication with native

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treatments. Time to administer ASV has been found to be the critical factor in predicting the prognosis.[8,10-12] Venom of the poisonous snakes has many enzymes and toxins. These substances lead to altered blood counts and abnormal renal function tests.[13] Hence the biochemical and blood parameters such as renal profile and blood counts have been used as prognostic markers in routine. Snakebite leads to various systemic complications namely acute kidney injury, bleeding diathesis, cellulitis leading to compartment syndrome and tissue necrosis and neuro paralysis. These complications are largely species specific in nature.[4,514,15] Apart from this syndromic approach, conventionally, Whole Blood Clotting Time (WBCT) has been used in all primary and emergency care settings in clinical decision making to continue ASV and to predict occurrence of bleeding diathesis. However, WBCT is not utilized for prediction against other systemic envenomation such as acute kidney injury, cellulitis or neuroparalysis. It has been estimated that for every one fatal case due to snake bite there are 100 non-fatal incidences are present. More than 67 species are found be poisonous in the country, however the widely followed standard treatment for snake bite in the form of Anti Snake Venom (ASV) protects only against 'big four' species namely cobra, Russels viper, Saw-scaled viper and krait.[13] Hence, all snake bites are cannot be treated by the currently available ASV alone. Relying on species of snake by history is neither specific nor accurate. Syndromic features such as local tissue necrosis takes longer time to develop. Hence, there is a long-term felt need among treating physician for appropriate point of care diagnostic marker to predict systemic envenomation at the earliest. The recent consensus by welcome Trust during 2012 also articulated the need for prompt screening for systemic complications in order to provide timely appropriate supportive treatment.[16] Though majority of the snakebites occur in the rural area the average time travelled by the patient to reach the health facility is varied from 6-12 hrs.[4,12] The nearest health facility like primary health centres do not have the access to laboratory parameters such as activated partial thromboplastin time, prothrombin time and serum creatinine. However, majority of the recently upgraded PHCs and sub-district health facilities have access to testing for platelet count. Hence, this study aimed to identify the pattern of association between clinical and laboratory parameters with platelet count among patients admitted and treated for systemic envenomation in the emergency division of one of the tertiary care medical college hospital in South India.

MATERIALS AND METHODS

A prospective hospital based observational study was conducted in patients with history of snake bite and features of systemic envenomation admitted in medicine wards and intensive medical care unit at a tertiary care teaching hospital in Thanjavur, Tamil Nadu. The study was conducted from April 2013 to October 2013. The study protocol was approved by the Institution's ethical committee. Patients were included in the study after obtaining informed consent and details of history and clinical examination was recorded. Only those patients who witnessed the offending snake and with any one of the following conditions: snake bite patients in whom the WBCT > 20mins, snake bite patients who have features of neuro-paralysis and presence of cellulitis in the area of snake bite were included for the study. Patients with history of ASV administration before reaching the study setting and those who did not had features of systemic envenomation were excluded from the study. The platelet count was estimated by improved Neubauer chamber manual method at the time of admission, on day 3 and day 5. PT, aPTT was estimated using DIAGNOS THROMBO 1.0 KIT at the time of admission, day 3 and day 5. Albumin level was assessed using BCG method at the time of admission, day 3 and day 5. Urea level was estimated using BERTHELOT method at the time of admission, day 3 and day 5. Serum Creatinine was estimated using JAFFE'S method at the time of admission, on day3 and day 5. Blood sample was collected aseptically by single prick from a peripheral vein. Patients were followed up during their stay in hospital and final outcome was observed. Data was entered in Microsoft Excel and analysis was done in SPSS version 17.0. Association of clinical and laboratory parameters with thrombocytopenia was assessed using chi squared test or Fischer exact test. Correlation of platelet count on day1, day 3 and day5 were assessed using Spearman correlation coefficient. A p value of less than 0.05 was considered as statistically significant.

RESULTS

Table 1: Demographic and clinical characteristics of patients attended and managed for snake bite in the emergency OPD, 2008

Characteristics (N=78)	Number (%)
Gender	
Male	38 (48.7)
Female	40 (51.3)
Age group (in years)	
1-20	7 (9.0)
21-30	14 (17.9)
31-40	15 (19.2)
41-50	27 (34.6)
51-60	10 (12.8)
>60	5 (6.4)
Clinical features	
cellulitis	53 (67.9)
Neuro paralysis	12 (15.4)
WBCT>20 mins	59 (75.6)
Coagulation profile	
Prothrombin time	
11-16 secs	30 (38.5)
17 secs or more	48 (61.5)
Activated Partial Thromboplastin time	
22-36 secs	32 (41)
37secs or more	46 (59)
Platelet count	
<50000	30 (38.5)
50001-1,00,000	18 (23.1)
1,00,001-1,50,000	18 (23.1)
>1,50,000	12 (15.4)
Systemic complications	
Serum creatinine >1.1mg/dl	62 (79.5)
Serum albumin <3.5 gms	48 (61.5)
Outcome	
Acute Kidney Injury	8 (10.3)
Coagulopathy	2 (2.6)
Neuro-paralysis	2 (2.6)
Recovered	66 (84.6)

Table 2: Association of Clinical and laboratory parameters with thrombocytopenia (<50000/dl) among patients admitted for treatment in the emergency department, 2008

Factor	Thrombocytopenia Present	Thrombocytopenia Absent	P value
*Age group**			
1-20	3 (42.9)	4 (57.1)	0.8
21-40	12 (41.4)	17 (58.6)	
41-60	14 (37.8)	23 (62.2)	
>60	1 (20)	4 (80)	
Sex			
Male	16 (42.1)	22 (57.9)	0.52
Female	14 (35)	26 (65)	
*Cellulitis**			
Absent	4 (16)	21 (84)	**0.01**
Present	26 (49.1)	27 (50.9)	
*Neuroparalysis**			
Absent	30 (45.5)	36 (54.5)	**0.002**
Present	0 (0)	12 (100)	
*WBCT>20 mins**			
Absent	3 (15.8)	16 (84.2)	**0.03**

Present	27 (45.8)	32 (54.2)	
*Prothrombin time**			
11-16 secs	0 (0)	30 (100)	**0.0001**
>=17	30 (62.5)	18 (37.5)	
*APTT**			
22-36secs	1(3.1)	31 (96.9)	**0.0001**
>=37	29 (63)	17 (37)	
*Creatinine (mg/dl)**			
1mg	0 (0)	16 (100)	**0.0001**
>=1.1	30 (38.5)	48 (61.5)	
*Serum albumin(gms/dl)**			
>=3.5	0 (0)	30 (100)	**0.0001**
<3.5	30 (62.5)	18 37.5)	

***P value by Fischer Exact chi square

Table 3: Association of systemic complications with thrombocytopenia (<50000/dl) among patients admitted for treatment in the emergency department, 2008

Outcome status	Thrombocytopenia Present	Thrombocytopenia Absent	P value
Acute Kidney Injury	8 (100)	0 (0)	0.0001
Coagulopathy	2 (100)	0 (0)	
Neuro paralysis	0 (0)	2 (100)	
Recovered	20 (30.3)	46 (60.7)	

A total of 78 patients with a history of snake bite with the presence of any one of the systemic envenomation had been admitted during April 2013 to October 2013. Mean (SD) age of patients was 40.3± 13.7 years. More than one-third of the patients belong to 40-50 years of age. Two third of the patients (67.9%) had features of cellulitis. Similarly, three fourth (75.6%) of the patients had WBCT >20 mins. More than one third (38.5%) of the patients had thrombocytopenia (platelet<50,000). Renal functions tests were in abnormal range among two third. (Table 1) In the study, 84.6% of patients recovered with prompt administration of fluids. Of total, 8 patients died due to acute kidney injury and 24 patients required renal replacement therapy. Two patients developed coagulopathy and were managed with FFP administration. Two patients died due to respiratory failure. Acute Kidney Injury was the most common systemic complications (10.3%) observed among the admitted patients followed by neuroparalysis (2.6%) and bleeding diathesis (2.6%). Patients with presence of cellulitis, WBCT>20 mins, raised prothrombin time >17 secs and APTT >36 secs were significantly more likely to be presented with day 1 thrombocytopenia. Similarly, patients with abnormal renal function tests such as raised serum creatinine and low albumin had significantly high proportions of thrombocytopenia compared to patients who had normal renal function tests (Table 2). Except for neuroparalysis, all the patientswho had other systemic complications had thrombocytopenia (table 3). Subsequent platelets measured on day 3 correlated well with day1 platelet (spearman rank correlation=0.85) compared to day 5 platelet counts (spearman rank correlation 0.59)

DISCUSSION

In the current study, there was good correlation between clinical and laboratory parameters with platelet count among patients admitted and treated for systemic envenomation. Patients with presence of cellulitis, WBCT>20 minutes, raised prothrombin time >17 secs and APTT >36 secs were significantly more likely to be presented with day 1 thrombocytopenia. Also,, all the patients who had other systemic complications had thrombocytopenia except for those patients who developed neuroparalysis. The patients with neuroparalysis had no reduction in platelet count and this implies clearly that thrombocytopenia is not a feature of neurotoxic snakes. In our study, serum creatinine level was elevated in 79.5% of patients. Possible cause could be hypovolemia as there was a custom prevalent in the study setting that patients will not be given any oral fluids after snake bite. Other cause might be hypotension due to capillary leak due to haemorrhagic manifestations in severe envenomation. Deaths due to platelet count was significantly more in patients with day 1 platelet count less than 50,000. Among them, eight died of acute kidney injury, two patients died of coagulopathy and two died of neuroparalysis and respiratory failure. We observed that only 66.7% of patients recovered with day 1 platelet count less than 50,000 whereas 83.3% of patients with day 1 platelet more than 1.5 lakh recovered, showing a significant association between reduction in day 1 platelet

count and outcome (p value<0.05). Also, there is a significant improvement in platelet count after prompt administration of ASV and correction of hypotension and fluid management in the study.

CONCLUSION

Platelet count was associated with outcomes in snake bite victims with systemic envenomation and hence can be used as marker for severity of systemic envenomation. Majority of the recently upgraded PHCs and sub-district health facilities have access to testing for platelet count. In primary health centres which do not have the access to laboratory parameters such as activated partial thromboplastin time, prothrombin time and serum creatinine, platelet count can be helpful in assessment of the snake bite victims.

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