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Original Research Article

Clinical, biochemical and haematological changes in leptospirosis

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ABSTRACT

Background: Leptospirosis is a globally important zoonotic disease caused by pathogenic leptospira. Leptospira species are spirochetes belonging to the order spirochetes and the family leptospiraceae. Present study is done to find out the incidence of thrombocytopenia in leptospirosis and to correlate it with other parameters like renal dysfunction, hepatic dysfunction and bleeding manifestation.
Methods: Study includes 51 clinically suspected and diagnosed cases of leptospirosis, in Government hospital, South Gujarat, during a period from January 2017 to December 2017. Clinical signs and symptoms and complications, biochemical profile like bilirubin and creatinine, haematological profile like Hb, WBC count and platelet count were recorded. Thrombocytopenia was defined as a platelet count below 1,50,000/cmm.
Results: The present study includes 51 cases of Leptospirosis. Age ranged from 16 years to 61 years (male-39 and Females-12) There were 38 (74.5%) cases with thrombocytopenia and 13 (25.4%) cases with normal platelet count. Out of 38 thrombocytopenic cases, 32 (84.2%) cases had renal dysfunction, 26 (68.4%) cases had hepatic dysfunction and 16 (42.1%) cases had pulmonary haemorrhage. Among 13 cases with normal platelet count, 8 (61.5%) cases had hepatic dysfunction and 7 (53.8%) cases had renal dysfunction and 3 (23%) cases had pulmonary haemorrhage.
Conclusions: Thrombocytopenia is a frequent complication (present in more than half of the patient) in leptospirosis and associated with more frequent and more severe complications. Therefore, early recognition of thrombocytopenia is recommended to prevent complications and mortality in leptospirosis.

Keywords: Complications, Leptospirosis, Thrombocytopenia

INTRODUCTION

Leptospirosis is a globally important zoonotic disease. The disease is caused by pathogenic Leptospira species. Leptospira species are spirochetes belonging to the order spirochetes and the family leptospiraceae. Disease is characterized by a spectrum of clinical manifestation. In mild form, it may present as nonspecific symptoms such as fever, headache and myalgia. Severe cases are characterized by jaundice, renal dysfunction and haemorrhagic diathesis and is often referred as Weil's syndrome. Severe pulmonary haemorrhage is increasingly recognized as an important presentation of severe disease.[1] Haematological manifestations are relatively common in leptospirosis, the most common being thrombocytopenia. Haemorrhagic manifestations seen in leptospirosis are aggravated by thrombocytopenia.[2-4] The possible reasons for thrombocytopenia in leptospirosis are: (i) Presence of disseminated intravascular coagulation; (ii) Toxin or cytotoxin mediated mechanism; (iii) The direct complication of vasculitis, triggered by the Leptospira as a general phenomenon of septicaemia or due to an undetected platelet antibody.[5-8] Acute renal failure and hepatic dysfunction are also known to be frequently associated with thrombocytopenia in leptospirosis.[9-11]

This study aims to give the influence of thrombocytopenia with other complications in leptospirosis.

METHODS

This retrospective study included 51 patients with leptospirosis who were admitted to Tertiary Care Hospital, South Gujarat, during a period from January 2017 to December 2017.

Inclusive criteria for present study were cases which were clinically suspicious for leptospirosis and cases which were positive for leptospirosis (on Microscopic agglutination test). All other cases were excluded from the study. Microscopic Agglutination Test (MAT), uses a live leptospiral strains, and the enzyme-linked immunosorbent assay (ELISA), which uses a broadly reacting antigen, are the standard serologic procedures used in our institute for serological confirmation of leptospirosis.[1]

Platelet count in present study were obtained by fully automated 3-part cell counters, all platelet counts were also confirmed manually on slides. Thrombocytopenia was defined as a platelet count below 1,50,000/cmm.[12] Degree of thrombocytopenia was categorized as mild (platelet count 1,00,000/cmm to 1,50,000/cmm), moderate (platelet count 50,000/cmm to 1,00,000/cmm) and severe (platelet count below 50,000/cmm). Presence of thrombocytopenia was clinically correlated with other complications of leptospirosis.

Renal dysfunction was defined as the any degree of increase in the levels of serum creatinine (creatinine reference range-0.6 to 1.2mg/dl, or associated oliguria or anuria. Hepatic dysfunction was defined as any degree of increase in the level of bilirubin or liver enzymes (total bilirubin reference range is up to 1mg/dl, SGOT up to 40IU/L).

Haemorrhagic manifestations were categorized as major and minor as follows. Major manifestations were Adult respiratory distress syndrome, gastrointestinal bleeding, haematuria and intracranial bleeding. Minor manifestations were rash, conjunctival haemorrhages, petechial haemorrhages and epistaxis.[13]

RESULTS

Present study includes 51 cases of (clinically suspected and serologically diagnosed) Leptospirosis. Age ranged from 16 years to 61 years. There were 39 (76.4%) male and 12 (23.6 %) females (Table 2).

There were 38 cases with thrombocytopenia and 13 cases with normal platelet count. (Table 2). There were 29% cases of the thrombocytopenic patients in the age group 21-30years and same 29% cases belong to the age group 41-50years (Table 1). Among 38 thrombocytopenic patients, 27 (71%) were male (Table 2). There were 16 (42.1%) cases with platelet count in the range of 50,000 to 1,00,000/cmm. (Table 3).

Table 1: Age wise distribution of cases (n= 51).

Age (years)	Thrombocytopenia	Non-thrombocytopenia
11-20	2 (5.3%)	0 (0%)
21-30	11 (28.9%)	7 (53.9%)
31-40	10 (26.3%)	0 (0 %)
41-50	11 (28.9%)	2 (15.4%)
>51	4 (10.5%)	4 (30.7%)
Total	38 (100%)	13 (100%)

Table 2: Sex wise distribution of cases (n= 51).

Sex	Thrombo cytopenia (out of 38)	Non-thrombo cytopenia (out of 13)	Total cases (out of 51)
Male	27 (71.1%)	12 (92.3%)	39/51 (76.4%)
Female	11 (28.9%)	1 (7.7%)	12/51 (23.6%)
Total	38 (100%)	13 (100%)	51 (100%)

Table 3: Distribution of cases according to severity of thrombocytopenia (n=38).

Platelet count (/cmm)	Severity	Cases
100000-150000	Mild	9 (23.7 %)
50000-100000	Moderate	16 (42.1 %)
Less than 50000	Severe	13 (34.2 %)
Total		38 (100%)

Table 4: Distribution of cases as to complications (n=51).

Complications	Acute renal failure/ renal dysfunction	Jaundice/ hepatic dysfunction	Pulmonary haemorrhage /ARDS	Combined hepatic and renal dysfunction
Thrombocytopenic (38 cases)	32 (84.2%)	26 (68.4%)	16 (42.1%)	23 (60.5%)
Non-thrombocytopenic (13 cases)	7 (53.8%)	8 (61.5%)	3 (23%)	4 (30.7%)

Table 5: Laboratory characteristics (mean values).

Lab. parameters	Thrombocytopenic	Non-thrombocytopenic
Haemoglobin (gm/dl)	9.13	9.98
White blood cells (/cmm)	9906	10,290
Platelets (/cmm)	73,419	2,09,900
Serum creatinine (mg/dl))	3.67	3.43
Total bilirubin (mg/dl)	10.73	8.11

Table 6: Mortality rate in present study (n=51).

Cause of death	Thrombocytopenic	Non- thrombocytopenic	Total cases (Out of 51)
Septicaemia	10 (19.7%)	2 (3.9%)	12 (23.6%)
ARDS	1 (1.9%)	1 (1.9%)	2 (3.8%)
Total	11 (21.6%)	3 (5.8%)	14 (27.4%)

Lowest platelet count seen in present study was 34,000/cmm. Out of 38 thrombocytopenic cases, 32 (84.2%) cases had renal dysfunction, 26 (68.4%) cases had hepatic dysfunction and 16 (42.1%) cases had pulmonary haemorrhage. Among 13 cases with normal platelet count, 8 (61.5%) cases had hepatic dysfunction and 7 (53.8%) cases had renal dysfunction and 3 (23%) cases had pulmonary haemorrhage (Table 4). Combined hepatic and renal dysfunction were observed in 27 (52.9%) cases. Of the 27 patients with hepatorenal dysfunction, 23 (60.5%) cases had thrombocytopenia and 4 (30.7%) cases had normal platelet count (Table 4).

Total bilirubin values were higher in the thrombocytopenic group (mean value 10.73mg/dl). (Table 5). The main signs and symptoms at admission were fever (90.2%), headache (70.7%), myalgia (68.3%), yellowish discolouration of urine/sclera (68.3%), body ache (56.1%), breathlessness (21.9%), decreased urine output (21.9%), cough (9.8%) and vomiting (4.9%). There were 14 (27.4%) patients who expired during the present study, 11 (78.5%) cases were thrombocytopenic, while 3 (21.5%) cases had normal platelet count. The reason for mortality in present study were due to Septicaemia (12 cases-23.6%) and ARDS (2 cases-3.8%) (Table 6).

DISCUSSION

There was increased incidence of leptospirosis in males in present study (39 cases-76.4%). The reason behind this is that male have more outdoor activity and more occupational exposure.[14] Similar findings seen in study done by Linda et al, and Turgut M et al, with incidence of leptospirosis in males were 68.3% and 81% respectively.[11,15] In present study we find spectrum of clinical manifestations like fever (90.2%) followed by headache (70.7%) and myalgia (68.3%). This was similar to findings in study by Daher et al, and Linda et al.[4,15] In present study, 71% cases of thrombocytopenia in male, similar to that seen in Daher et al, (83.4%), Turgut M et al, (81.4%) and Jayashree et al, (52%) (Table 7).[4,11,13]

Table 7: Comparison of male cases with thrombocytopenia between present study and other studies.

Study	Percentage of male cases
Daher et al[4]	83.4%
Turgut M et al[11]	81.4%
Jayashree et al[13]	52%
Present Study	71%

Table 8: Comparison of hepatic dysfunction in thrombocytopenic cases between present study and other studies.

Study	Jaundice/ hepatic dysfunction
Jayashree et al[13]	46%
Lina et al[3]	67%
Linda et al[15]	69.2%
Present study	68.4%

Table 9: Comparison of renal dysfunction in thrombocytopenic cases between present study and other studies.

Study	Acute renal failure/ renal dysfunction
Jayashree et al[13]	71.4%
Edwards et al[10]	72.2%
Lina et al[3]	94%
Present study	84.2%

Thrombocytopenia was associated with a higher incidence of complications. Although both groups had these complications, but they were seen with increased frequency in the thrombocytopenic group (Table 4). Lina et al, study has reported hepatic dysfunction in 67% cases and Linda et al, have reported in 69.2%, which is similar

to present study (68.4%) (Table 8).[3,15] In present study, renal dysfunction was seen in 84.2% cases, which was quite similar with Edwards et al, and Jayashree et al, (72.2% and 71.4% respectively).[10,13] In Lina et al, frequency of renal dysfunction was higher than present study (94 %) (Table 9).[3] In present study, 42.1% cases of pulmonary haemorrhages found in thrombocytopenic patients similar to study done by Jayashree et al, (46.4%) (Table 10).[13] Total mortality rate was 27.4% in present study, which was comparatively higher in thrombocytopenic patients (78.5%), similar findings were seen in Turgut M et al, and Lina et al, (14% and 25% respectively) (Table 11).[3,11]

Table 10: Comparison of pulmonary haemorrhage/ARDS in thrombocytopenic cases with other studies.

Study	Pulmonary haemorrhage/ARDS
Jayashree et al[13]	46.4%
Present study	42.1%

Table 11: Comparison of mortality rate in different studies.

Study	Mortality rate
Turgut M et al[11]	14%
Lina et al[3]	25%
Present study	27.4%

CONCLUSION

Thrombocytopenia, hyperbilirubinemia and increased serum creatinine are frequent diagnostic findings in leptospirosis and it is present in 75% patients at the time of hospital admission. Thrombocytopenia in leptospirosis is associated with more severe form of leptospirosis and also with increased number of hepatic and renal dysfunction. Mortality rate is higher in thrombocytopenic patients as compared to non-thrombocytopenic patients. Early recognition of thrombocytopenia is recommended to prevent further complications and mortality in leptospirosis.

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