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Elevated Serum Transaminases: Aspartate Aminotransferase and Alanine Aminotransferase Among Leptospirosis Patients Admitted in a Tertiary Level Teaching Hospital

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Abstract
The aim of the present study was to estimate the proportion of elevated serum transaminases and to study the clinical profile of Leptospirosis patients with transaminitis and disproportionate rise in AST admitted in tertiary level teaching hospital. This cross-sectional study was conducted in the Department of General Medicine KIMS Mangalore in the year of 2023 in monsoon season with 105 patients. All patients diagnosed as Leptospirosis by Modified Faines criteria. Exclusion criteria-patients having previously diagnosed chronic liver disease, serologically diagnosed Dengue fever, Hepatitis A, Alcoholic liver disease. The mean age was found to be 37.9±12.1 years. 81% were males and 19% were females. 45.7% of study population was manual labourers. In this study fever myalgia observed in all patients, Jaundice seen in 32.4%, Headache was present in 67.6%, Conjuctival suffusion in 28.6%, Hemoptysis in 6.7% of patients, Tachycardia, Hypotension, Reduced urine output in 32.4%, 26.7% and 15.2%. 94 patients have elevated AST which comprised of 89.5% of study population. 94 patients have elevated AST which comprised of 89.5% of study population. 86 patients have elevated ALT which comprised 81.9% Population. 24 patients (23%) have disproportionte rise in AST with values more than 3 times compared to ALT. Renal failure was the most common complication seen in this study, seen in 45 patients which constitutes 42.9%. Non-oliguric AKI is observed in most patients. Respiratory failure was seen in 16 patients which constitutes 15.2%. Shock is seen in 28 patients which constitutes 26.7%. MODS is seen in 8 patients which constitutes 7.6%. A Disproportionate rise in AST when compared to ALT with AAR i.e., AST/ALT ≥3 is associated with higher mortality rate. Respiratory failure, coagulopathy and MODS are common if AAR ≥3.

INTRODUCTION

Leptospirosis is caused by a variety of pathogenic spirochetes of the genus Leptospira[1], the human beings are generally the dead-end host after transmission from animal contact[2]. This disease is characterized by a broad spectrum of manifestations, which are usually subclinical[1,2]. Its diagnosis relies upon strong suspicions of this disease from some nonspecific clinical presentations[3]. Confirmation of this infection is usually established by serological studies[4] or PCR[5,6].

In terms of pathologic findings and biochemical manifestations, liver is not the main target of spirochete infection[2,3,7,8]. Hepatic dysfunction in leptospirosis was usually mild and resolved eventually. However, if jaundice occurs, serum bilirubin levels might be markedly elevated as compared with aspartate transaminase (AST) and alanine transaminase (ALT)[9]. Weil's disease, defined as severe icteric leptospirosis with renal failure, accounts for mortality associated with leptospirosis[1].

Leptospirosis, known as rat-urine fever in some countries[10] is the most common anthropozoonosis worldwide. Nowadays, the disease in not only restricted to the rural setting but also hits the urban areas particularly the outbreaks after the rainy season[11] and it had escaped from its homeland in tropics to cause urban epidemics in the poor communities of the developed and developing nations[12]. Moreover, WHO expects increasing the importance of the disease as a result of the global climate changes[13] and the rise in global travel and eco-tourism particularly for recreational activities and military expeditions which particularly exposes individuals from the developed world to the disease, as outbreaks show[14].

The aim of the present study was to estimate the proportion of elevated serum transaminases and to study the clinical profile of Leptospirosis patients with transaminitis and disproportionate rise in AST admitted in tertiary level teaching hospital.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of General Medicine KIMS Mangalore in the year of 2023 in monsoon season with 105 patients.

Inclusion Criteria: All patients diagnosed as Leptospirosis by Modified Faines criteria.

Exclusion Criteria: Patients having previously diagnosed chronic liver disease, serologically diagnosed Dengue fever, Hepatitis A, Alcoholic liver disease.

Inclusion Criteria: All patients diagnosed by Modified Faine's criteria.

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RESULTS AND DISCUSSIONS

The mean age was found to be 37.9±12.1 years. 81% were males and 19% were females. 45.7% of study population was manual labourers.

In this study fever myalgia observed in all patients, Jaundice seen in 32.4%, Headache was present in 67.6%, Conjuctival suffusion in 28.6%, Hemoptysis in 6.7% of patients, Tachycardia, Hypotension, Reduced urine output in 32.4%, 26.7% and 15.2%.

94 patients have elevated AST which comprised of 89.5% of study population. 86 patients have elevated ALT which comprised 81.9% Population.

24 patients (23%) have disproportionte rise in AST with values more than 3 times compared to ALT.

Renal failure was the most common complication seen in this study, in 45 patients which constitutes 42.9%. NON-OLIGURIC AKI is observed in most patients. Respiratory failure was seen in 16 patients which constitutes 15.2%. Shock is seen in 28 patients which constitutes 26.7%. MODS is seen in 8 patients which constitutes 7.6%.

There is a considerable burden of leptospirosis in many parts of India[15]. Leptospirosis is one of the most common causes of admission in the monsoon season in the public and private sectors. There is an increased "out of pocket expenditure" for the patient as well[16]. With the increase in the COVID-19 cases, AFIs have increased the burden on already overburdened hospitals[17]. In a study from Brazil, most leptospirosis clusters occurred after a natural disaster preceded by heavy rainfall in that area[18].

Myositis is a common presentation in leptospirosis and usually abated by the 2nd week[19,20]. If the extrahepatic AST had come from muscle, AST would return to normal within 2 week rather than being progressively elevated as seen in the two cases. Moreover, it has been reported that for severe myositis in leptospirosis, CPK elevation up to 8880 U/L only correlated with AST elevation as high as 440 U/L[21]. Myositis alone could not contribute to AST elevation in the two cases, as their AST elevations (901 and 580 U/L) were not in proportion to CPK (628 and 99 U/L) elevations in terms of myositis. Therefore, the muscle origin of AST could not simply explain this phenomenon and the exaggerated AST elevation must have had another source. The mean age was found to

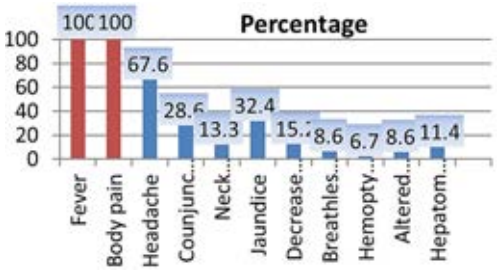

Fig. 1: Clinical features

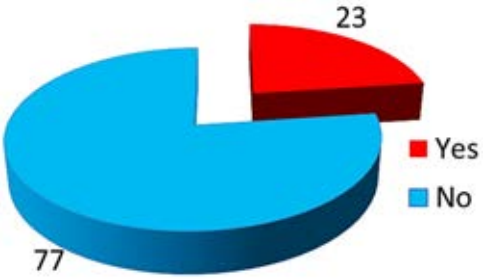

Fig. 2: Disproportionate rise in AST

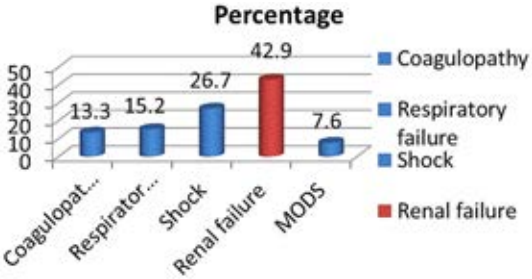

Fig. 3: Complications

Table 1:Modified Faine's Criteria

Part A: Clinical Data	Score
Headache	2
Fever	2
If fever, Temperature 39°C or more	2
Conjunctival suffusion (Bilateral)	4
Meningism	4
Muscle pain (Especially calf muscle)	4
Conjunctival suffusion+Meningism+Muscle pain	10
Jaundice	1
Albuminuria or Nitrogen Retention	2
Part B: Epidemiological Factors	**Score**
Rainfall	5
Contact with contaminated environment	4
Animal contact	1
Part C: Bacteriological and Laboratory Findings	
Isolation of Leptospira on culture	Diagnosis certain
Positive Serology	
ELISA Igm positive.,SAT Positive.,	
MAT single high titre*	
(Any one of the three tests should be scored)	15
MAT rising titre (Paired sera)	25

A presumptive diagnosis of leptospirosis may be made if: (I) Score of part A+Part B = or more (Part C laboratory report is usually not available before fifth day os illness., thus it is mainly a clinical and epidemiological diagnosis during early part of disease)or Part A+Part B+Part C

A score between 20 and 25: Suggest a possible but unconfirmed diagnosis of leptospirosis.

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Table 2: Demographic data

Gender	N	%
Male	85	81
Female	20	19
Mean age	37±12 years	
Occupation		
Labourers	48	45.7
Farmers	24	22.9
Others	33	31.4

Table 3: Proportion of elevated AST and ALT in leptospirosis patients

AST	Count	Percent
Normal	11	10.5
Elevated	94	89.5
ALT		
Normal	19	18.1
Elevated	86	81.9

be 37.9±12.1 years. 81% were males and 19% were females. 45.7% of study population was manual labourers. In this study fever myalgia observed in all patients, Jaundice seen in 32.4%, Headache was present in 67.6%, Conjuctival suffusion in 28.6%, Hemoptysis in 6.7% of patients, Tachycardia, Hypotension, Reduced urine output in 32.4%, 26.7% and 15.2%. 94 patients have elevated AST which comprised of 89.5% of study population.

94 patients have elevated AST which comprised of 89.5% of study population. 86 patients have elevated ALT which comprised 81.9% Population. 24 patients (23%) have disproportionate rise in AST with values more than 3 times compared to ALT. Renal failure was the most common complication seen in this study, in 45 patients which constitutes 42.9%. Non-oliguric AKI is observed in most patients. Respiratory failure was seen in 16 patients which constitutes 15.2%. Shock is seen in 28 patients which constitutes 26.7%. MODS is seen in 8 patients which constitutes 7.6%. Moreover, another study showed that males had significantly longer hospital stay compared to females and individuals aged ≥38 had significantly longer hospital stay[22]. Similarly, Lopes *et al.* found that older survivors significantly spent longer hospital stay than younger survivors[23]. Furthermore, patients from rural areas significantly spent longer hospitalization period than their counterparts from urban area in the current study. This may be attributed to the longer period they spent before they were admitted to hospital. This delay in seeking care may be due to logistical barriers or deficiency in the awareness of those people regarding the disease. At the end, this delay is expected to increase the chance for further complications of the disease which necessitate further and longer period of hospital care for those patients. Mean value of the duration before the admission is significantly longer in patients who had prolonged hospitalization according to data from the current study and late hospitalization after 4 days was insignificantly associated with the prolonged hospitalization. These findings underscore the need for awareness campaign particularly in the rural areas where the disease is endemic to improve the care

seeking behavior among those people and to help them getting access to the hospital care as early as possible[24].

CONCLUSIONS

Serial monitoring of liver function especially serum transaminases has benefit in identifying at risk patients as disproportionate rise in AST more than 3 times that of ALT was associated with increased risk for coagulopathy, respiratory failure, MODS. Patients with AAR>3 was associated with higher mortality.

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