

THE LEVEL OF SERUM URIC ACID IN CHRONIC LIVER DISEASE AND ITS CORRELATION WITH CHILD-PUGH SCORE AT A TERTIARY CARE CENTRE IN AGARTALA

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Abstract

Background: Chronic liver disease (CLD) accounts for 19.6 deaths per 1000 population of India which involves progressive deterioration of liver functions due to inflammation, destruction and regeneration leading to fibrosis and cirrhosis. In this study we tried to correlate the level of serum uric acid (UA) and severity of CLD represented by Child-Turcotte-Pugh (CTP) score.

Materials and Methods: A cross sectional observational study was conducted at the Department of General Medicine in Agartala Government Medical College, Tripura from January 2024 to June 2024. Fifty patients diagnosed with CLD in the age group of 18-60 years in either gender were enrolled in the study. Serum uric acid, serum aspartate amino transferase (AST), serum alanine amino transferase (ALT), international normalized ratio (INR), serum bilirubin and albumin levels were measured. Statistical analysis was performed to evaluate the association between serum uric acid and other liver parameters.

Result: In the present study, the mean serum UA level was raised in patients with CLD in correlation to its severity. Alcoholic liver disease (ALD) was the most common etiology for CLD (60%) followed by nonalcoholic fatty liver disease (20%) followed by Hepatitis B virus infection (12%), hepatitis C (Hep C) virus infection (4%) and autoimmune cause (4%). Serum UA levels increased as the CTP score increased. The mean UA level in CTP class C was 9.12 mg/dl. 21 patients had elevated uric acid and AST levels. 16 patients had elevated uric acid and ALT levels. 21 patients had elevated serum UA and serum bilirubin levels. 20 patients had elevated serum uric acid and low albumin levels. 18 patients had elevated uric acid and INR values.

Discussion: Serum uric acid was significantly elevated in patients with severe disease as indicated by CTP score class C. Various parameters such as AST, ALT, total bilirubin, INR, and albumin were significantly associated with serum UA levels in CLD patients. **Conclusion:** The correlation between serum uric acid and CTP score shows that serum UA can be used as an indicator for assessing the severity of CLD.

INTRODUCTION

The main functions of liver include synthesis of protein, clotting factors, gluconeogenesis, detoxification of harmful products of metabolism and excretion of bile.^[1] Chronic Liver Disease (CLD) is a progressive deterioration of liver function for more than 6 months. It is a continuous

process of inflammation, destruction and regeneration of liver parenchyma ultimately leading to fibrosis and cirrhosis.^[2] It accounts for 19.6 deaths per 100000 population of India as per 2019 WHO data.^[3] In human and higher primates, uric acid is the end product of purine metabolism and is excreted in urine.^[4] It is also a mediator of inflammation and tissue damage. In CLD high uric

acid is independently associated with severe disease and poor prognosis.^[5] In CLD there is progressive liver damage leading to loss of function.^[6] High uric acid level is an independent etiological risk factor in patients with non alcoholic fatty liver disease.^[7] Uric acid has been found to directly correlate with tissue damage as per studies.^[8]

In spite of being one among the leading cause of death in India there has not been enough study in order to study correlation between uric acid and other parameters of liver dysfunction. Therefore this study is taken up.

MATERIALS AND METHODS

This is a cross-sectional observational study, conducted for duration of six months with effect from January 2024 to June 2024 in the IPD, Department of General Medicine at Agartala Government Medical College, Tripura

Aim and Objectives

To study the correlation between serum uric acid and CTP score in patients of chronic liver disease.

To study the accuracy of serum uric acid in predicting severity of CLD

Inclusion Criteria

All diagnosed CLD patients, both male and female in the age group 18 to 60 years admitted to General Medicine, were included in the study.

Exclusion Criteria

Patients with, gout, chronic kidney disease, known infection, trauma, pregnant and lactating mothers, on drugs (frusemide, thiazide, allopurinol, and febuxostat), malignancy (leukaemia and lymphoma) undergoing chemotherapy, and with recent Surgery were excluded.

Sample Size: 50 patients admitted to the General Medicine Department fulfilling the inclusion and exclusion criteria were selected for the study.

After obtaining a written informed consent, the data were collected using a semi-structured questionnaire consisting of different sections on socio-demographic profile, clinical history, and examination. Further, the patients were subjected for blood investigations for serum uric acid level, liver function tests, prothrombin time and INR was determined on the day of admission. The severity of chronic liver disease was assessed using Child-Turcotte-Pugh score.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) IBM version 29.0. The categorical variables were expressed as percentages, frequency, and proportions and compared using Pearson's Chi square test or Fisher's exact test, as appropriate. A $p \leq 0.05$ was considered statistically significant.

RESULTS

In this study, patients belonged to age groups varying from 22 years to 60 years with a mean age

of 45.4 years. Four patients (08%) belonged to the age group of 20–30 years. Among them, two patients (04%) had a UA value of less than 7. Twelve patients (24%) belonged to the age group of 31–40 years. Among them, six patients (12%) had a UA value of less than 7. Twenty four patients (48%) belonged to the age group of 41–50 years. Among them, 14 patients (28%) had a UA value of less than 7. Ten patients (20%) belonged to the age group of > 50 years. Among them, four patients (8%) had a UA value of 7 as depicted in [Figure 1].

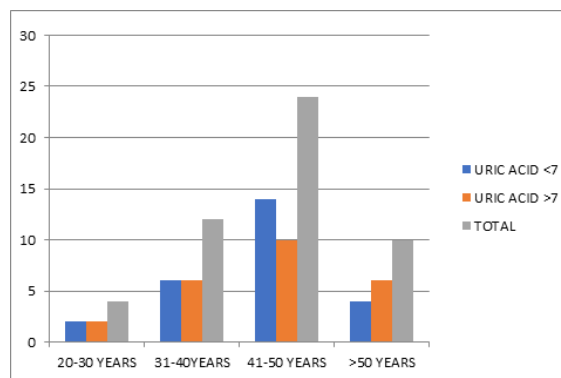


Figure 1: Age distribution and its relationship with serum uric acid value

As depicted in [Figure 2], 40 patients (80%) were male, and ten patients (20%) were female. Among the 40 male patients, 21 (42%) patients had a UA value of < 7 and 19 (38%) patients had a value of UA > 7. Among the ten (20%) female patients, five (10%) patients had a UA value of < 7 and five (10%) patients had a value of UA > 7.

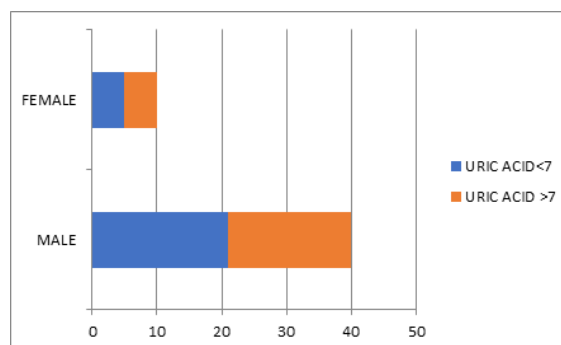


Figure 2: sex distribution among study groups

As seen in [Figure 3], out of 50 patients, 30 (60%) were taking significant alcohol. Among those taking alcohol, 28 were male and two were female. Ten patients (20%) in the study population was found to have non alcoholic fatty liver disease of which six were males and four were females. 6 (12%) patients in the study population were found to have hepatitis B (Hep B). Hepatitis C (Hep C) was present in two patients (04%). In two patient (04%), autoimmune hepatitis was present.

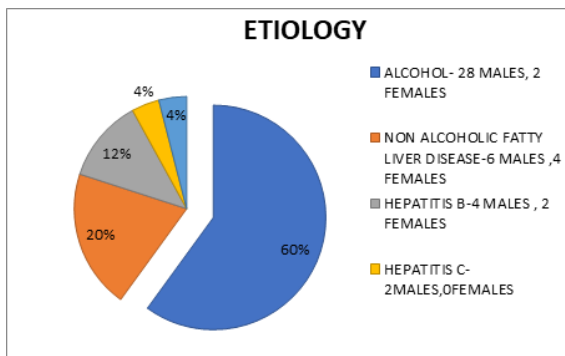


Figure 3: Etiology Among Study Group

The mean UA level among various classes of CTP are as follows: In class A, the mean value is 4.8 among six patients; in class B, it is 5.92 for 20 patients; and in class C, it is 9.12 for 24 patients showing a direct correlation between higher CTP and UA levels as depicted in [Figure 4].

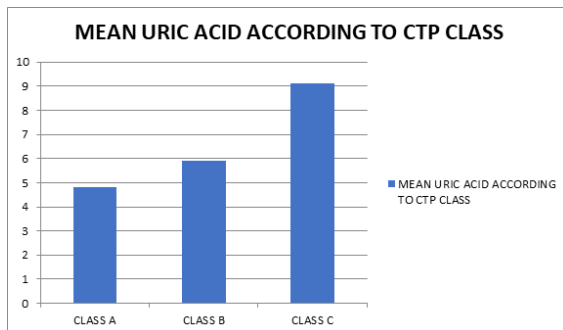


Figure 4: Mean Uric Acid According to CTP Class

Of the total 50 patients, 26 of them had a UA value of less than 7 of which 19 had signs of portal hypertension, whereas in seven of them, no signs of portal hypertension were present. The rest of 24 patients had a UA value of greater than 7, and in all of them, signs of portal hypertension were present. In this study, we have looked for the correlation of serum AST with UA. We found both serum UA and AST were normal in 11 patients, while normal AST with high UA was seen only in three patients. In 15 patients, AST was high with normal UA, while in 21 patients AST and UA were both high, which showed a direct relation to each other. The P value calculated was significant (<0.05).

In this study, we have looked for the correlation of serum ALT with UA. We found both serum UA and ALT were normal in 18 patients, while normal ALT with high UA was seen only in eight patients. In 8 patients, ALT was high with normal UA, while in 16 patients ALT and UA were both high, which showed a direct relation to each other. The P value calculated was significant (<0.05).

We have looked for the correlation of serum bilirubin with UA. We found that among 12 patients with normal bilirubin levels, both serum UA and bilirubin were normal in 9 patients, while normal bilirubin with high UA was seen only in three patients. Among 38 patients with high bilirubin

levels, 21 patients were having high UA levels, while 17 patients were having normal UA levels. The P value calculated was significant (<0.05).

We have looked for the correlation of serum albumin with UA. We found that among 17 patients with normal albumin levels, both serum UA and albumin were normal in 13 patients, while normal albumin with high UA was seen only in four patients. Among 33 patients with low albumin levels, 20 patients were having high UA levels, while only 13 patients were having normal UA levels. The P value calculated was significant (<0.05).

We have looked for the correlation of the international normalized ratio (INR) with serum UA. We found that among 20 patients with normal INR values, both serum UA and INR were normal in 14 patients, while normal INR with high UA was seen only in six patients. Among the 29 patients with increased INR values, 18 patients were having high UA levels, while only 12 patients were having normal UA levels. The P value calculated is significant (<0.05).

DISCUSSION

In this study most of patients were males (80%) compared to females which were only (20%).

This is further supported by a study conducted by Anjan Yadav et al and Noklang et al where majority of the study population were males.^[5,9]

Majority of the subjects were in the age group of 41-50 years and least number of cases in the age group of 20-30 years. According to Anjan Yadav et al⁹ majority of the population were in the age group of 41-60 years.

Most of the patients were alcoholic liver disease followed by non-alcoholic fatty liver disease followed by hepatitis b, hepatitis c and autoimmune cause respectively. According to Duseja et al,^[10] and Noklang et al, the aetiology was mostly alcoholic liver disease though Duseja et al found an increasing trend of non alcoholic fatty liver disease.

In this study 48% had elevated uric acid whereas Noklang et al and Gupta et al,^[11] found 40% and 76% of elevated uric acid level respectively in their studies.

Our study reported increased uric acid levels with rise in severity of disease with mean uric acid being significantly higher in CTP Class C (9.12) compared to Class A and B similar to the findings of Gupta et al,^[11] who also noted that mean uric acid levels were higher in CTP Class C (8.94) compared to Class A (4.03) and Class B (5.17).

In our study, serum AST level (mean 66.39 mg/dl, P value < 0.05) and serum ALT level (mean 52.16 mg/dl, P value < 0.05) were higher in patients with high serum UA levels as compared to patients with normal serum UA levels. Molla et al,^[12] demonstrated positive correlation between elevated uric acid leading to elevated liver enzymes

In our study, serum total bilirubin (mean 5.16mg/dl, P value<0.05) was higher in patients with high serum UA levels as compared to patients with normal serum UA levels. In a study conducted by Prakash Kumar Gupta et al,^[4] it was found that the level of serum bilirubin increases with increase in uric acid level.

In our study INR value were higher in patients with high uric acid level compared to CLD patients with normal uric acid level. Prakash BC,^[13] and Rai SK demonstrated a positive correlation between serum uric and INR values.

In our study serum albumin levels were low in patients with high uric acid compared to patients with normal uric acid.

CONCLUSION

Serum uric acid was found to elevated in patients with severe disease which was denoted by CTP score. It was also found to be elevated with increased AST, ALT, serum bilirubin, INR and decreased albumin. Therefore serum uric acid has accuracy in determining disease severity in Chronic liver disease and can be used as an inexpensive prognostic marker.

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