



Changes in AST , ALT and De Ritis ratio with the duration of Alcohol Dependence : A cross sectional study

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ABSTRACT

Background: Alcohol dependence is a significant worldwide public health concern that can negatively affect mental health, social interactions, and overall functioning. Prolonged consumption of alcohol can cause severe liver damage as well as dysfunction in other organs.

Aim: To examine effects of the duration of alcohol dependence on AST and ALT levels and De Ritis ratio in patients at a tertiary care centre.

Method: A cross-sectional study was conducted at the Department of Psychiatry, Assam Medical College & Hospital, Dibrugarh, India. A total of 90 patients diagnosed with alcohol dependence according to ICD-10 criteria were recruited from both inpatient and outpatient settings over a one-year period from March 2021 to April 2022. The study received institutional ethics committee (H) approval and informed consent was obtained from the participants. Demographic information was collected using a self-designed socio-demographic form. AST and ALT levels were measured and the De Ritis ratio (AST/ALT) was calculated. Statistical analysis was performed using SPSS version 25.

Results: The average duration of alcohol dependence in participants was 11.89 (SD=4.9) years.

Elevated AST levels were found along with derangement of the De Ritis ratio. The duration of alcohol dependence was found to be positively correlated with both AST levels and De Ritis ratio ($r=0.624$, $p<0.001$; $r=0.390$, $p<0.001$ respectively)

Conclusion: Prolonged alcohol dependence leads to hepatic impairment, increasing morbidity and mortality. Early diagnosis, treatment, and preventive measures are critical to mitigate alcohol dependence.

INTRODUCTION:

Throughout history, alcohol has been a widely used addictive substance for recreational purposes and as part of religious customs in certain societies, making it one of the most popular and socially accepted substances globally. However, dependence on alcohol can lead to a multitude of problems, including physical and mental health issues, behavioral difficulties, and impaired social functioning. Not only does alcohol dependence affect the everyday life of the individual, but it also has an impact on their family. Furthermore, the risk of morbidity and mortality associated with liver disease is greatly increased in individuals with alcohol dependence. According to a report by the World Health Organization (WHO), alcohol consumption is responsible for three million deaths annually worldwide, and millions more suffer from poor health and disabilities as a result. Additionally, harmful alcohol use accounts for 5.1% of the global burden of disease. Men and women are affected differently, with harmful alcohol use responsible for 7.1% and 2.2% of the global burden of disease, respectively.¹ Over the past three decades, alcohol consumption in India has increased among both men and women. This trend may be attributed to changes in the economic and socio-cultural environment.² According to the National Family Health Survey-5 (NFHS-5) for 2019-2021, alcohol consumption among men in India has decreased by 7%. However, this decrease could be attributed to the non-availability of alcohol during the COVID-19 lockdown period.³

There are several contributing factors that can lead to dependence, such as genetic, environmental, sociocultural, and medical factors. Individuals may be susceptible to one or more of these factors, which can result in alcohol dependence.

Alcohol consumption plays a significant role in alcoholic liver disease, particularly when combined with other causes. The quantity and duration of alcohol use are the most significant risk factors for the development and severity of liver disease. Women are more vulnerable to the adverse effects of alcohol on the liver than men. The metabolic function of the liver is impaired in individuals with alcoholic liver disease, resulting in changes in biochemical and hematological parameters observable in peripheral blood tests. Aspartate aminotransferase (AST) and Alanine transaminase (ALT) are two commonly used biomarkers that reflect the diseased state of the liver, such as in jaundice, hepatitis, necrosis, and cirrhosis, due to cellular injury that leads to enzyme leakage into the bloodstream. This study aims to investigate changes in AST, ALT, and the De Ritis ratio (AST/ALT) with the duration of alcohol dependence in upper Assam, which is a region in northeastern India with limited research on this topic.

AIM: To study the AST and ALT changes with the duration of alcohol dependence.

MATERIALS AND METHODS: This was a cross-sectional study conducted over a period of one year (Apr 2021 – Mar 2022) in the Department of Psychiatry, Assam Medical College and Hospital, Dibrugarh, Assam. 90 alcohol-dependent patients enrolled in the study were selected both from the outpatient and inpatient department, after a diagnosis of Mental and Behavioural disorders due to the use of alcohol with dependence syndrome according to ICD 10. The subjects between 15-65 years of age willing to participate in the study and with no history of any major debilitating physical illness were

recruited in the study. Concurrent history of any other substance abuse was considered a criterion of exclusion.

The study was commenced after the approval of the Institutional Ethics Committee (H). Written informed consent was obtained from all the subjects. A semi-structured questionnaire developed in the Department of Psychiatry, Assam Medical College, and the Kuppaswamy Scale was applied for obtaining relevant information regarding alcohol consumption and documenting the socio-demographic details respectively.

A blood sample (2ml) was drawn in a plain clot vial for assessment of liver function test. The Biochemical parameter AST and ALT was obtained by multiple point rate enzymatic methods using VITRO 5600 Auto analyzer system.

Data were expressed as mean \pm SD for quantitative and frequency and percentage for categorical variables. Pearson's correlation coefficient was calculated to find out the correlation between quantitative variables. Data were analyzed by using SPSS statistics version 25 (SPSS, IBM; Inc., Chicago, IL, USA). The p-value \leq 0.05 was considered statistically significant.

RESULT:

Results show that most of the study participants were male (91%) with the average age of the participants being 37.5 years. 62 % were married and had a nuclear family. The majority hailed from the rural area (69%) and had received education up to middle school (43.2%). Study participants were mostly engaged in skilled agricultural and fishery work (27%). As per the Kuppaswamy scale, 46% of the participants belonged to the upper-lower class (Table 1 : Socio demographic details)

In this study, the average duration of dependence in the participants was found to be 11.89 (SD=4.9). The average level of AST, ALT and the AST/ALT ratio was 128 (SD=20), 46 (SD=11), and 2.92 (SD=0.74) respectively. (Table 2 : Duration of dependence and biochemical parameters)

On correlation analysis AST and Deritis ratio correlated positively with duration of dependence ($r = 0.624$, $p < 0.001$; $r = 0.390$, $p < 0.001$). (Table 3 : Correlation of variables)

Table 1. Socio-demographic details

Socio- demographic details		N (%)
AVERAGE AGE (Mean \pm SD) 37.5 \pm 3.6	AGE	
	15-25	10 (11.2)
	26-35	31 (34)
	36-45	29 (32.5)
	46-55	13 (14.5)
	56-65	7 (7.8)
GENDER		
MALE		82(91)
FEMALE		8(9)

EDUCATION	
No formal education	5 (4.17)
Primary School Certificate	12 (13.3)
Middle School Certificate	39 (43.3)
High School Certificate	25 (27.7)
Graduate/ Post Graduate	9 (10)
OCCUPATION	
UNEMPLOYED	11(12)
ELIMENTARY OCCUPATION	15 (16)
CRAFT AND RELATED TRADE WORKERS	16 (17)
SKILLED AGRICULTURAL AND FISHERY WORKERS	25 (27)
CLERKS	14 (15)
SKILLED WORKERS AND SHOP AND SALES WORKERS	9 (10)
TECHNICIANS AND ASSOCIATE PROFESSIONALS	6 (5)
<u>TYPE OF FAMILY :</u>	
NUCLEAR	67 (74)
JOINT	23 (26)
<u>DOMICILE :</u>	
RURAL	62 (69)
URBAN	28 (31)
<u>MARITAL STATUS:</u>	
UNMARRIED	27 (30)
MARRIED	56 (62)
SEPERATED	7 (8)
<u>RELIGION :</u>	
HINDU	69 (77)
ISLAM	8 (9)
CHRISTIAN	11 (12)
OTHERS	2 (2)

SOCIOECONOMIC STATUS	
UPPER MIDDLE (II)	14 (15.5%)
LOWER MIDDLE (III)	26(29%)
UPPER LOWER (IV)	42(46%)
LOWER (V)	8 (9.5%)

Table 2. Duration of dependence and biochemical parameters

	Mean	SD
Duration in year	11.89	4.9
AST	128	20
ALT	46	11
AST/ALT	2.92	0.74

Fig. 1. Correlation of Duration with AST

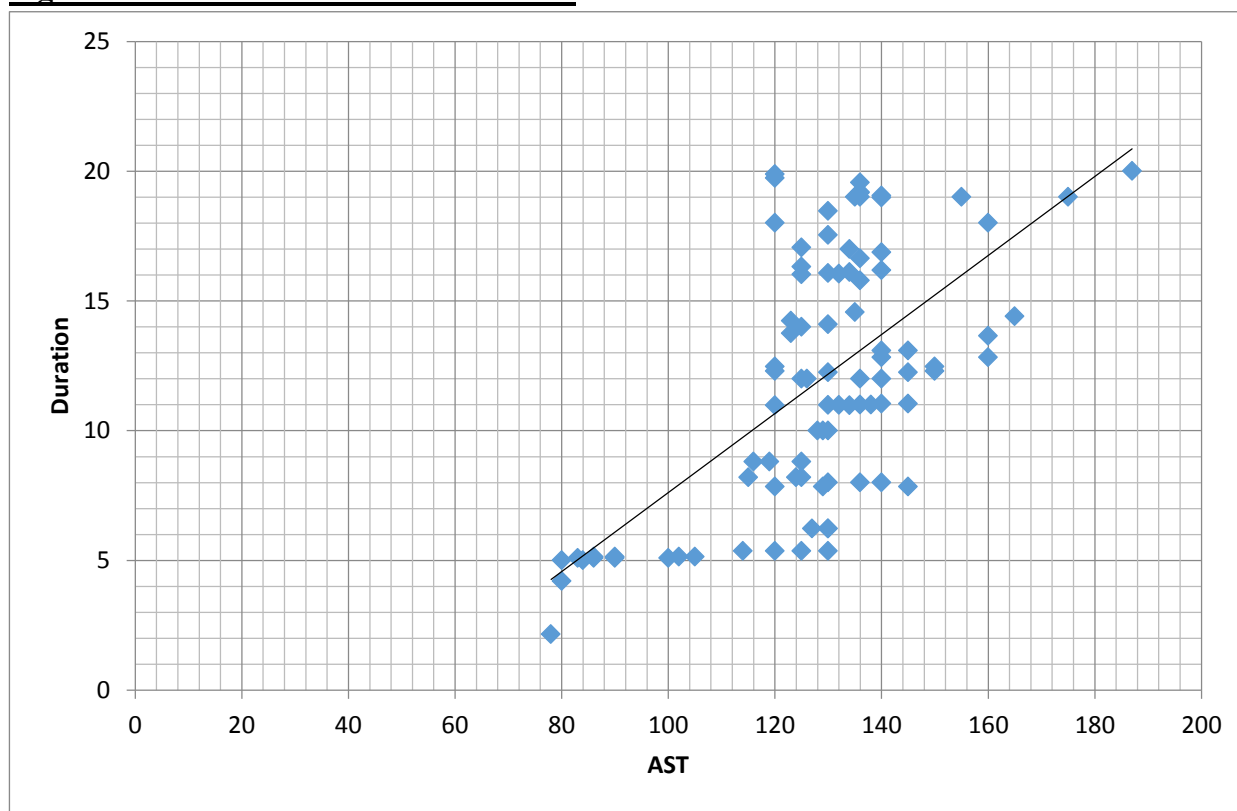
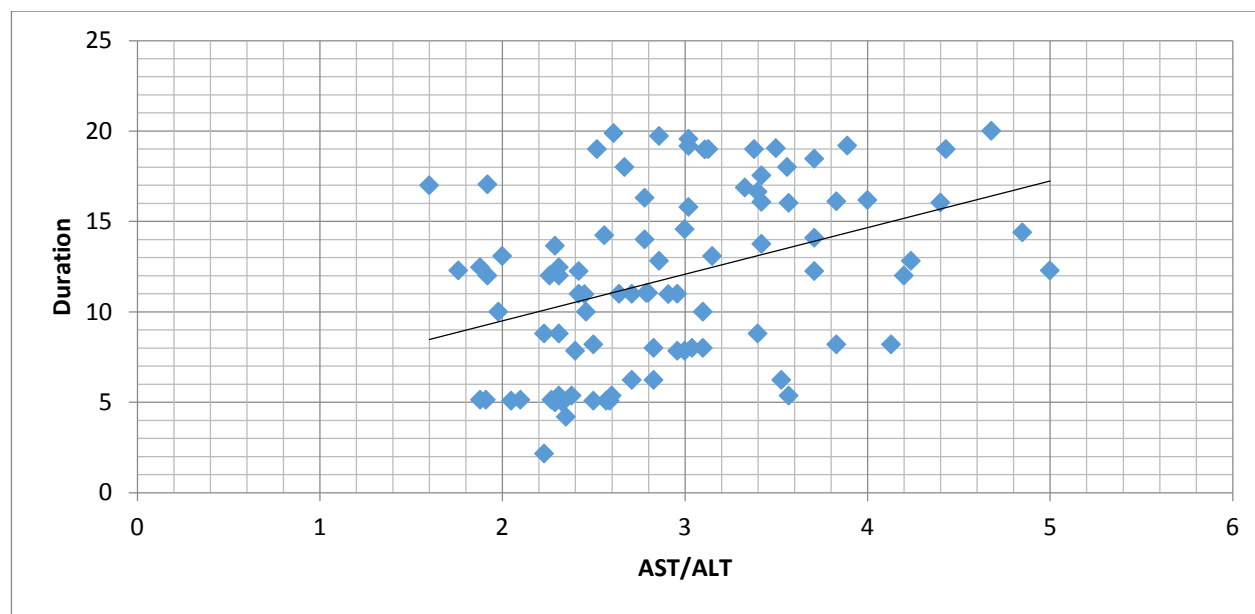


Fig. 2. Correlation of Duration with De Ritis ratio (AST/ALT)

**Table 3 : Correlation of Variables**

	r value	P value
AST	0.624	<0.001
ALT	0.061	0.57
AST/ALT	0.390	<0.001

DISCUSSION:

Alcohol consumption is a major public health concern worldwide and is influenced by various factors. The purpose of this study is to investigate the relationship between specific biomarkers and the duration of alcohol dependence among patients seeking psychiatric services at Assam Medical College in Dibrugarh, Assam. The mean age at presentation of the study participants was 37.5 years. This is in line with previous findings, which have reported average ages ranging from 37 to 43 years.⁴⁻⁶ The majority of participants in the study had completed middle school education and were skilled workers in agriculture and fisheries. This finding could be attributed to the physical and economic stress associated with these occupations. However, previous research has indicated a link between alcohol dependence and lower levels of education.^{6,7} Vignesh et al. (2014) conducted a study in which the majority of participants came from a rural background and were skilled workers.⁶

In this study, most of the participants were from nuclear families and were married, which is consistent with previous studies conducted in India. However, this finding differs from studies conducted in Western countries, which have often reported that individuals with alcohol dependence are divorced or separated.⁸ The difference in findings between studies conducted in India and the West regarding the marital status of individuals with alcohol dependence could be attributed to cultural and familial differences between the two regions. In this study, the majority of participants were from the upper-lower class, which aligns with previous research conducted in India. The current study found that the mean duration of alcohol dependence was 11.89 years, which is consistent with previous research on this topic.^{4,9} The current study found that the mean values of AST, ALT, and AST/ALT ratio were 128, 46, and 2.92, respectively. This is consistent with a study conducted by Yadav et al.¹⁰ but differs from

the findings of another Indian study⁹ and a study conducted in the Nepalese population¹¹ which reported different mean values for AST. However, the serum ALT levels in all of these studies were found to be in a similar range. The high AST/ALT ratio observed in the current study may be due to the fact that alcoholics have depleted levels of pyridoxal phosphate in their liver (the active form of vitamin B6), resulting in reduced hepatic ALT and mitochondrial damage leading to increased mitochondrial AST in the blood.¹²

Based on the analysis conducted, there was a positive correlation found between AST and the duration of alcohol dependence ($r=0.624$, $p<0.001$). In a study conducted by Gedam et al. significant correlation was found between severity of Alcohol Dependence (as reflected by SADQ scores) and AST levels.¹³ In the present study, a positive correlation was observed between De Ritis ratio and the duration of alcohol dependence ($r=0.390$, $p<0.001$), which is in contrast to the findings of the study conducted by Kherada et al. However, the correlation was not statistically significant in Kherada et al's study.¹⁴ In our study, it is possible that high AST/ALT ratios in alcoholic liver disease were primarily observed in patients with advanced disease, as suggested by Nyblom et al.¹⁵

LIMITATIONS:

The study's generalizability to females is limited due to the small number of female patients included. Additionally, the cross-sectional design of the study does not allow for follow-up assessments to evaluate changes in biomarkers following interventions. It is important to note that in patients with advanced liver disease, biomarkers may appear normal or falsely low. Furthermore, previous attempts at abstinence and subsequent relapses were not taken into account, which may have influenced the liver enzymes.

CONCLUSION:

This study aimed to investigate the relationship between alcohol dependence duration and markers of liver function, specifically the AST, ALT and De Ritis ratio. The findings suggest that longer durations of alcohol dependence are associated with higher AST and De Ritis ratios, indicating liver pathology that can lead to cirrhosis. It underscores the importance of early intervention and prevention of alcohol dependence, particularly among young adults and adolescents, to reduce the risk of liver damage and related health problems. The use of multiple biomarkers in combination with AST and ALT may improve the accuracy of detecting liver damage in individuals with alcohol dependence. The study's results emphasize the need for implementing effective strategies to reduce hazardous alcohol consumption and prevent liver disease.

CONFLICT OF INTEREST : None

FINANCIAL SUPPORT : Nil

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