

A study of the biochemical profile and its correlation with Alcohol Dependence: a hospital based study

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ABSTRACT

Background: The aim of the research was to study the biochemical profile of the male patients diagnosed with alcohol dependence syndrome and its correlation with the severity of dependence.

Methodology: A descriptive study comprising of 60 patients admitted in the psychiatry de-addiction clinic at HSK hospital from 1st July 2017 to 31st December 2017 was done after taking institutional ethical committee clearance. A semi-structured proforma was used to determine the socio-demographic details like education, occupation, socio-economic status etc. the severity of dependence was determined using Severity of Alcohol Dependence Questionnaire (SADQ) scale and basic biochemical tests were performed. Descriptive analysis using an appropriate statistical test was done.

Results: The mean age at presentation was 37.9 years. Out of 60 patients, 21 (35%) had mild dependence, 24 (40%) had moderate dependence and 15 (25%) had severe dependence. Hepatic enzymes AST and ALT were raised in 76.67% and 66.67% patients respectively. AST to ALT ratio was above 2 in 11.67% patients. There was a significant correlation between total SADQ scores and Alanine Transaminase ($\rho = 0.281$, $P = 0.03$, $n = 60$).

Conclusion: The biochemical tests were deranged in most of the patients with alcohol dependence. Certain markers can be developed based on their significant association with the dependence levels, thus, helping in early diagnosis and prevention of alcohol dependence syndrome.

Keywords: Alcohol dependence, S-aspartate-aminotransferase, S-alanine-aminotransferase, alcohol, biochemical profile.

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INTRODUCTION

Substance abuse has become a global phenomenon greatly influenced by social, economic, political, and psychosocial factors. The phenomenon not only includes the use of licit substances like alcohol, tobacco but also illicit substances such as cannabis, opioids, etc. Alcohol has been consumed in India for centuries. The worldwide prevalence of alcohol use disorders among the individuals at the age of 15 years and above was estimated to range from 0% to 16% [1]. The prevalence of use of alcohol ranges from a low of 7% in Gujarat (officially under Prohibition) to 75% in the North-eastern state of Arunachal Pradesh [2].

There is a subgroup of alcohol consumers who drink excessively so as to develop physical tolerance, withdrawal, loss of control and salience; and are diagnosed with alcohol dependence. These individuals are at high risk for multiple system failures due to micronutrient deficiency and the toxic effects of alcohol. Hence, there is an exaggerated risk for morbidity and mortality.

Various self-reporting screening questionnaires and laboratory tests can be used to help in the diagnosis of alcoholism. Various biochemical markers for alcohol abuse are available, but none is 100% efficient. A screening test should be highly sensitive and specific and discriminate between safe social drinking and

heavy, hazardous drinking. The marker should not be elevated by non-alcoholic liver disease and should be non-invasive (e.g. urine, saliva, breath or blood test). A marker that is used to detect relapse should be sensitive to any alcohol consumption above safe levels [3].

S-aspartate-aminotransferase (AST), and S-alanine-aminotransferase (ALT) are frequently used in general practice for assessing liver function in health screening. AST and ALT are often raised in patients who are alcoholics, a 40- percent increase in AST is 90- percent sensitive, and a 20-percent increase in ALT is 80-percent sensitive for relapse, yet both have low specificity [4]. Serum AST can also arise from non-hepatic sites, particularly heart and muscle, and levels are increased in conditions such as myocardial infarction and skeletal muscle trauma. The AST: ALT ratio improves the test; a ratio > 1.5 strongly suggests, and a ratio > 2.0 is almost indicative of, alcohol-induced damage to the liver. One study has shown the AST: ALT ratio to be the best in distinguishing between alcohol-induced and non-alcoholic liver disease [3]. Deficiency of pyridoxal-5'-phosphate, a necessary coenzyme for both aminotransferases, is common in alcoholic liver disease. This deficiency causes a decrease in hepatic ALT to a greater extent than AST [5].

Electrolyte abnormalities are common in chronic alcoholics. One study showed that mixed disturbances were present in 78% of patients with alcohol dependence [6]. A study found hyponatremia (72.8%) was the most frequent electrolyte disturbance in patients with alcohol dependence followed by hypomagnesemia (29.8%) and hypokalemia (28.9%) [7]. Another feature of chronic alcoholic liver disease is progressive hypoalbuminemia, the decrease in serum albumin level is attributed to the nutritional status of the subjects. On the other hand, the albumin is a potential subject of the formation of adduct by acetaldehyde, an alcohol metabolite. This albumin or other protein adducts can stimulate the formation of immunoglobulins, thus causing a rise in serum globulin levels [8].

Screening is helpful in identifying subjects at risk particularly in the early phase of drinking. It helps in identifying both hazardous and harmful users. The severity of alcohol dependence instruments is useful in patients with significant misuse but may not be sensitive to low-level use [9]. The ideal screening tool should be easy to administer, short and accurate, and correlate with other more complex diagnostic tests. Questionnaires are ideal for screening and can identify up to 80% of alcoholics, but they rely on the patient's truthfulness and memory [10]. The questionnaire method has depended on the severity of Alcohol Dependence Questionnaire (SADQ).

The current study has explored the biochemical profile of individuals diagnosed with alcohol dependence syndrome. We have also tried to find the correlation between various biochemical markers and the severity of alcohol dependence.

METHODOLOGY

The study was conducted in the De-Addiction Clinic of the Department of Psychiatry at a private medical college in Bagalkot, Karnataka during the period from 1st July 2017 to 31st December 2017. All the patients fulfilling the inclusion and exclusion criteria during the study period were included in this study.

Inclusion Criteria

All in-patients admitted through the de-addiction clinic of the HSK Hospital with alcohol-related problems were potential candidates for this study and were enrolled in the study if they fulfil the following inclusion criteria:

1. Patient of age 18 years and above
2. A patient who fulfils criteria for dependence according to ICD-10.
3. Willing to give written informed consent.

Exclusion Criteria

Subjects with any of the following were not included in the study:

1. History of any major illness requiring intensive medical/surgical intervention.
2. Not giving informed consent.

The design and nature of the clinical study was explained to the patients. Informed consent was obtained. All patients were first examined by consultant Psychiatrist to confirm the diagnosis of alcohol dependence. Socio-demographic details like education, occupation, socio-economic status etc. were collected using a semi-structured proforma, the severity of dependence was determined using Severity of Alcohol Dependence

Questionnaire (SADQ) scale and basic biochemical tests were performed.

SADQ is a 20-item questionnaire formulated by Edwards and Gross. The original SADQ is divided into five sections:

- (i) physical withdrawal symptoms,
- (ii) affective symptoms of withdrawal,
- (iii) craving and withdrawal relief drinking,
- (iv) typical daily consumption and
- (v) reinstatement of withdrawal symptoms after a period of abstinence.

It has been validated in inpatient, outpatient, and community settings [11].

Statistical analysis was done using SPSS for Windows (SPSS software package, trial version 20).

RESULTS

A total of 60 patients were included in the study. The mean age at presentation was 37.9 years (SD = 9.27). Minimum age being 20 years and maximum being 65 years. Table 1 gives the summary of the socio-demographic profile of the patients. Out of 60 patients, 21 (35%) had mild dependence, 24 (40%) had moderate dependence and 15 (25%) had severe dependence according to SADQ scores dependent patients, 8(53.33%) had hypokalemia.

Table 1: Socio-demographic data

Socio-demographic Data	N (%)
No. of Participants	60
Age (average) at presentation	37.9 years
Education	
No Formal Education	4(6.67)
Primary	5(8.33)
Secondary	21(35)
Higher Secondary	14(23.33)
Graduate	12(20)
Postgraduate	4(6.67)
Marital Status	
Single	12(20)
Married and living with spouse	43(71.67)
Separated	5(8.33)
Occupation	
Unemployed	4(6.67)
Unskilled/Farmer/Clerical	26(43.33)
Semi-skilled/Skilled work	22(36.67)
Professional/ Business	8(13.33)
Socio- economic status	
Above Poverty Line	44(73.33)
Below Poverty Line	16(26.67)

Table 2: Biochemical profile of the subjects

Variable	Median	Range, 95%CI
FBS (mg/dL)	100	68-158
PPBS (mg/dL)	140	94-264.7
Urea (mg/dL)	24	9-60
Creatinine (mg/dL)	0.90	0.5-1.3
Total Protein	6.35	4.4-8
Albumin (g/dL)	3.4	2.4-4.8
Globulin (g/dL)	2.95	1.2-4.4
Total Bilirubin (mg/dL)	0.95	0.3-2.8

Direct Bilirubin (mg/dL)	0.4	0.1-1.2
Alkaline Phosphate (U/L)	99.5	50-248
AST (U/L)	98	14-2000
ALT (U/L)	57.5	10-8300
Sodium (meq/L)	135	129-147
Potassium (meq/L)	3.6	2.9-5
Chloride (meq/L)	107	90-132

There Was A Significant Correlation Between Total SADQ Scores And Alanine Transaminase ($p=0.281$, $p=0.03$, $N=60$). (Table 3)

Table 3: Correlation of Liver Function Test with Severity Of Alcohol Dependence

Liver Function Test	SADQ			Spearman Rho (P)	P Value
	Mild	Moderate	Severe		
ALT					
Normal	11	6	3	0.281	0.03 ^a
High	10	18	12		
AST					
Normal	7	4	3	0.138	0.291
High	14	20	12		
Total Bilirubin					
Normal	12	18	6	0.094	0.473
High	9	6	9		
Alkaline Phosphate					
Normal	19	16	11	0.182	0.164
High	2	8	4		

Note: ^aCorrelation is significant at the 0.05 level.

DISCUSSION

The present study was a hospital-based study and aimed at determining the relationship of liver enzymes with the severity of dependence in patients of alcohol dependence syndrome. The mean age at presentation was 37.9 years (SD = 9.27). Mean age at presentation in previous studies with a similar design have ranged between 37 and 43 years [1,12]. A majority of individuals (73.3%) belonged to the above poverty level group socio-economically. A study by Gedam and others [13] involving a rural population of central India found a majority of participants belonged to lower socio-economic status (53%). Most of the individuals had education more than the secondary level. Various studies showed lower education status associated with alcohol dependence [12-13]. Seventy two percent of patients were married and living with a spouse. The same was replicated by various Indian studies [13], however, most western studies found the marital status of the patient to be being separated or divorced. The difference could be due to Indian customs and culture. Only 6% of individuals were unemployed, but most of them i.e. 44% were involved in work not requiring much education. A study done by Vignesh and others [1] found 58% of employment in skilled work in alcohol-dependent patients.

Our study demonstrated a moderate level of dependence (40%) in most of the participants, which is similar to previous Indian study by Singh and others [14], where 77% of participants were moderately dependent. However, a few studies included participants with severe dependence [12-13]. Both ALT (66.67%) and AST (76.67%) were raised in majority of the participants, urea (96.67%), creatinine (98.33%), potassium (41.67%) total bilirubin (60%) and alkaline phosphate (76.67%) were found to be within normal limits, and sodium (51.67%) was found to be low in the present study. This is in accordance to previous studies which have reported high AST, ALT levels upon admission of patients [12,15]. Acute ingestion of alcohol induces a water diuresis owing to suppression of circulating vasopressin levels, predisposing patients to dehydration and hypernatremia. This suppressive effect is absent with repeated exposure or prolonged continuous exposure. In these patients, vasopressin levels increase, resulting in increased urine osmolality and decreased

clearance of free water. As a result, hyponatremia is a common disorder that occurs in as many as 17% of patients with chronic alcohol-use disorder as reported by researchers [16-18].

However, hypokalemia was found in nearly 50% of hospitalized patients with chronic alcohol-use disorder in previous studies [16]. Researchers have observed increased serum urea and serum creatinine values in individuals with alcohol dependence syndrome [7]. Our results also found significant correlation between SADQ scores and ALT. Pradeep and others [18], also reported significant association between total SADQ scores and ALT. Gedam and others [13], however found correlation between SADQ scores and liver enzymes such as ALT AST This supports the idea that severity of dependence is associated with the liver dysfunction. The above differences in results could be attributed to heterogeneity of the population under study and tools used for measurement.

CONCLUSION

Alcohol dependence was more common in individuals with education more than secondary level. The biochemical tests were deranged in most of the patients with alcohol dependence. Certain markers can be developed based on their significant association with the dependence levels, thus, helping in early diagnosis and prevention of alcohol dependence syndrome.

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