Original Research Article

# Relationship between gamma glutamyl transferase (GGT) and psychiatric comorbidity among alcohol dependent in-patients: A cross-sectional study

R Jaisingh[1], S R Nirmal[2*]

[1]Associate Professor, [2]Professor & HOD, Department of Psychiatry, DSMCH, Perambalur, INDIA.
**Email:** drsrnirmal@gmail.com

## Abstract

**Aim:** To examine the prevalence and pattern of psychiatric disorders in alcohol dependence (ADS) and their relationship with physical and laboratory findings. **Materials and Methods:** Hundred males admitted in a tertiary care medical college with ADS were examined using International Classification of Disease-10th Edition, Alcohol Use Disorder Identification Test for alcohol use, blood sampling electrocardiogram, and ultrasonogram of abdomen. **Results:** Eighty percent had a comorbid Axis I or an Axis II psychiatric disorder, over 75% had nicotine dependence, and 50% had comorbid Axis II disorder, antisocial personality being the most common. Gamma glutamyl transferase (GGT) levels were raised and were significantly associated with comorbidity. **Conclusions:** High comorbidity of Axis I psychiatric disorders was found among persons with alcohol dependence. Axis II disorders were also present. GGT levels were elevated in most of patients and there was a significant association with psychiatric comorbidity.
**Key Word:** Alcohol dependence, physical correlates, psychiatric comorbidity, GGT

[*]**Address for Correspondence:**
Dr. S R Nirmal, Professor & HOD, Department of Psychiatry, DSMCH, Perambalur, INDIA.
**Email:** drsrnirmal@gmail.com
Received Date: 10/05/2019 Revised Date: 04/06/2019 Accepted Date: 23/07/2019
DOI: https://doi.org/10.26611/1071121

Access this article online

Quick Response Code:

Website: www.medpulse.in

Accessed Date: 01 August 2019

## INTRODUCTION

Alcohol has been a major problem across the globe. Alcohol dependence is by far the most common substance use disorder among people across the world. The pattern of drinking varies from individual to individual. Somehow there is deliberate denial or falsification of dependence due to various reasons. Alcoholism is in the rise among Indians, and people seem to take to it at a younger age. The recent increase in consumption of alcohol, atleast in the state of Tamilnadu, can be attributed to Government availability of bars at almost all liquor sale outlets. People of rural origin who have sold out vast areas of their agricultural lands to real estate tycoons and industries are left with a lot of money and have no active occupation to do; they land up drinking alcohol and get dependent on it. ~ 50% of alcohol-dependent persons develop alcohol-induced clinical syndromes and are of particular importance to psychiatrists.[1] Patients with comorbid psychiatric disorders constitute the majority of alcohol-dependent populations presenting to de-addiction clinics.[2] Psychiatric comorbidity rates in alcohol-dependent persons range from 100% in psychiatric in-patient settings[3] to 47% in community samples.[4] In patients with dual diagnosis alcohol use and psychiatric illness become extensively intertwined over time and worsen outcomes of each other[5] Hospitalized patients who are not truthful about their alcohol consumption may be at risk for an unplanned withdrawal. Self-reports of alcohol use such as CAGE and the Alcohol Use Disorders Identification Test (AUDIT) are valid, inexpensive, and non invasive, but patients easily can feign results[6] Biochemical measures are more objective, and combinations of markers are an effective tool to detect recent heavy drinking in the 10% to 25% of patients who underreport alcohol use.[7] Biochemical measures can detect acute alcohol

How to cite this article: R Jaisingh, S R Nirmal. Relationship between gamma glutamyl transferase (GGT) and psychiatric comorbidity among alcohol dependent in-patients: A cross-sectional study. *MedPulse – International Journal of Psychology.* August 2019; 11(2): 20-23. http://www.medpulse.in

intoxication and recent prolonged drinking. Because marker levels return to normal after long-term abstinence, ongoing monitoring can help detect a relapse before a patient admits to it.[8] The aim of the present study was to examine physical and psychiatric comorbidity in association with alcohol dependence, and to analyze the relationship of physical and laboratory findings with psychiatric comorbidity at a rural based tertiary care teaching hospital psychiatry unit.

## MATERIALS AND METHODS

The study was conducted at the Department of Psychiatry, Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur, a tertiary care teaching hospital catering to the surrounding rural population from 2016 – 18. Consenting subjects fulfilling inclusion criteria was recruited into the study. Ethical approval was obtained from the Institutional Ethics Committee of Human Subjects. (To calculate sample size, the prevalence of psychiatric comorbidity in alcohol dependence was taken as 40%[10] and error in precision was taken to be 30%. Using the formula, 2 $\sqrt{pq/n}$ = prevalence × error/100, *n* was found to be 66.6. Thus, a minimum *n* = 67 was obtained. However eighty subjects were finally recruited.) Males diagnosed as alcohol dependence as per International Classification of Disease-10th Edition (ICD-10) Diagnostic Criteria for Research (World Health Organization, 1993) criteria,[9] between ages 18 and 60 years, willing to participate, and to provide informed consent were requested for participation. Those with serious physical/neurological conditions or any other brain dysfunction interfering with assessment, with mental retardation or co-existing substance abuse or dependence other than for nicotine were excluded. They were recruited after obtaining valid written informed consent. All participants were assessed using a structured clinical interview to diagnose dependence, and Alcohol Use Disorder Identification Test (AUDIT) for alcohol use[10]. Blood sample, electrocardiogram (ECG) and ultrasonogram were done. Data analysis was conducted using the SPSS version 16.0 (San Francisco, CA). Chi-square test was used for any association between psychiatric comorbidity, ECG, and ultrasonogram changes. Student's *t*-test was used for comparing cases with or without comorbidity on continuous variables (age at presentation, age at onset, age at first intoxication, age at daily drinking, age at dependence, AUDIT score, and laboratory investigations). $P < 0.05$ was accepted as cut-off for significance.

## RESULTS

**Table 1:** prevalence of psychiatric comorbidity

| Psychiatric disorders - Comorbid | Prevalence % |
|---|---|
| Nicotne dependence | 80 |
| Personality disorders | 56 |
| Antisocial | 15 |
| Paranoid | 9 |
| Anxious avoidant | 8 |
| Anankastic | 6 |
| Schizoid | 5 |
| Histrionic | 5 |
| Emotionally unstable | 4 |
| Borderline | 4 |
| Anxiety disorders | 45 |
| Panic disorder | 17 |
| Generalized anxiety disorder | 14 |
| Phobic disorders | 10 |
| OCD | 4 |
| Affective disorders | 29 |
| Depression | 15 |
| Dysthymia | 9 |
| BPAD | 2 |
| Mania | 3 |
| Schizophrenia | 3 |
| Schizophrenia - like | 4 |
| Coplicated withdrawal (Seizures/ delirium) | 12 |

A total of hundred participants (all males) were included with a mean age of 36.7 (standard deviation = 10.5), the large majority were educated upto high school only (0–8 years: 20%, >9 years: 50%, college education: 30%), married (75%), and resided in rural areas (65%), with nearly equal representation from nuclear (52%) or joint (48%) families. Nearly, one-fifth were unemployed and around 70% earned <Rs. 10,000/month. The lifetime prevalence of complicated alcohol withdrawal state was 12% and alcohol-induced psychotic disorder was 11%. The mean AUDIT score was 28.41 (8.03) with a wide range of 8–40 [Table 1]. Overall, 87% participants had a comorbid psychiatric disorder, the most common being nicotine dependence (80%). A total of 56 patients (56%) had comorbid personality disorders (PD) -antisocial (15%), paranoid (9%), and avoidant (8%). The least common were borderline (4%) and impulsive (4%). Lifetime prevalence among anxiety disorders was panic disorder (17%), generalized anxiety disorder (14%), phobic disorders (10%), and OCD (4%). Affective disorders were present in 29% of the participants and schizophrenia in 3%. There was no significant difference between those with or without comorbidity when age at presentation, age of attaining different alcohol milestones (age at first drink, first intoxication, daily drinking, and dependence), income, AUDIT scores, and lab markers (hemoglobin, mean corpuscular volume (MCV), fasting and postprandial blood sugar, bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase

(AST), alkaline phosphatase, blood urea, serum creatinine, ultrasonogram, and ECG) were compared. Gamma glutamyl transferase (GGT) was the only marker ($P < 0.023$) that was shown to be significantly associated with psychiatric comorbidity. [Table 2]

**Table 2:** Clinical variables and psychiatric comorbidity

| Clinical Variables | Comorbidity – Mean (SD) | | t (p) |
|---|---|---|---|
| | Present (n=87) | Absent (n=13) | |
| AUDIT score | 28.43 (7.95) | 28.30 (9.02) | 0.43 (0.967) |
| Liver function | | | |
| Total Bilirubin | 0.74 (0.33) | 0.77 (0.24) | 0.351(0.731) |
| AST | 103.34 (92.14) | 129.60 (99.05) | 0.788 (0.447) |
| ALT | 83.35 (68.51) | 95.80 (64.67) | 0.565 (0.583) |
| Alkaline Phosphatase | 133.15 (55.89) | 145.00 (60.80) | 0.582 (0.572) |
| **GGT** | **104.00 (52.09)** | **73.60 (32.83)** | **2.511 (*0.023*)** |
| MCV (Hemogram) | 92.91 (7.01) | 92.97 (7.05) | 0.023 (0.982) |

AST - Aspartate aminotransferase; ALT – Alanine aminotransferase; GGT – Gamma Glutamyl aminotransferase, MCV – Mean Corpuscular volume; SD – Standard Deviation

## DISCUSSION

Our study found high rates of psychiatric disorders andPDs in a relatively stable Indian sample seeking inpatient deaddiction treatment. Only males were included as alcoholism is rare in females and few of them only seek treatment for alcohol or drug use. We did not find significant association between educational status and income with psychiatric comorbidity in contrast with other studies showing association with both higher and lower income and psychopathology.[11,12,13] Psychiatric comorbidity and age at first drink, age at first intoxication, age at daily drinking, and age at dependence were not significantly correlated as opposed to many previous reports.[11,12,13,14,15,16,17,18,19,20,21] Nicotine dependence expectedly topped the list of comorbidity, considering the prevalence, cheap, and easy availability of tobacco products in India.[18] There were high rates of PDs, similar to studies by DeJong *et al*.[21] (78% alcoholic inpatients with at least one Axis II disorder; 28% only one, and 50% more than one PD) and Morgenstern *et al* (58%).[22] Lifetime prevalence for anxiety disorders was 45%, comparable to hospital-based studies by Schneider *et al*.[16] and Bowen *et al*.[23] with lifetime prevalence of anxiety disorders of 42% and 43.8%, respectively.[19,23] The most common disorder was panic disorder (17% vs. 2–16%) in others[12,24,25] followed by generalized anxiety disorder (14%), phobic disorders (10%) similar to Powell *et al*.,[12] and obsessive compulsive disorders (4% vs. 2–12%) by others.[2,9,16,17,20,25] Prevalence of lifetime diagnosis of affective disorders was 29%, the most common being depressive episode (15%) followed by dysthymia (9%), bipolar disorder (2%), mania (2%) and mania with psychotic symptoms (1%). Past hospital-based studies reported lifetime prevalence from 19% to 34%.[2,9,26] Previous Indian studies reported a prevalence of 30%.[25] The prevalence of schizophrenia was 3%, comparable with Hesselbrock *et al*.,[24] Nurnberg *et al*.,[29] 2%, and Herz *et al*., 2.7%.[20] Others reported rates ranging from 0.8% to 8.0%.[4,9,16,17,20,25,26,27] The prevalence of alcohol-withdrawal seizures and delirium tremens was 7% and 4%, respectively, as compared to 3–5% and 5%, respectively, from the literature.[28,29] The mean values of fasting blood sugar, postprandial blood sugar, ALT, AST, GGT, serum uric acid, and MCV were significantly higher, comparable to others.[26,30,31,32] A statistically significant association was found between the psychiatric comorbidity and mean GGT value ($P = 0.023$) only. Significant changes were seen in ultrasonogram of 55%participants, but there was no association with psychiatric comorbidity. There was a significant association between GGT levels and AUDIT scores. However, no significant association between psychiatric comorbidity and AUDIT scores was found. Reasons for this finding are uncertain although limited sample size may be an issue. This study although a cross-sectional study focused on participants from an inpatient deaddiction of a tertiary care hospital catering to Perambalur and surrounding rural areas. It was conducted with sufficient sample size; structured interview schedules supplemented with clinical history were used. As we included male treatment seekers who were likely to be more ill, an inherent selection bias was unavoidable. Many subjects were not motivated and were brought to hospital unwillingly by relatives. Combinations of biomarkers improve the detection of physical comorbidity in alcohol-dependent persons.

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Source of Support: None Declared
Conflict of Interest: None Declared