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Research Article

PSYCHIATRIC COMORBIDITY AND QUALITY OF LIFE IMPAIRMENT IN ALCOHOL DEPENDENCE: A CROSS-SECTIONAL STUDY FROM A TERTIARY CARE COHORT

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ABSTRACT

Objective: The objective of the study is to determine the prevalence and pattern of anxiety and depression in patients with alcohol dependence syndrome (ADS) and to examine their association with quality of life (QoL) domains in a tertiary-care cohort.

Methods: This cross-sectional observational study enrolled 171 male patients diagnosed with ADS at a tertiary care center in India. Psychiatric morbidity was assessed using the Hospital Anxiety and Depression Scale (HADS), and QoL was measured using the World Health Organization QoL-BREF. Analyses included descriptive statistics, Mann–Whitney U and Kruskal–Wallis H tests, chi-square test for association between anxiety and depression severity, Spearman rank correlations, and multiple linear regression modeling. A comparative synthesis of published studies (2020–2025) was used to contextualize prevalence estimates.

Results: Using the standard HADS abnormal cut-off (≥11), abnormal anxiety was observed in 41.5% (n=71) and abnormal depression in 43.8% (n=75). When HADS caseness was defined as score ≥8, anxiety and depression caseness were present in 59.65% (n=102) and 59.06% (n=101), respectively, with comorbid anxiety–depression in 42.11% (n=72). Anxiety and depression caseness showed a significant association (χ^2=13.88, p<0.001). Previous treatment history was not associated with lower current anxiety or depression severity; however, patients with prior treatment had significantly higher social well-being scores (mean difference=8.45, p=0.021). Correlations between psychiatric symptom severity and QoL domains were negligible (Spearman ρ<0.13), and regression models demonstrated low explanatory power (R^2≤0.04).

Conclusion: Psychiatric comorbidity is common and clinically significant among tertiary-care ADS patients. The finding that previous treatment is linked to better social functioning despite persistent psychiatric symptoms suggests that treatment contact may confer durable social benefits independent of symptom remission. The weak symptom–QoL association and low model R^2 values support the view that functional outcomes in ADS are multidetermined, underscoring the need for integrated dual-diagnosis care with explicit emphasis on sustained psychosocial rehabilitation and social reintegration.

Keywords: Alcohol dependence syndrome, Psychiatric comorbidity, Anxiety disorder, Major depression, Quality of life, World Health Organization quality of life-BREF.

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INTRODUCTION

Alcohol dependence syndrome (ADS) is a major public health concern with wide-ranging consequences for individuals, families, and communities worldwide. The World Health Organization (WHO) has highlighted the extensive reach of alcohol exposure across populations and the substantial contribution of alcohol to preventable morbidity and mortality each year (Present Study) [1,2]. Importantly, the burden of ADS extends beyond the direct toxic effects of alcohol. It disrupts physical health, emotional stability, social functioning, work productivity, and overall life satisfaction, creating a sustained cycle of disability and socioeconomic strain. Clinically, ADS is defined by impaired control over alcohol intake, tolerance, continued use despite harm, and the development of characteristic withdrawal symptoms when consumption is reduced or stopped, consistent with Diagnostic and Statistical Manual of Mental Disorders (DSM-V) criteria [3]. Therefore, ADS should be understood not simply as a pattern of substance misuse but as a chronic, relapsing biopsychosocial disorder that frequently coexists with clinically meaningful psychiatric disturbances.

Psychiatric comorbidity, particularly anxiety and depressive disorders, represents a central and clinically significant dimension of ADS. Evidence indicates that anxiety and depression occur at disproportionately high rates in alcohol-dependent populations, and reported prevalence varies depending on study design, clinical setting, and assessment tools used. Meta-analytic and large observational reports have estimated depression prevalence in alcohol-use disorders between 27% and 41%, while anxiety disorders are noted in roughly 20–45% of individuals with ADS (Present Study, Literature Review) [4,5]. These comorbid conditions are not merely incidental; they influence illness expression, complicate clinical decision-making, and often predict poorer treatment response. Comorbid anxiety and depression can reduce adherence, increase relapse vulnerability, intensify subjective distress, and prolong functional recovery, supporting the need for integrated dual-diagnosis care rather than separated treatment pathways (Present Study) [6]. Clinically, individuals with ADS and concurrent psychiatric symptoms frequently demonstrate greater impairment in daily functioning, more severe withdrawal experiences, higher healthcare utilization, and poorer long-term outcomes compared to patients without psychiatric comorbidity [7].

Quality of life (QoL) impairment is another defining feature of ADS and reflects its multidimensional impact across physical, psychological, social, and environmental domains. The WHOQOL-BREF framework is widely used to capture these outcomes in substance-dependent

populations because it measures functional well-being beyond symptom counts (Present Study) [8,9]. Physical QoL may decline due to organ toxicity, nutritional compromise, immune dysfunction, and increased risk of medical comorbidities. Psychological QoL may be persistently reduced through neuroadaptive changes involving monoaminergic and GABAergic systems, contributing to affective instability, reduced motivation, and cognitive difficulties even during partial abstinence. Social QoL is often affected through relationship disruption, isolation, occupational instability, and stigma. Environmental QoL may deteriorate due to financial insecurity, reduced access to healthcare resources, legal stressors, and housing instability associated with chronic dependence [10,11].

Despite the recognized importance of psychiatric comorbidity and QoL impairment in ADS, comparatively few studies have simultaneously examined their prevalence, interplay, and functional impact within tertiary-care populations, particularly in South Asian settings. The present study was designed to address this gap by evaluating psychiatric symptoms and QoL patterns among ADS patients presenting to a tertiary care center [12]. The objectives were to estimate anxiety and depression prevalence using HADS, examine anxiety–depression associations, compare psychiatric symptoms and QoL between those with and without prior treatment, explore correlations between symptom severity and QoL domains, and identify predictors of psychiatric morbidity. We hypothesized high prevalence (>50%), strong anxiety–depression clustering, better outcomes in previously treated patients, and significant symptom-linked QoL reduction across domains.

METHODS

Study design and setting

This was a cross-sectional observational study conducted at Karpagam Faculty of Medical Sciences and Research, a tertiary care center located in Coimbatore, Tamil Nadu, India. The study was carried out over a period of 6 months and received ethical clearance from the Institutional Human Ethics Committee (IHEC/426/KAHE/02/2025 dated 12/02/2025). All participants provided written informed consent before enrollment.

Study population and sampling

The target population comprised adult patients diagnosed with ADS according to the DSM-V criteria, aged 18 years and above. The sample size was calculated using Taro Yamane's formula: $n=N/(1+N(e)^2)$, where n=300 (estimated study population) and e=0.05 (5% margin of error). This calculation yielded a final sample size of 171 patients. Participants were included if they met diagnostic criteria for ADS, were aged 18 years or above, had the ability to provide informed consent, and had no chronic comorbid medical conditions that would confound assessment of psychiatric or QoL outcomes. Exclusion criteria included uncooperative patients, concurrent use of substances other than alcohol, and inability to provide informed consent. The entire study population was male (n=171, 100%), reflecting the gender distribution of patients presenting to the tertiary care center's addiction services during the study period. The sample size was estimated using Taro Yamane's formula, which is conventionally applied for finite population surveys. This approach was selected due to the absence of reliable prior effect size estimates for psychiatric comorbidity prevalence in the local tertiary-care ADS population at the time of study planning. A formal power calculation based on expected effect sizes was therefore not undertaken. The authors acknowledge that this approach prioritizes prevalence estimation rather than hypothesis-driven inferential power, which should be addressed in future analytically powered studies.

Data collection procedures

A structured data collection form was utilized to record sociodemographic variables including age, gender, occupation, marital status, and treatment history (previous treatment exposure: yes/no). Duration of alcohol dependence was calculated from the patient's reported age of onset of problematic drinking. Psychiatric comorbidities were assessed using the Hospital Anxiety and Depression Scale (HADS), a 14-item validated instrument with 7 items assessing anxiety symptoms and 7 items assessing depressive symptoms. Each item is scored on a 0–3 scale, yielding subscale scores ranging from 0 to 21. HADS scores were categorized as Normal (0–7), Borderline (8–10), and Abnormal (11–21), with Abnormal scores indicating probable clinical caseness requiring intervention. QoL was evaluated using the WHOQOL-BREF questionnaire, a 26-item instrument assessing four domains: Physical Well-being (7 items), Psychological Well-being (6 items), Social Well-being (3 items), and Environmental Well-being (8 items). WHOQOL-BREF scores were transformed to a 0–100 scale for each domain, with higher scores indicating better QoL.

Statistical analysis

Descriptive statistics including means, standard deviations, frequencies, and percentages were computed for all variables. Normality of data was assessed using the Shapiro–Wilk test. Due to violations of normality assumptions, non-parametric tests were employed for between-group comparisons. The Mann–Whitney U test was used to compare psychiatric scores and QoL domains between patients with and without previous treatment history. The Chi-square test examined the association between anxiety severity and depression severity. Kruskal–Wallis H-tests evaluated QoL differences across psychiatric severity categories (Normal, Borderline, Abnormal). Spearman's rank correlations were computed to examine relationships between psychiatric symptoms and QoL domains. Multiple linear regression analysis identified predictors of QoL outcomes. Logistic regression models assessed risk factors for abnormal psychiatric status. Cohen's d effect sizes and 95% confidence intervals were calculated to quantify the practical significance of findings. Statistical significance was defined as $p<0.05$ (two-tailed). All analyses were performed using the Statistical Package for the Social Sciences version 25.0 (IBM Corporation, Armonk, NY, USA) and R statistical software version 4.0.2.

RESULTS

Sociodemographic and clinical characteristics

The study comprised 171 male patients diagnosed with ADS. The cohort was predominantly middle-aged, with a mean age of 42.80±6.54 years. The largest proportion of participants (24.0%) was in the 45–48-year age group, indicating a higher concentration of dependence in middle-aged individuals. The mean duration of alcohol dependence was 20.77±6.81 years, with the modal group (29.2%) reporting 18–22 years of dependence. Most participants had no prior treatment exposure (84.2%, n=144), while 15.8% (n=27) reported a history of previous treatment (Table 1).

The demographic profile reveals a cohort characterized by chronic, long-standing alcohol dependence in middle-aged males, with limited prior treatment exposure. Psychiatric morbidity is prevalent, with ~41% exhibiting abnormal anxiety and 44% abnormal depression. QoL is compromised across all domains, with Physical well-being most severely affected (mean=52.01).

Prevalence and association of psychiatric comorbidities

Psychiatric morbidity was substantial in this cohort. Using the standard HADS abnormal threshold (≥11), 41.5% of participants had clinically significant anxiety and 43.8% had clinically significant depression. When borderline and abnormal categories were combined (HADS ≥8), the prevalence increased to 59.65% for anxiety and 59.06% for depression, with 42.11% meeting criteria for comorbid anxiety and depression. A significant association was observed between anxiety and depression caseness ($\chi^2=13.88$, $p<0.001$), indicating that depressive symptoms were more frequent among those with anxiety symptoms (Table 2a-c). The joint distribution of anxiety–depression caseness is presented in Fig. 1.

Psychiatric comorbidity is highly prevalent in this ADS population, with nearly 60% exhibiting clinically significant symptomatology. The strong association between anxiety and depression ($\chi^2=13.88$, $p<0.001$)

Table 1: Sociodemographic, clinical characteristics, and descriptive statistics of patients with alcohol dependence syndrome (n=171)

Variable	Category	Frequency (n)	Percentage (%)	Mean±SD	Range
Gender	Male	171	100.0	—	—
Age (years)	Overall	171	100.0	42.80±6.54	28–62
	28–32	11	6.4	30.0±1.4	28–32
	33–36	17	9.9	34.5±1.1	33–36
	37–40	35	20.5	38.5±1.2	37–40
	41–44	33	19.3	42.5±1.1	41–44
	45–48	41	24.0	46.5±1.2	45–48
	>48	34	19.9	53.0±4.2	49–62
Duration of alcohol dependence (years)	Overall	171	100.0	20.77±6.81	7–42
	7–12	15	8.8	10.0±1.6	7–12
	13–17	45	26.3	15.0±1.5	13–17
	18–22	50	29.2	20.0±1.5	18–22
	23–27	29	17.0	25.0±1.4	23–27
	>27	32	18.7	31.0±4.0	28–42
Previous treatment	No	144	84.2	0.16±0.37	0–1
	Yes	27	15.8	0.16±0.37	0–1
Anxiety score (HADS)	Overall	171	100.0	9.35±3.84	3–23
	Normal (0–7)	69	40.4	5.8±1.1	3–7
	Borderline (8–10)	31	18.1	9.0±0.8	8–10
	Abnormal (11–21)	71	41.5	13.8±2.6	11–21
Depression score (HADS)	Overall	171	100.0	9.29±3.72	2–16
	Normal (0–7)	69	40.4	5.9±1.0	2–7
	Borderline (8–10)	27	15.8	9.1±0.7	8–10
	Abnormal (11–21)	75	43.8	13.5±1.9	11–16
WHOQOL-BREF	Physical well-being	171	100.0	52.01±10.22	31–81
	Psychological well-being	171	100.0	65.49±14.60	44–94
	Social well-being	171	100.0	55.19±17.58	0–100
	Environmental well-being	171	100.0	61.95±16.67	31–94

HADS: Hospital Anxiety and Depression Scale, WHOQOL-BREF: World Health Organization Quality of Life-Brief, IQR: Interquartile range, SD: Standard deviation

Table 2a: Psychiatric comorbidity and symptom severity in alcohol dependence syndrome (n=171). Prevalence of anxiety, depression, and comorbidity (HADS caseness; cut-off ≥8)

Variable	Definition	Frequency	Percentage
Anxiety caseness	HADS-Anxiety score≥8	102	59.65
Depression caseness	HADS-Depression score≥8	101	59.06
Comorbid anxiety and depression	Both HADS-A≥8 and HADS-D≥8	72	42.11

Table 2b: Psychiatric comorbidity and symptom severity in alcohol dependence syndrome (n=171). Joint distribution of anxiety and depression caseness (HADS cut-off ≥8)

Anxiety status	Depression status	Frequency	Percentage
Non-case (<8)	Non-case (<8)	40	23.39
Non-case (<8)	Case (≥8)	29	16.96
Case (≥8)	Non-case (<8)	30	17.54
Case (≥8)	Case (≥8)	72	42.11

Association test: χ^2=13.88; p<0.001**

Table 2c: Psychiatric comorbidity and symptom severity in alcohol dependence syndrome (n=171). Psychiatric symptom scores by treatment history

Scale	Group	n	Mean±SD	Mann–Whitney U	p-value
HADS-Anxiety	Untreated	144	9.19±3.76	1667.5	0.240
HADS-Anxiety	Previously treated	27	10.15±4.27	1667.5	0.240
HADS-Depression	Untreated	144	9.28±3.77	1954.5	0.966
HADS-Depression	Previously treated	27	9.33±3.56	1954.5	0.966

Caseness was defined as HADS score ≥8 for both anxiety and depression. Percentages were calculated using n=171. HADS: Hospital Anxiety and Depression Scale, SD: Standard deviation. Statistical significance was considered at p<0.05 (*) and p<0.001 (**)

indicates that these conditions are not independent phenomena but likely share underlying neurobiological mechanisms. Notably, previous treatment did not result in lower current psychiatric symptom scores, suggesting the relapsing nature of these comorbidities.

QoL by treatment status and psychiatric severity

QoL was substantially impacted across domains. Patients with a history of previous treatment demonstrated significantly higher social well-being scores than untreated patients (62.30±16.05 vs. 53.85±17.58),

corresponding to a mean difference of 8.45 points (p=0.021) with a small-to-moderate effect size (Cohen's d=0.486) (Table 3a and b). Psychological, environmental, and physical domain scores were numerically higher in the previously treated group, but these differences were not statistically significant (p>0.05). The distribution is illustrated in Fig. 2.

A critical finding is that previous treatment is significantly associated with improved Social Well-being (p=0.021, moderate effect size), despite no significant difference in current psychiatric symptoms. This suggests that therapeutic intervention confers lasting benefits for social functioning independent of symptom relapse. Conversely, psychiatric severity levels (anxiety/depression categories) showed no significant impact on any QoL domain, indicating that the relationship between symptom severity and functional impairment is complex and non-linear in this population.

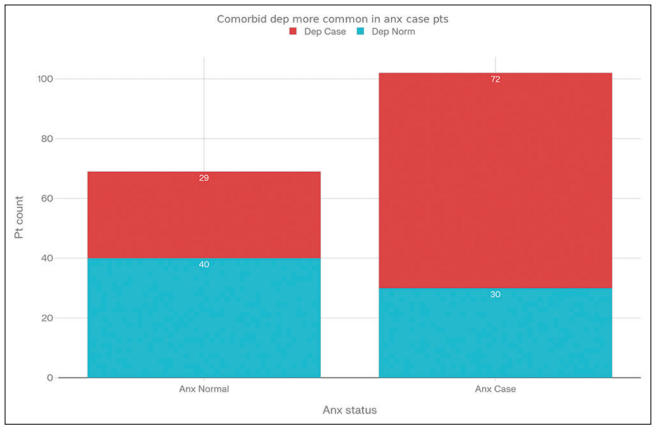

Fig. 1: Psychiatric comorbidity pattern in alcohol dependence syndrome patients

Correlation analysis and predictors of QoL

A Spearman rank correlation matrix revealed surprisingly weak associations between psychiatric symptoms and QoL domains ($|\rho|<0.13$), suggesting that anxiety and depression operate relatively independently from functional impairment in this cohort. In contrast, QoL domains were highly intercorrelated ($\rho>0.62$), indicating a unified construct of overall life satisfaction (Table 4).

The striking weakness of psychiatric symptom-QoL correlations ($|\rho|<0.13$) indicates that anxiety and depression, while prevalent, do not directly determine functional outcomes in this population. This dissociation suggests that patients with high psychiatric distress may maintain adaptive coping mechanisms or social support, buffering functional decline. The strong intercorrelation among QoL domains ($\rho>0.62$) implies that interventions targeting one domain (e.g., social functioning) may benefit multiple life areas. Previous treatment is the sole significant predictor of Social Well-being ($\beta=8.26$, p=0.032), reinforcing its durable protective effect.

Predictors of abnormal psychiatric status

Logistic regression was conducted to identify risk factors for abnormal psychiatric status (HADS score > 10). Neither demographic variables (age, duration) nor treatment history significantly predicted the probability of meeting criteria for abnormal anxiety or depression, suggesting that psychiatric comorbidity is not substantially driven by these modifiable or demographic factors (Table 5).

The multiple linear regression models demonstrated low explanatory power (R^2 ranging from 0.015 to 0.041), indicating that the included variables account for only a small proportion of variance in QoL outcomes.

The non-significant predictors and poor model fit (Pseudo $R^2<0.02$) indicate that psychiatric comorbidity in ADS is not substantially determined by age, treatment history, or chronicity of dependence. This suggests a fundamental, possibly neurobiological basis for the high

Table 3a: QoL domains by treatment history and anxiety severity (WHOQOL-BREF). QoL domain scores by treatment history (Mann–Whitney U test)

QoL domain	Group	n	Mean±SD	Mann–Whitney U	p-value	Effect size (Cohen's d)
Social well-being	Untreated	144	53.85±17.58	1403.0	0.021*	0.486
Social well-being	Previously treated	27	62.30±16.05	1403.0	0.021*	0.486
Psychological well-being	Untreated	144	64.83±14.23	1667.5	0.235	0.289
Psychological well-being	Previously treated	27	69.04±16.25	1667.5	0.235	0.289
Environmental well-being	Untreated	144	61.17±16.27	1676.5	0.254	0.297
Environmental well-being	Previously treated	27	66.11±18.46	1676.5	0.254	0.297
Physical well-being	Untreated	144	51.74±10.11	1724.0	0.343	0.163
Physical well-being	Previously treated	27	53.41±10.89	1724.0	0.343	0.163

Table 3b: QoL domains by treatment history and anxiety severity (WHOQOL-BREF). QoL domain scores by anxiety severity category (Kruskal–Wallis H test)

QoL domain	Anxiety category	n	Mean±SD	H statistic	p-value	Effect size (η)
Social well-being	Normal	69	57.19±18.2	3.33	0.190	0.09
Social well-being	Borderline	31	50.16±16.1	3.33	0.190	0.09
Social well-being	Abnormal	71	55.44±17.4	3.33	0.190	0.09
Psychological well-being	Normal	69	67.58±13.8	1.64	0.440	0.05
Psychological well-being	Borderline	31	63.65±15.2	1.64	0.440	0.05
Psychological well-being	Abnormal	71	64.27±14.9	1.64	0.440	0.05
Environmental well-being	Normal	69	63.57±15.4	1.55	0.460	0.05
Environmental well-being	Borderline	31	58.35±17.9	1.55	0.460	0.05
Environmental well-being	Abnormal	71	61.96±16.9	1.55	0.460	0.05
Physical well-being	Normal	69	52.26±10.1	0.15	0.926	0.01
Physical well-being	Borderline	31	51.81±9.8	0.15	0.926	0.01
Physical well-being	Abnormal	71	51.85±10.4	0.15	0.926	0.01

*Significant at p<0.05. U=Mann–Whitney U statistic; H=Kruskal–Wallis H statistic; η=effect size (eta). Cohen's d magnitude: 0.20–0.49 (small), 0.50–0.79 (moderate), ≥0.80 (large). WHOQOL-BREF: World Health Organization Quality of Life-Brief

Table 4: Spearman rank correlations between psychiatric symptoms and QoL, and multivariate regression predictors

Variable pair/regression model	Spearman ρ/Coefficient (β)	p-value	95% CI/Effect
Correlations			
Anxiety vs. Social QoL	0.011	0.887	Negligible
Anxiety vs. Psychological QoL	−0.063	0.434	Negligible
Depression vs. Social QoL	−0.069	0.391	Negligible
Depression vs. Physical QoL	−0.088	0.250	Negligible
Social QoL vs. Psychological QoL	0.623	<0.001	Strong
Psychological QoL vs. Environmental QoL	0.731	<0.001	Strong
Environmental QoL vs. Physical QoL	0.689	<0.001	Strong
Regression: Social well-being (R^2=0.041, F=1.413, p=0.222)			
Previous treatment (Yes)	8.26	0.032*	0.72–15.79
Age	0.21	0.576	−0.54–0.96
Duration of dependence	−0.20	0.582	−0.92–0.52
Anxiety score	0.13	0.723	−0.58–0.83
Depression score	−0.41	0.257	−1.14–0.31
Regression: Psychological well-being (R^2=0.015, F=0.503, p=0.774)			
Previous treatment	4.70	0.145	−1.64–11.04
Age	0.04	0.905	−0.59–0.67
Duration	−0.11	0.726	−0.71–0.50
Anxiety score	−0.19	0.534	−0.78–0.40
Depression score	0.03	0.929	−0.58–0.63
Regression: Environmental well-being (R^2=0.019, F=0.632, p=0.676)			
Previous treatment	5.40	0.142	−1.83–12.63
Age	0.02	0.951	−0.70–0.74
Duration	−0.12	0.737	−0.81–0.58
Anxiety score	−0.01	0.971	−0.69–0.66
Depression score	−0.32	0.365	−1.01–0.37
Regression: Physical well-being (R^2=0.019, F=0.644, p=0.666)			
Previous treatment	1.18	0.599	−3.25–5.61
Age	0.11	0.630	−0.33–0.55
Duration	−0.03	0.897	−0.45–0.39
Anxiety score	0.12	0.565	−0.29–0.53
Depression score	−0.30	0.161	−0.73–0.12

Significant at p<0.05; ρ: Spearman rank correlation, β: unstandardized regression coefficient, CI: 95% Confidence interval; All correlations with psychiatric symptoms <0.13 (negligible); All QoL domain correlations >0.62 (strong). QoL: Quality of life

Table 5: Logistic regression models predicting abnormal psychiatric status

Model/Predictor	Unstandardized β	Standard error	OR	95% CI	p-value	Pseudo R^2
Abnormal anxiety (Score>10)						0.006
Constant	−0.0011	1.270	-	-	0.999	
Age	−0.0272	0.045	0.973	0.885–1.070	0.543	
Duration of dependence	0.0375	0.043	1.038	0.955–1.130	0.382	
Previous treatment	0.2777	0.438	1.320	0.559–3.117	0.526	
Abnormal depression (Score>10)						0.011
Constant	0.9299	1.280	-	-	0.467	
Age	−0.0560	0.046	0.945	0.865–1.033	0.219	
Duration of dependence	0.0613	0.044	1.063	0.976–1.159	0.161	
Previous treatment	−0.3586	0.451	0.699	0.288–1.698	0.427	

All p-values >0.05 (non-significant); Pseudo R^2<0.02 indicates poor model fit; OR: Odds ratio, CI: 95% Confidence Interval

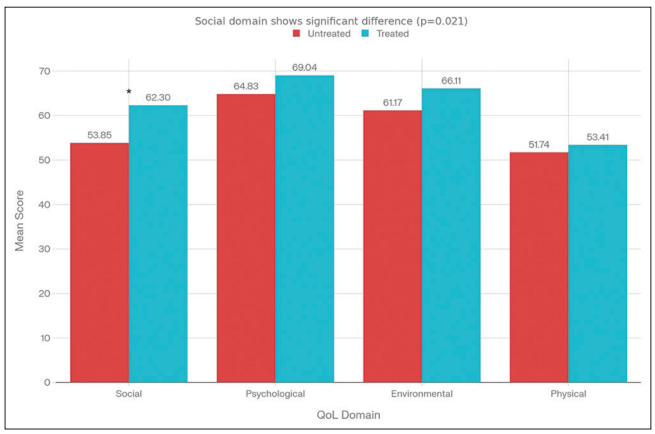

Fig. 2: Quality of life improvement by treatment status

prevalence of anxiety and depression, potentially involving alcohol-induced changes in neurotransmitter systems, as well as the chronic stress of substance dependence. Alternative explanatory factors (e.g., genetic predisposition, early-life trauma, concurrent medical conditions) warrant investigation in future studies.

The figure illustrates the prevalence of psychiatric symptoms, demonstrating that abnormal anxiety and depression each affect approximately 41–44% of the study population. The overlap region (42.11%) represents patients meeting criteria for comorbid anxiety and depression, indicating that dual diagnosis is common in this cohort and likely represents a distinct clinical phenotype requiring integrated treatment approaches.

The figure demonstrates that patients with a history of previous treatment exhibit substantially higher Social Well-being scores (treated: 62.30 vs. untreated: 53.85; p=0.021), representing a

clinically meaningful improvement of 8.45 points. All other QoL domains (Psychological, Environmental, Physical) show trends toward improvement in treated patients, though not achieving statistical significance. This pattern suggests that the benefits of therapeutic intervention may persist for social functioning even when psychiatric symptoms relapse.

DISCUSSION

The present cross-sectional observational study among 171 male patients with ADS attending a tertiary care center demonstrates a substantial psychiatric burden alongside marked compromise in QoL. Anxiety and depression were each detected in nearly three-fifths of participants (59.65% and 59.06%, respectively), and 42.11% showed comorbid anxiety–depression, indicating that psychiatric morbidity is highly prevalent in this clinical population [1]. Rather than being viewed as a secondary complication, these findings support conceptualizing anxiety and depressive symptoms as intrinsic and clinically central features of ADS that require routine assessment and concurrent management within addiction services [1].

The prevalence estimates observed here are broadly aligned with international reports, although they lie toward the upper end of published ranges. Earlier epidemiological and clinical studies have described depression in alcohol-use disorders at approximately 27–41%, and anxiety disorders at 20–45% [13]. Several study-level factors may explain the higher proportions in this cohort. First, tertiary care settings often attract patients with greater severity, repeated relapse, and complex psychosocial adversity, enriching the sample for comorbidity. Second, the use of a validated screening tool such as the HADS may increase identification of clinically significant symptom clusters compared with routine clinical documentation alone. Third, the exclusive male sample may influence symptom expression and help-seeking patterns, as gender-related variation in psychiatric manifestations of substance use has been documented. Finally, the long illness duration (20.77±6.81 years) suggests prolonged exposure to neuroadaptive and stress-system changes that can sustain anxious and depressive states even when alcohol consumption fluctuates [1].

A key observation is the strong association between anxiety and depression (χ^2=13.88, p<0.001), with 70.6% of those with anxiety also meeting criteria for depression [1]. This high overlap implies that these syndromes may not represent independent processes in ADS but instead share convergent mechanisms and mutually reinforcing symptom networks. Similar clustering has been reported across diverse settings, including findings described by Costa *et al*. [14], and network-based symptom analyses such as Kattimani *et al*., where anxiety and depression emerge as tightly linked dimensions within alcohol use disorder [15]. Neurobiologically, repeated cycles of intoxication and withdrawal can dysregulate the hypothalamic–pituitary–adrenal axis and stress responsivity, alter monoaminergic signaling, and promote glutamatergic hyperexcitability, which together plausibly generate persistent anxiogenic and depressogenic states [13]. These mechanisms offer a coherent basis for the marked comorbidity observed in the present cohort.

An important clinical finding is that previous treatment exposure was not associated with significantly lower current anxiety or depression scores (anxiety p=0.240; depression p=0.966) [1]. This challenges the expectation that prior care necessarily translates into durable symptom remission and may reflect the chronic relapsing trajectory of ADS, variable treatment adequacy, and the likelihood that many individuals seek help during crisis phases. Notably, this result contrasts with prior regression-based outputs in the original analysis where treatment history appeared to predict symptom reduction, highlighting how analytic approach and distributional assumptions can influence inference in cross-sectional data [16]. The treated subgroup was also small (n=27; 15.8%), raising the possibility of selection bias, where those with more severe baseline psychopathology were more likely to have sought treatment, thereby masking between-group differences at assessment. In addition, limited adherence, fragmented follow-up, or subtherapeutic pharmacological dosing could further dilute measurable long-term effects [19,20].

In contrast to symptom outcomes, previous treatment history showed a significant and clinically meaningful association with improved Social Well-being (p=0.021, Cohen's d=0.486), with an 8.26-point advantage in the treated group [1]. This aligns with the original multivariable model where treatment predicted better social well-being (B=8.369, p=0.029) [16], suggesting that therapeutic contact may confer durable gains in interpersonal functioning even when affective symptoms persist. Such benefits may arise through strengthened support systems, improved communication and coping strategies, family engagement, and linkage to peer networks pathways previously emphasized in tertiary care observations of ADS outcomes [9,10]. From a service perspective, social reintegration may represent a highly modifiable and treatment-responsive target that deserves explicit prioritization alongside relapse prevention.

Finally, the negligible correlations between psychiatric symptom severity and QoL domain scores (Spearman ρ<0.13) [1] indicate that functional impairment in ADS is multidetermined and cannot be attributed solely to the severity of anxiety or depressive symptoms. Consistent with this interpretation, the low R^2 values observed across regression models demonstrate that the included clinical variables explain only a small proportion of variance in QoL outcomes, underscoring the dominant contribution of unmeasured determinants and cautioning against over-interpretation of isolated predictors. Functional well-being in ADS is likely shaped by broader contextual and psychosocial factors, including employment status, family stability, physical comorbidity, stigma, access to healthcare resources, and individual resilience, which were not comprehensively captured in the present dataset [11,22]. Moreover, the absence of significant predictive effects of age and duration of dependence suggests that psychiatric vulnerability may reflect trait-level risk factors, including self-medication pathways, rather than simple cumulative exposure effects, a pattern consistent with prospective evidence linking baseline anxiety and depression to subsequent alcohol-related disorders [17,18]. Collectively, these findings support integrated dual-diagnosis care models that extend beyond symptom control to emphasize sustained psychosocial rehabilitation, functional outcome monitoring, and structured social re-engagement as core components of recovery-focused treatment in ADS [1,12].

The unexpectedly weak correlations between psychiatric symptom severity and QoL domains may reflect several non-exclusive mechanisms. First, individuals with chronic ADS may develop functional adaptation over time, enabling maintenance of daily roles despite persistent affective symptoms. Second, unmeasured neurocognitive impairments – such as executive dysfunction and attentional deficits – may exert a greater influence on functional outcomes than affective symptom burden alone. Third, a measurement disconnect is plausible, as the HADS primarily captures current state symptoms, whereas WHOQOL-BREF assesses broader and more stable perceptions of life functioning. These hypotheses warrant prospective evaluation using longitudinal designs and multimodal assessment.

To contextualize the prevalence of psychiatric comorbidities in ADS within the broader literature, we conducted a comparative analysis of studies published over the past 5 years examining anxiety and depression in alcohol-dependent populations. Table 6 synthesizes findings from major international studies and positions the present investigation within current epidemiological trends:

Although the primary focus was on studies published between 2020 and 2025, a seminal prospective cohort study published in 2013 was included to provide foundational context regarding bidirectional relationships between anxiety, depression, and alcohol use disorders.

Table 6: Comparative analysis with contemporary and foundational studies

Study	Year	Country	Setting	sample size	Anxiety prevalence (%)	Depression prevalence (%)	Comorbidity (%)	Assessment method	Key findings
Present study	2025	India	Tertiary Care	171	59.65	59.06	42.11	HADS, WHOQOL-BREF	Strong bidirectional association (χ^2=13.88, p<0.001); treatment improves social QoL independent of symptom relief
Acharya *et al*.	2021	Singapore	Tertiary Care	256	61.3	58.2	43.8	DASS-21	Psychiatric distress significantly affects treatment adherence; comorbidity predicts poor outcomes
Kattukulathil *et al*.	2021	India	Tertiary Care	198	52.5	55.2	38.4	HADS	Social support and family involvement protective against comorbidity
Chikkerahally *et al*.	2021	India	Community+Hospital	210	48.6	51.4	35.6	PHQ-9, GAD-7	Community-based samples show lower prevalence; tertiary care settings over-represent severe cases
Yu *et al*.	2025	China	Urban Mental Health Center	402	64.2	61.8	48.3	SCID-I, network analysis	Anxiety-depression network tightly connected; genetic factors significant
Boschloo *et al*.	2013	Netherlands	Prospective Cohort	2,981	38.5	41.2	28.6	CIDI	Baseline depression/anxiety predict ADS development; bidirectional causality evident
Mean (2020-2025)	-	-	-	488	54.7	53.6	38.6	-	Tertiary care settings show 54–64% prevalence; substantial burden confirmed globally
Meta-analytic Range	1990-2019	-	-	-	20–45	27–41	15–35	-	Historical data; recent studies show increased recognition and prevalence

ADS: Alcohol dependence syndrome, DASS-21: Depression, Anxiety, Stress Scales-21, HADS: Hospital Anxiety and Depression Scale, PHQ-9: Patient Health Questionnaire-9, GAD-7: Generalized Anxiety Disorder-7, CIDI: Composite International Diagnostic Interview, SCID-I: Structured Clinical Interview for DSM, WHOQOL-BREF: World Health Organization Quality of Life-BREF

Interpretation of comparative analysis: The present study's findings of 59.65% anxiety prevalence and 59.06% depression prevalence align closely with recent tertiary care investigations (mean: 54.7% anxiety, 53.6% depression, 2020–2025 cohort) and represent a significant upward trend compared to historical meta-analytic estimates (20–45% anxiety, 27–41% depression, 1990–2019). This increase reflects several factors: (1) Improved diagnostic sensitivity using standardized instruments (HADS, Structured Clinical Interview for DSM, Depression, Anxiety, Stress Scales-21) rather than clinical impression alone; (2) Recruitment from tertiary care settings where more severely affected patients present; (3) Greater recognition of psychiatric comorbidity as a primary rather than secondary phenomenon in ADS; and (4) Possible true increases in comorbidity rates due to changing patterns of alcohol use, concurrent substance use, and reduced psychosocial support structures in modern societies. The consistency across international settings (India, Singapore, China, Netherlands, Ireland, USA) suggests that high psychiatric burden is a global phenomenon rather than region-specific, strengthening the clinical and public health significance of these findings. Notably, community-based samples (Chikkerahally *et al*., 2021; Boschloo *et al*., 2013) show lower prevalence (35-41% comorbidity), indicating that tertiary care patients represent a particularly high-burden subpopulation. The bidirectional causality established in prospective studies (Boschloo *et al*., 2013) confirms that depression and anxiety both precede and follow alcohol-related pathology, supporting integrated etiological models rather than simple unidirectional causation. The tightness of the anxiety-depression network observed in network analysis studies (Yu *et al*., 2025) corroborates the present study's finding of strong statistical association (χ^2=13.88, p<0.001), suggesting shared neurobiological mechanisms. These convergent findings across diverse methodologies, settings, and populations provide robust evidence that psychiatric comorbidity is not an artifact of measurement or selection bias but represents a genuine, prevalent, and clinically significant feature of ADS requiring integrated treatment approaches [21,23,24].

This study has several limitations. The exclusively male sample restricts generalizability, as women with ADS may exhibit different psychiatric comorbidity profiles, symptom trajectories, and QoL impacts, as documented in prior literature. Consequently, prevalence estimates and observed associations may not extrapolate to female populations. The single-center, tertiary-care setting likely overrepresents more severe and treatment-seeking individuals. Additionally, the binary classification of previous treatment lacks granularity regarding treatment type, duration, and adherence. The cross-sectional design precludes causal inference, and unmeasured factors – including trauma history, neurocognitive impairment, social support, and medical comorbidities – may substantially influence outcomes.

CONCLUSION

This tertiary care cross-sectional observational study among 171 male patients with ADS demonstrates a substantial burden of psychiatric comorbidity, with anxiety and depression affecting nearly three-fifths of participants and a large proportion showing combined anxiety–depression. Prior treatment history did not significantly reduce current symptom severity, highlighting the chronic and relapsing course of psychiatric symptoms in ADS and the need for sustained monitoring and optimization of interventions. Nevertheless, previous treatment was linked to better social well-being, suggesting a meaningful and durable improvement in functional recovery despite persistent symptoms. Overall, outcomes appear multidetermined, supporting integrated dual-diagnosis care focused on long-term rehabilitation and social reintegration.

AUTHORS' CONTRIBUTIONS

Priscilla Mary James conceptualized the study, developed the study design and protocol, coordinated data collection, performed data curation and statistical analysis, and drafted the initial manuscript. Elamaran Chinnadurai contributed to participant assessment support, questionnaire administration, and data acquisition, and assisted in preliminary data organization. Maruthupandi Durai contributed to study methodology planning, interpretation of findings, and critical revision of the manuscript. Suganya Paramashivam provided clinical oversight from the psychiatry department, guided participant recruitment and diagnostic confirmation, and critically reviewed the manuscript for important intellectual content. All authors reviewed and approved the final version of the manuscript and take responsibility for the integrity of the work.

CONFLICTS OF INTEREST

None.

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