Research Report

COGNITIVE DYSFUNCTION IN MALE INPATIENTS WITH ALCOHOL DEPENDENCE: A COMPARATIVE CROSS-SECTIONAL STUDY FROM SOUTH INDIA

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ABSTRACT

Background: Alcohol is the most widely used psychoactive substance worldwide. More than 50% of alcohol dependent subjects can have alterations in cognitive functions. Cognitive dysfunction interferes with treatment and increases the risk of relapse in alcohol dependence; hence, its identification has potential therapeutic implications. We compared the cognitive dysfunction in alcohol dependent inpatients with controls. **Methods:** This hospital-based cross-sectional comparative study was conducted in a tertiary center in South India. The study population consisted of 76 consenting male psychiatry inpatients of the age group 18-65 years with alcohol dependence who did not have delirium, while 76 caregivers who accompanied patients to the hospital and were not dependent on alcohol were the controls. The severity of alcohol dependence in the study group was assessed using the Short Alcohol Dependence Data Questionnaire (SADD), and the cognitive functions of both groups were evaluated by the Montreal Cognitive Assessment (MoCA). **Results:** The prevalence of cognitive impairment was higher in the study group than in controls (96.1% vs. 36.8%, p = 0.001). **Conclusion:** There is a significantly greater cognitive impairment in those with alcohol dependence compared to those without. Evaluating alcohol dependent patients for cognitive impairment can have important therapeutic and prognostic implications.

Keywords: Alcohol dependence, cognitive impairment, MoCA

INTRODUCTION

Alcohol is the most widely used psychoactive substance across the world. Alcohol dependence is characterized by three or more of the following at some time during a period of one year – strong desire or compulsion to use alcohol, difficulties in controlling substance-taking behavior, physiological withdrawal state as evidenced by characteristic withdrawal syndrome or taking alcohol for relieving or avoiding withdrawal symptoms, tolerance, progressive neglect of alternative pleasures or interest and continued use despite harm as per ICD-10.[1]

Alcohol use and dependence are relatively very prevalent in the Indian population.[2] A study conducted in a medical college in Chennai among the individuals visiting the outpatient department for the treatment of alcohol-related problems found that more than half of these

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patients had either medium (40%) or high levels of alcohol dependence (46%) on Short Alcohol Dependence Data Questionnaire (SADD).[3]

In India, the 12-month prevalence of alcohol dependence in the year 2010 was estimated to be 2.1%.[4] National Family Health Survey (NFHS-3) found that 45.2 % of males drink alcohol in Kerala.[5] A more recent study by the Indian Council for Medical Research (ICMR) found that 35.9% and 23.6% of males consumed alcohol at least once during the last 12 months and one month, respectively, in our state.[6] In Kerala, 8.8 % of drinking males consumed alcohol almost daily, while 26.5% drank alcohol 1-4 days/week. Moreover, 10.5% had at least a day of binge drinking during the last seven days.[7]

Chronic alcohol consumption leads to several neuroadaptive changes like decreased GABAergic activity in the cortex, cerebellum, and ventral tegmental area, increased glutamatergic activity in the amygdala, and modification of the function of other neurotransmitters and modulators including glycine, adenosine, serotonin and dopamine.[8,9]

Effects of alcohol on cognitive functioning were reported as early as the 1880s by Carl Wernicke and Sergei Korsakoff, followed by Hamilton, Fisher, and David Wechsler.[10] More than 50% of alcohol dependent subjects can have alterations of cognitive functions that probably impact their management.[11] There is also evidence for impaired frontal lobe function in apparently clinically healthy abstinent alcohol-dependent subjects.[12] However, the nature and severity of these impairments vary from individual to individual.

Significant differences in attention, spatial working memory span, and visual episodic memory were found between alcohol dependent patients and healthy controls in one cross-sectional study.[13] Poor cognitive functioning increases the risk of relapse in alcohol dependent patients.[14] Hence, cognitive assessment has significant practical and clinical applications in patients with alcohol use disorders.[13] However, studies evaluating the cognitive functions of patients with alcohol dependence in Kerala are relatively sparse.

Our study objective was to compare the cognitive impairment in alcohol dependent male inpatients and apparently healthy individuals not dependent on alcohol.

MATERIALS AND METHODS

This hospital-based cross-sectional comparative study was conducted in the department of Psychiatry of a tertiary teaching hospital in South India. Formal approval of the Institutional Research Committee and the Institutional Ethics Committee was obtained, and the study was conducted for a period of one year from May 2019. Taking α as 5%, β as 20%, the prevalence of cognitive dysfunction in alcohol dependence as 81%, and assuming the effect size to be 18, the sample size was calculated as 76 in each group.[15]

The study group consisted of consenting male inpatients aged 18-65 years, satisfying the criteria for alcohol dependence syndrome as per ICD-10 diagnostic criteria. They were recruited after the acute withdrawal phase was over. Consenting male caregivers of psychiatry in-patients who were not dependent on alcohol and were of a similar age were selected as controls.

Those with delirium or evidence of Wernicke's encephalopathy, mental retardation, other psychotic or mood disorders, neurological disorders or serious physical illness interfering with the assessment, dependence on drugs other than nicotine, history of head injury or brain surgery were excluded from both cases and controls.

After obtaining written informed consent, sociodemographic and clinical details were collected using a specially designed proforma. Cognitive assessment of both cases and controls was done using MoCA (Montreal Cognitive

Assessment). The severity of alcohol dependence in alcohol dependent subjects was assessed by SADD (Short Alcohol Dependence Data Questionnaire).

The Montreal Cognitive Assessment (MoCA) is a short, easily administered screening measure that has accuracy for the detection of mild cognitive impairment (MCI) in conditions including substance use disorder. It has sensitivity and specificity of 90% and 80%, respectively, for detecting mild cognitive impairment and has been used in rehabilitation treatment and in guiding neurocognitive investigations. Cut off score is 26.[16,17] The scale consists of seven subdomains of cognitive function, namely visuospatial, naming, attention, language, abstraction, delayed recall, and orientation. MoCA is found to be more sensitive than the Mini-Mental State Examination (MMSE) for mild-to-moderate cognitive impairment and provides a time- and resource-efficient assessment for identifying MCI. The sensitivity and specificity of the MoCA for detecting minimal cognitive impairment (n = 94) were 90% and 87% compared with 18% and 100% using the MMSE, respectively.[18]

Short Alcohol Dependence Data Questionnaire (SADD) is a 15-item self-report scale that measures the severity of alcohol dependence and the behavioral and psychological changes associated with it. The first 14 items are related to withdrawal discomfort. The 15th question is to check amnesia, an indicator of tolerance. It is brief, easy to administer, and covers all the aspects of alcohol dependence in a single questionnaire.[19] It provides the severity of alcohol dependence as mild, moderate, and severe with scores of 1-9, 10-19, and >/= 20 respectively.[20] SADD has been documented to have satisfactory test-retest and split-half reliability, as well as good content and construct validity.[19]

The data was analyzed with SPSS version 18. Descriptive statistics are provided. The comparison was done using the chi-square test.

Table 1. Comparison of sociodemographic factors between cases and controls

Variables		Frequency (%)	
		Cases (n1 = 76)	Controls (n2 = 76)
Age (years)	18-25	2 (2.6)	10 (13.1)
	26-45	48 (63.2)	36 (47.4)
	46-65	26 (34.2)	30 (39.5)
Residence	Urban	11 (14.5)	23 (30.3)
	Rural	65 (85.5)	53 (69.7)
SES	APL	16 (21.1)	38 (50.0)
	BPL	60 (78.9)	38 (50.0)
Marital status	Married	54 (71.1)	52 (68.4)
	Unmarried	19 (25.0)	20 (26.3)
	Separated	0 (0.0)	0 (0.0)
	Divorced	1 (1.3)	0 (0.0)
	Widower	2 (2.6)	4 (5.3)
Education	Below HS	63 (82.9)	50 (65.8)
	HS & >	13 (17.1)	26 (34.2)
Occupation	UE	3 (3.9)	13 (17.1)
	ML	46 (60.5)	35 (46.1)
	Farmer	4(5.3)	3 (3.9)
	Business	5 (6.6)	5 (6.6)
	Profl.	5 (6.6)	8 (10.5)
	Others	13 (17.1)	12 (15.8)

APL – Above poverty line, BPL – Below poverty line, HS – Higher secondary, ML – Manual laborer, Profl. – Professional, SES – Socioeconomic status, UE - Unemployed

RESULTS

The majority of the study population belonged to the age group of 26-45 years and were from rural areas (77.6% of the total sample). Most (78.9%) of the subjects in the alcohol dependence group belonged to the Below Poverty Line (BPL) category. The majority of the participants in both groups were married, were high school educated (52.6% and 43.4%, respectively), and approximately half (53.3%) of the total participants were manual laborers (Table 1). Family history of alcohol dependence was found in 65.8% of the total sample, and it was significantly higher among the cases (77.6%) compared to controls (53.9%). Comorbid nicotine dependence was found to be significantly higher (56.57%) in the group

Table 2. Comparison of domains of MoCA

Domains of MoCA (Maximum score)	Mean scores (SD)	
	Cases (n_1 = 76)	Controls (n_2 = 76)
*Visuospatial (5)	2.38 (1.41)	3.53 (1.18)
*Naming (3)	2.39 (0.71)	2.92 (0.27)
*Attention (6)	3.32 (1.51)	5.22 (0.92)
*Language (3)	0.84 (0.77)	1.71 (0.75)
*Abstraction (2)	1.16 (0.85)	1.59 (0.55)
*Delayed recall (5)	1.67 (1.43)	3.57 (1.08)
*Orientation (6)	5.38 (0.85)	5.96 (0.34)

*-P value = 0.001

with alcohol dependence when compared to the control group (3.9%).

The majority of the participants (71.1%) with alcohol dependence started using alcohol between 16 and 25 years and had been using alcohol for more than 10 years. The duration of dependence was less than ten years in 63.2% of patients. The majority of the participants (72.2%) with a past history of detoxification reported peer pressure as the most important reason for relapse. Complications of alcohol use was the reason for attending the deaddiction services in 46.1% of participants. More than 50% of the participants with alcohol dependence had deranged liver function tests. Out of the 76 participants with alcohol dependence, 65 had severe dependence, and the remaining 11 had moderate dependence.

The presence of cognitive impairment in cases with alcohol dependence was found to be significantly higher (96.1%) when compared to controls (36.8%) (χ^2 = 59.76, *df* = 1, p = 0.001). Mean MoCA score was 17.93 (SD – 4.14) in alcohol dependent subjects and 25.18 (SD – 2.73) in controls. The mean scores of all sub-domains of cognitive functions were found to be significantly lower in cases compared to controls (Table 2).

DISCUSSION

In this study, we found that 96.1% of patients with alcohol dependence had cognitive impairment. This was determined using a cutoff score of 26 on the MoCA. The study and control groups were comparable in age; most participants were in the 26 to 45 years age group. This finding is consistent with previous studies that have found that the peak age group for alcohol use was 25 to 44 years.[21]

Since the subjects in the present study were inpatients in a tertiary care hospital, those with a longer duration and more severe pattern of dependence were more likely to be included in the study. Consistent with existing literature, family history of alcohol dependence was found to be more in cases compared to controls (77.6% and 53.9% respectively).[22] More than half of the subjects reported nicotine dependence, making it the most common comorbidity. This association between alcohol dependence and nicotine dependence has been well documented in literature.[23,24]

71.1% of patients with alcohol dependence reported that they had first used alcohol between the ages of 16 and 25. This finding is similar to those of other studies. The majority of participants in the study (85.5%) had severe alcohol dependence, which is defined as a score of 20 or higher on the scale. The remaining participants had moderate alcohol dependence, which is defined as a score of 11 to 19. The high percentage of participants with severe alcohol dependence may be due to the fact that the study was conducted at a tertiary-level teaching hospital.

Lower MoCA scores were observed in those with alcohol dependence when compared to those without. This was evident in both the total MoCA score and in each of the MoCA subdomain scores. The fact that most of the patients were young and had been dependent on alcohol for less than ten years suggests that cognitive function should be formally assessed in all patients with alcohol dependence. The long-term course of cognitive impairment in these patients may be crucial to their functional recovery. Since patients with delirium or encephalopathy were excluded from the study, the actual magnitude of clinically significant cognitive impairment in this group of patients

may be even higher. Persistent cognitive impairment may also lead to problems with treatment adherence or relapse. Therefore, regular assessment of cognitive function in patients recovering from severe alcohol dependence may help to develop better treatment strategies.

This cross-sectional study used the MoCA to evaluate the cognitive function in patients with alcohol dependence after the acute withdrawal phase when the nutritional status and the benzodiazepine-associated cognitive problems could have influenced the outcome of the assessment. Moreover, MoCA is a brief screening tool and does not provide a comprehensive assessment of cognitive function. Future longitudinal studies with more comprehensive neuropsychological evaluations are needed to track the evolution of cognitive dysfunction and its changes with respect to abstinence and non-abstinence and to evaluate the impact of different clinical, biochemical, and neuroimaging variables on cognitive dysfunction.

Conclusions

Cognitive impairment was significantly more prevalent in alcohol dependent subjects compared to healthy controls, and this impairment was noted in each subdomain of cognitive function in cases compared to controls.

Conflicts of Interest and Funding

No conflicts of interest and no funding.

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