National Journal of Physiology, Pharmacy and Pharmacology

RESEARCH ARTICLE

Assessment of cognitive function in patients with alcohol dependence: A cross-sectional study

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Received: August 20, 2017; **Accepted:** September 21, 2017

ABSTRACT

Background: This study aimed to evaluate cognition in patients with alcohol dependence. During the past decade, there has been an increasing interest in the evaluation of cognitive function in substance use disorders. Substance use includes the use of licit substance such as alcohol, tobacco, and diversion of drugs as well as illicit substances. Alcohol in beverage form is among the most widely used psychoactive drugs in the world, and it has dependence-producing properties. Ethanol in alcohol is a chemical and after consumption has a multitude of effects. **Aims and Objectives:** The aim of this study was to assess the cognitive functions in patients with alcohol dependence as compared to the normal controls using Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA). **Materials and Methods:** This study included 44 patients with alcohol dependence diagnosed as per international classification of disease tenth edition criteria with a mean age of 43.61 ± 7.38. Cognition was tested using a sensitive battery of psychometric testing MMSE and MoCA. **Results:** Compared with healthy controls ($n = 44$), patients had lower total scores of cognitive testing MMSE ($P = 0.010$) and MoCA ($P = 0.000$). **Conclusion:** Our results indicted cognitive impairment in patients with alcohol dependence. This is important to determine prognosis and managing patients.

KEY WORDS: Substance Use; Cognition; Alcohol Dependence

INTRODUCTION

Alcohol is a psychoactive substance with dependence-producing properties. Ethanol in alcohol is a chemical and after consumption has a multitude of effects. Globally alcohol consumption has increased in recent years, and most of that increase is in developing countries.[1]

In India, it is estimated that 75 million people are alcohol users.[2] The National House Hold Survey of drug use in India, was the first systematic effort to document the nationwide prevalence of drug use, as per this survey alcohol (21.4%) was the primary substance used (apart from tobacco) followed by cannabis (3.0%) and opioids (0.78%), and 17 to 26% of alcohol users were diagnosed alcohol dependents, i.e., an average prevalence of about 4% as per international classification of disease tenth edition (ICD-10).[3]

The ICD-10 criteria specifies dependence as three or more experiences exhibited at some time during a 1 year period and these experiences includes (a) tolerance, (b) physiological withdrawal state, (c) impaired capacity to control, (d) craving, (e) continued use despite harm, and (f) salience. Criteria (a) and (b) are physiological, while rest are psychological in nature.[4]

Between 50% and 80% of individuals with alcohol use disorders experience mild-to-severe neurocognitive impairment,

Access this article online	
Website: www.njppp.com	Quick Response code
DOI: 10.5455/njppp.2018.8.0935121092017	

mainly affecting executive functions, episodic memory, and visuospatial capacities related to multiple brain lesions.[5]

Therefore, the present study was planned to evaluate the cognitive functions using Mean Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA).

MATERIALS AND METHODS

The present study was conducted from September 2015 to August 2016 in the Department of Physiology in associations with the Department of Psychiatry and Department of Neurology, Indira Gandhi Medical College (IGMC), Shimla, which is one of the tertiary care centers of Himachal Pradesh and also has coverage of majority of population of this state. 44 consecutive patients of alcohol dependence syndrome of experimental group diagnosed as per ICD-10 criteria with abstinence of 2 weeks were selected from among the outpatients/inpatients with the Department of Psychiatry, IGMC and Hospital, Shimla. For the normal control group, 44 normal healthy controls were selected from among the volunteers and attendants of psychiatric and neurological patients with the psychiatry or neurology departments. In this study, a cross-sectional design was used. Selection of individuals: (a) Experimental group (patients of alcohol dependence syndrome) and (b) control group (normal healthy controls), who fulfilled the following inclusion and exclusion criteria were included in the study.

Experimental Group (Patients of Alcohol Dependence Syndrome)

Inclusion criteria

1. Male patients of alcohol dependence between age group 20 and 60 years.
2. Patient abstinent from alcohol for at least 2 weeks.
3. Patient who fulfilled ICD-10 criteria for the diagnosis of alcohol dependence syndrome.

Exclusion criteria

1. Patients with serious medical conditions, seriously sick, nonambulatory, and noncooperative patients.
2. Patient of significant liver disease (cirrhosis of liver).
3. History of drug dependence other than nicotine or caffeine.
4. Clinical evidence of Wernicke–Korsakoff syndrome.
5. Significant history of head trauma or brain surgery.
6. Patient with organic brain syndrome, psychotic disorder, major depressive disorder, and bipolar disorder.

Control Group

The control group included 44 normal healthy male individuals, matched by age, sex, and had similar educational level as that of experimental group. Selection of individuals was made who fulfilled the following criteria:

Inclusion criteria

1. Normal healthy male individuals between 20 and 60 years of age.
2. Not having met lifetime ICD-10 criteria for alcohol dependence syndrome.

Exclusion criteria

1. Not having any serious medical problem or psychiatric illness on anamnestic recall.
2. Having taken alcohol within 24 h of cognitive function assessment.
3. Significant history of head trauma or brain surgery.
4. History of drug dependence other than nicotine or caffeine.

Instruments and Tools

Instruments for alcohol use evaluation

1. CAGE questionnaire.[6]
2. Alcohol use disorder identification test questionnaire.[7]

Instruments for cognitive function testing

1. MMSE.[8]
2. MoCA.[9]

Statistical Analysis

Descriptive data on sociodemographic, clinical, MMSE, and MoCA variables were analyzed using percentage, mean, and standard deviation. For categorical variables, independent samples test and Pearson test were used. Statistical software SPSS window version 20 was used for data analysis.

RESULT

MMSE Scores in Patients of Alcohol Dependence and Normal Control Group

The mean MMSE score in patients of alcohol dependence was 25.45 ± 3.62 and control group was 27.23 ± 2.65. A significant difference was found in the MMSE score of two groups ($t = -2.622$, $P = 0.010$*) (Table 1).

MoCA Score in Patients of Alcohol Dependence and Normal Control Group

The mean MoCA score of patients with alcohol dependence was 21.5 ± 3.33 and that of controls was 24.41 ± 2.94 and a significant difference between patients and control groups was found ($t = -4.346$), $P = 0.000$**) (Table 2).

Table 1: MMSE scores in patients of alcohol dependence and normal control group

Variable	Mean±SD		*t*	*P*
	Patients (*n*=44)	Normal controls (*n*=44)		
MMSE score	25.45±3.62	27.23±2.65	−2.622	0.010*

MMSE: Mini mental state examination, SD: Standard deviation

Table 2: MoCA score in patients of alcohol dependence and normal control group

Variable	Mean±SD		*t*	*P*
	Patients (*n*=44)	Normal controls (*n*=44)		
MoCA score	21.5±3.33	24.41±2.94	−4.346	0.000**

SD: Standard deviation, MoCA: Montreal cognitive assessment

DISCUSSION

About 44 consecutive patients of alcohol dependence syndrome diagnosed as per ICD-10 criteria with abstinence of 2 weeks were selected from the Department of Psychiatry, IGMC, Shimla. The study was done to assess the cognitive functions in patients of alcohol dependence using MMSE and MoCA and compared the findings of above tests with that of normal healthy controls. MoCA and MMSE scores of patients of alcohol dependence were significantly lower than those of the normal controls. In this study, patients of alcohol dependence with 2 weeks abstinence were included in the experimental group and physically and mentally healthy males in control group.

Comparison of MMSE and MoCA Scores between Patients of Alcohol Dependence and Normal Control Group

The comparison of MMSE and MoCA scores in patients of alcohol dependence with normal controls was the main objective of the study.

MMSE

In our study, the mean Mini-Mental State test score of patients of alcohol dependence was 25.45 ± 3.62 and those of normal control group was 27.23 ± 2.65. There was a statistically significant difference in the mean MMSE scores of two groups ($P = 0.010$).

In other studies, Mini-Mental State test score found 27 ± 3 by Fatih[10] and Manning et al.,[11] 26.63 ± 2.27 were similar to our studies.

MoCA

The MoCA, a screening tool for cognitive impairment, has demonstrated superiority over the routinely used MMSE in multiple clinical populations, yet is rarely used in addiction settings or studies. Validation studies are needed to determine its sensitivity and specificity with an Asian population.

In this study, the mean MoCA score of patients of alcohol dependence was 21.50 ± 3.33 and that of control group 24.41 ± 2.94. The MoCA score of patients of alcohol dependence was found significantly decreased as compared to that of normal control group ($P = 0.000$**). Similar MoCA score was reported by Manning et al.[11] in their alcoholic patients (22.37 ± 3.86).

In our study, the mean of the Mini-Mental State MMSE test score and the MoCA of patients of alcohol dependence were lower as compared to controls and were consistent with other studies.[10,11]

Alcohol dependence is a chronic disorder, which involves the brains dopaminergic system. Brain's reward system is responsible for alcohol-seeking behavior. Alcohol consumption produces a large and rapid release of dopamine (DA) in the nucleus accumbens (NAC) from ventral tegmental neurons. Enhanced DA transmission in the NAC plays a critical role in the positive rewarding aspects of drug abuse and the initiation of the addictive process.[12]

Alcohol dependence is a chronic disease resulting in disturbances of various cognitive functions. Even mild-to-moderate drinking can adversely affect cognitive functioning (i.e., mental activities that involve acquiring, storing, retrieving, and using information).[13]

In the present study, our result indicated impairment in cognitive functions in patients of alcohol dependence with 2 weeks abstinence. It is recommended that this result should be confirmed by further studies, especially done after 3 weeks of abstinence.

Limitations of the Present

Although conducted with a relatively sound methodology, this study nonetheless has few limitations. Due to a small sample size, the findings of this study need to be corroborated in larger sample studies. The study did not include women. The study being time-bound project could not afford larger sample. The assessment was made, when the patients were abstinent for 2 weeks. Greater delay between starting sobriety and assessment would reduce the bias of prolonged withdrawal symptoms. The present study was cross-sectional in design; thus, there was no scope for follow-up of the study individuals. This study has shown that cognitive impairment is especially pronounced in early abstinence and might recover with longer duration of abstinence.

CONCLUSION

MMSE and MoCA scores in patients with alcohol dependence were significantly different from that in normal controls.

MoCA and MMSE scores were lower in patients with alcohol dependence as compared to normal controls. Such results indicate impairment in cognitive functions in patients with alcohol dependence. Hence, the cognitive function tests, i.e., MoCA and MMSE are useful in assessing the cognitive functions in patients of alcohol dependence.

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How to cite this article: Sharma D, Padam A, Gharu Y, Sharma D, Sharma S. Assessment of cognitive function in patients with alcohol dependence: A cross-sectional study. Natl J Physiol Pharm Pharmacol 2018;8(3):337-340.

Source of Support: Nil, **Conflict of Interest:** None declared.