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EFFECT OF NICOTINE DEPENDENCE ON COGNITIVE IMPAIRMENT IN PATIENTS OF ALCOHOL DEPENDENCE-A COMPARATIVE STUDY

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ABSTRACT **Introduction:** Cognitive decline includes a wide spectrum of changes in cognitive function due to age-related and pathological decline. Many unhealthy behaviors like substance use accelerate cognitive decline. Long term alcohol is associated with cognitive impairment but effect of comorbid nicotine dependence has not yet been studied over in our region. **Objectives:** The study was planned to examine the concurrent effect of use of nicotine on cognitive impairment in patients of alcohol dependence syndrome. **Methods:** 30 patients each of Alcohol dependence without concurrent Nicotine Dependence (group A) and Alcohol dependence with concurrent Nicotine Dependence (group B) were enrolled in this study. Montreal Cognitive Assessment (MoCA) Test was used for assessment of cognitive functions. **Results:** Among the various domain of MoCA, attention and orientation was found to be better in Group B patients, i.e patients with concurrent alcohol and nicotine dependence syndrome. All other domains were more impaired in Group B as compared to Group A patients. Overall, patients with alcohol dependence with nicotine dependence had a lower MoCA score i.e. 23.4±2.2 and 22.4±1.8 in group A and B respectively (p-value-0.82) suggesting greater cognitive decline in patients of Group B. **Conclusion:** The present study suggests that the decline in cognitive performance is more in patients with concurrent use of alcohol and nicotine as compared to patients of alcohol dependence alone. However, attention and orientation were found to be better in patients with concurrent use of alcohol and nicotine.

KEYWORDS : *Alcohol Dependence, Nicotine Dependence, MOCA*

INTRODUCTION

A wide spectrum of changes in cognitive function due to age-related decline and pathological decline is referred to as cognitive decline [1]. Identifying the determinants of individualized variations in cognitive functions has been as area of interest in as it helps managing the patient in a better way when improvement in cognition is also targeted.

Many unhealthy behaviors like substance use accelerate cognitive decline, especially in poor-socioeconomic groups. Consumption of alcohol is very common in many societies and thus the effect of alcohol on cognition has a great potential of being important to public health, specifically while considering prevention of impairment in cognitive function. [2]

Nicotine is one of the active components of tobacco which is consumed in both smokeless form and by smoking. Its consumption is associated with deficit in memory and with deterioration in reasoning abilities. Smoking is an important risk factor for atherosclerosis which is a risk factor for impairment of cognitive function [3,4], and hence the association between tobacco smoking and cognition [5]. Further, a decline in cerebral perfusion, acceleration of atrophy of cerebrum and appearance of various lesions in white matter are also seen as a result of smoking. [6]

Several studies have found an association between alcohol use or nicotine use and cognitive decline, but only a few considered the concurrent effect of nicotine and alcohol on cognition.

AIMS AND OBJECTIVES

To examine the concurrent effect of nicotine use on cognitive impairment in patients of alcohol dependence syndrome.

STUDY SETTING

After taking approval from the ethical committee of the institute, a cross sectional, observational study was carried out in psychiatric out-patient and in-patient setting at a tertiary care centre from November 2021 to march 2022. Total 60 patients diagnosed with Alcohol dependence based on ICD-10 (International classification of Diseases-10) were recruited. The patient and one of the family members were explained in detail about the study and its purpose and subsequently a written informed consent was taken.

Inclusion Criteria

Patients of age 18-60 years and of either sex and able to read and write, diagnosed based on ICD-10 and with >6 months duration of alcohol dependence and nicotine dependence, willfully agreeing to participate in the study were enrolled.

Exclusion Criteria

Patients not willing to provide their informed written consent to participate in this study and who reported having a severe or long-term physical illness or intellectual disability, any neurological deficits were excluded from the study.

MATERIAL AND METHODOLOGY

Study Tools

Semi-structured proforma -to elicit the information including socio demographic details and clinical variables.Montreal Cognitive Assessment (MoCA) Test- Cognitive performance was evaluated using this test. It measures 7 cognitive domains with the help of 13 items. The domains tested are: executive functioning; visuospatial abilities; attention, concentration and working memory (referred to as 'attention'); language; abstract reasoning; memory; and orientation. We get a total score after adding all the scores. The maximum score is 30. Higher the score on this scale, better is the cognitive performance of the subject. The score is also adjusted based on the educational level of the subject, subjects with a low educational level are given two extra points and subjects with an average level of education are awarded one extra point, however, the total score is maintained as 30. In patients with substance addiction, an optimal cut-off score of 24 is predictive of substance-induced cognitive impairments, with sensitivity and specificity being 0.56 and 0.62 respectively, using an extensive neuropsychological assessment as gold standard [7].After recruiting the 60 patients, once their diagnosis was established, they were divided into two groups i.e.

Group A-30 cases of Alcohol dependence without concurrent Nicotine Dependence.

Group B-30 cases of Alcohol dependence with concurrent Nicotine Dependence.

Following this, informed consent was taken and data was collected in form of semi-structured proforma including details of socio-demographic profile and clinical variables of patients. Lastly, MoCA Test was applied to evaluate cognitive performance.

Statistical Analysis

Descriptive statistical measures like mean, median, standard deviation, and independent t-tests were applied for the quantitative characteristics. For qualitative data, chi square test was used. SPSS-v-21 was used for analysing the data statistically. A p-value <0.05 was considered statistically significant.

RESULTS

Table-1:- Clinical Variables

Variables	Group A (n=30)	Group B (n=30)	p-value
Mean age (in years)	44.2±6.2	45.1±5.8	0.68

Age(years) of onset of substance use	24.8±4.5	18.3±2.4	0.001**
Family history of substance use	8(26.7%)	12(40%)	0.001**
Total duration of substance abuse (years)	8.2±1.6	14.8±2.2	0.001**

*= correlation is significant at the level of 0.05
**= correlation is significant at the level of 0.01

Table 1 depicts the clinical variables of the patients. The mean age was comparable in both groups- 44.2±6.2yrs in group A and 45.1±5.8yrs in group B(p-value-0.68). Age of onset of substance use was significantly lower in group B compare to group A (p-value-0.001). The family history of substance use was also found in a greater number of patients of group B (40%) as compared to that of group A (26.7%) (p-value-0.001). Patients of Group B had a significantly longer duration of substance use in comparison to group A (p-value-0.001).

Table-2:- Comparison Of MoCA Score Between Both Groups

Domain	Group A (n=30)	Group B(n=30)	p-value
Visuospatial	3.1±1.3	2.96±1.4	0.62
Naming	2.8±1.6	2.6±1.4	0.54
Attention	3.2±1.1	4.1±1.6	0.03*
Language	2.1±1.3	1.98±1.2	0.72
Delayed recall	2.3±1.1	2.1±1.4	0.45
Orientation	3.8±1.6	4.8±2.1	0.04*
Total score	23.4±2.2	22.4±1.8	0.82

*= correlation is significant at the level of 0.05
**= correlation is significant at the level of 0.01

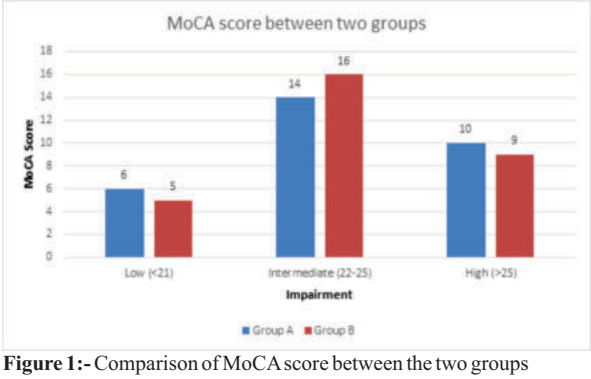

Figure 1:- Comparison of MoCA score between the two groups

Table 2 and Figure 1 depicts the comparison of MoCA Score between two groups of patients. Among the various domain of MoCA, attention and orientation were found to be better in Group B patients, i.e patients with concurrent alcohol and nicotine dependence syndrome. All other domains were more impaired in Group B as compared to Group A patients. Considering the total score, patients with alcohol dependence with nicotine dependence had a lower MoCA score i.e. 23.4±2.2 in group A and 22.4±1.8 in group B (p-value-0.82) suggesting greater cognitive decline in patients of Group B.

DISCUSSION

The study was planned with an aim to compare the level of cognitive impairment in patients of Alcohol dependence without concurrent Nicotine Dependence and in patients with Alcohol dependence with concurrent Nicotine Dependence.

In our study, the mean age was comparable in both groups- 44.2±6.2yrs in group A and 45.1±5.8yrs in group B (p-value-0.68). Age of onset of substance use was significantly lower in group B compare to group A (p-value-0.001) suggesting that the patients with concurrent use of alcohol and tobacco started using the substance at an earlier age. The family history of substance use was also found in a greater number of patients of group B (40%) as compared to that of group A (26.7%) (p-value-0.01). Patients of Group B had a significantly longer duration of substance use in comparison to group A, which can be explained by earlier age of onset and continued use of substance thereafter in these patients (p-value-0.001). This can be explained by recent research which suggests that due to the positive effects of nicotine on some domains of cognitive performance in alcohol dependence patients, they may gravitate more towards it and hence the duration of substance use is increased as well. [8]

The results of the study also found that effect of nicotine use and alcohol consumption when combined, accelerated the decline in various domains of cognitive assessed by application of MoCA. Previous similar studies which considered combined effect of both these substances on cognitive decline or dementia have also made similar observations [2,9]. ***Muhammad et al (2021)*** conducted a cross sectional study and found that elderly subjects who weren't using either of these substances or consumed either of them unlike consuming smokeless tobacco only [10]. Among the various domain of MoCA, attention and orientation were found to be better in Group B patients, i.e patients with concurrent alcohol and nicotine dependence syndrome. This was in accordance with the study conducted by ***Peter et al (2008)*** which mentions that nicotine may enhance reaction time, memory and learning. [11] All other cognitive domains were found to be more impaired in Group B as compared to Group A patients. Similar to the results of our study results of studies by ***Jenkins et al (2011)*** and ***Pilatti et al (2014)*** also summed up that the patients with concurrent use of alcohol and nicotine had a longer duration of alcohol use and a significant higher family history of substance use which may be explained by easy and early access to alcohol, which further increases the chances of AUD. These results which considered various factors, reported that factors acted synergistically and thereby increased the risk of problematic alcohol use in subjects with early onset of drinking, concurrent consumption of nicotine and positive family history of substance use. [12,13]

CONCLUSION-

There is high clinical relevance of assessment of cognitive deficits in chronic substance abusers as the outcome of the treatment as well as the dropout rates of the patients are also to an extent determined by it. [14]

The results of our study suggest that apart from the domains of attention and orientation which were found to be better in patients concurrently using alcohol and nicotine, all other domains were better in patients with alcohol dependence without use of nicotine. Considering the overall score of MoCA, the combined effect of alcohol and nicotine abuse appears to accelerate cognitive decline.

Limitation-

The size of study sample wasn't large enough to generalize it to the population. Also, all the subjects in our study were males so varying effects based on gender couldn't be studied effectively. Moreover, effect of age, and other environmental factors like dietary factors, on cognition was not taken into consideration. In our study the duration of substance use was more for patients with concurrent use of alcohol and nicotine which acted as a confounding factor and may have affected the results.

Implications

Although long term alcohol consumption is associated with cognitive impairment but the concurrent effect of nicotine on cognition should also be considered while evaluating the patients. Nicotine being a much acceptable form of substance use is usually not paid much attention and thus a detailed evaluation may have better outcome in terms of both daily functioning of the patient and in management of their substance addiction.

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