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Effect of Chronic Alcohol Intake on Motor Functions and Quality of Life in Older Adults - A Pilot Study

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ABSTRACT

Background and objective: Alcohol consumption causes alterations in the neural circuits which can cause severe physical dysfunctions. Furthermore, during natural aging process, several functional alterations are observed. Alcohol Use Disorder (AUD) is a chronic and progressive disease influenced by genetic, psychosocial and environmental factors. Thus, considering the consequence of chronic alcohol consumption and natural ageing process, this study aimed to find the degree of motor impairment along with quality of life in older adults with chronic alcohol consumption.
Method: A comparative study was conducted on older adults (>45 years) who consumed alcohol in Southern Karnataka. An analysis of alcohol consumption was done using AUDIT (Alcohol Use Disorder Identification Test) questionnaire, which divided them into two groups- Alcohol Use Disorder group (AUD) and control group. All the participants underwent testing for motor function using Comprehensive Coordination Scale (CCS) and Six-Minute Walk Test (6-MWT). Quality of Life was analyzed using SF-36 questionnaire.
Result: The results of the pilot study with 24 participants showed that CCS scores were significantly higher in control group. In 6-MWT, total distance covered by AUD group was significantly less than control group. Sf-36 showed statistically significant difference in the domains of physical functioning, role limitation due to physical health, energy/fatigue and social functioning.
Interpretation and Conclusion: The study concluded that there was a detrimental effect of chronic alcohol consumption on motor functions and quality of life among older adults. Coordination and physical function were better in individuals consuming low-moderate levels as compared to heavy consumption (AUD). Quality of life was poorer in the domains of physical functioning, role limitation due to physical health, energy/fatigue and social functioning in AUD individuals.

Keywords: Alcohol Use Disorder, Quality of Life, motor coordination, physical function

INTRODUCTION

Ageing is a complex, multifaceted process causing changes in the cellular mechanisms leading to several physiological changes in the human body.[1] WHO defines healthy ageing as the process of developing and

maintaining the functional ability that enables well-being in older age. Functional ability includes the capacity to meet the basic needs, be mobile, build and maintain relations and contribute to the society.[2] Common health conditions that may lead to functional disability include cardiopulmonary diseases, neurological conditions, diabetes mellitus, cancer, obesity, dementia, ophthalmologic and auditory disorders and fractures. The coexistence of two or more health conditions often creates more disability than would be expected. As the number of impairments increase from one to four, the percentage of persons reporting functional dependence increases exponentially (7% to 14% to 28% to 60%).[3]

Alcohol has been produced and consumed for a very long time making it the best means of altering consciousness.[4] Some of the oldest indications of the production and consumption of alcoholic beverages date back to the seventh millennium BC. The immediate effects of alcohol include increased relaxation and sociability, impaired muscle coordination, slurred speech, impaired judgement, vision, balance and lethality.

The size of a serving of alcohol varies depending on the country. For example, a standard glass of wine, beer, and distilled spirits in the Netherlands contains approximately 10 grams of alcohol, whereas a standard glass in the United Kingdom contains 8 grams and in the United States it contains 14 grams.[4]

Alcohol has shown to have detrimental effect on the brain ranging from simple 'slips' in memory to permanent & debilitating conditions namely Wernicke-Korsakoff Syndrome, Hepatic encephalopathy, Psychiatric illnesses etc. Multiple factors influence the extent of effect of alcohol on brain. It includes quantity, frequency, no of years, age, gender, genetic background, prenatal exposure, family history, general health status, level of education.[5]

According to the World Health Organization (WHO) Global Status on Alcohol and Health, 2.3 billion people are drinkers with consumption of 6.4L per capita. A recent study by the medical journal Lancet reported that there has been an increase in alcohol consumption in India over the last three decades. The analysis showed consumption was highest among men in the age group of 40-64 years, in which alcohol consumption has increased by 5.63% since 1990, followed by the 15-39 age group with a jump of 5.24%. For the elderly it has increased by 2.88 percent. India's latest National Family Health Survey revealed that alcohol consumption among both men and women was higher in rural parts of the country than in urban areas. Overall, around 1% of Indian women aged ≥15 drink alcohol, compared to 19% of men in the same age group.[6]

A study was conducted in southern Karnataka between Jan-June 2015 to find the prevalence of tobacco & alcohol consumption in 825 fishermen. The results showed that 86.9% of subjects were consuming either alcohol or tobacco.[7]

Alcohol Use Disorder (AUD) has been called as 'The Invisible Pandemic'. It is a medical condition characterized by an impaired ability to stop or control alcohol use despite adverse social, occupational or health consequences. It encompasses the conditions that can be referred to as alcohol abuse, alcohol dependence, alcohol addiction or the colloquial term alcoholism.[8] Heavy alcohol consumption is defined as consumption of >40 g of pure alcohol per day over a sustained period of time.[9]

Chronic alcohol use may induce cerebellar and cerebral alterations, resulting in alterations in motor planning, motor coordination, balance, speech, behaviour, and cognitive function. Damage to motor function is one of the most common symptoms seen in people with AUD. A study with fMRI of elderly individuals with AUD showed their motor execution network was impaired, mainly with alterations in the functional connectivity of the cerebellum-thalamus-striatum-cortical circuit.[10]

Chronic alcohol consumption is associated with various degrees of gait and trunk ataxia

along with balance and motor coordination dysfunctions. This predisposes the individual to falling, increases the risk of bone fractures, as a consequence may cause fear of falling. It also affects manual dexterity and hinders the ability to perform daily activities, affecting functional independence.[11] Daily consumption of 150g of alcohol for 10 years was associated with significant cerebellar atrophy on Computerized Tomography (CT) in 30% of patients.[12]

Gait and posture instability is a characteristic symptom which includes massive sway, irregular stepping, associated with compensatory short stride, widened stance, slow speed. Lower limb ataxia is common and obvious during heel-shin testing. More advanced cases have upper limb ataxia and dysarthria. Gait difficulties either worsen progressively over weeks or months or rapidly turn into a debilitating stage in case of malnutrition.[13] Balance and motor coordination dysfunctions have strong functional impact on life of an alcoholic person, since they can contribute to difficulties in professional activities, unemployment, and loss of social independence. Furthermore, they can lead to dependence on others for basic activities of daily living and instrumental activities, since they limit movement, change one's lifestyle and directly influence quality of life.[11]

According to the report in Harvard Review of Psychiatry, quality of life has been significantly impaired in those with alcohol abuse and dependence, particularly in the domains of mental health and social functioning.[14] Determinants of QOL in patients with alcohol dependence who undergo treatment have also been studied. Factors that predict QOL include severity of alcohol dependence, intensity of alcohol use, employment status, age, gender and psychiatric history, including the presence of personality disorders and post-traumatic stress disorder.[15] A longitudinal study by JA Fischer reported that there was a strong association between quality of life and quantity of alcohol consumed. Poor quality of life in early stages was a strong predictor of AUD in later stages of life.[16]

The available evidence is inconclusive between quantity of alcohol consumed and level of motor impairment and quality of life. Therefore, the aim of the present study was to estimate the influence of Alcohol Use Disorder (AUD) on coordination, physical function and quality of life in chronic alcoholic individuals.

METHODOLOGY

A comparative study was conducted among older adults aged >45 years in psychiatric and deaddiction departments of selected hospitals in Southern Karnataka. A total of 24 participants were analysed who were categorised into two groups- 12 AUD individuals and 12 controls. All the participants underwent testing for motor function using Comprehensive Coordination Scale (CCS) and Six-Minute Walk Test (6-MWT). Quality of Life was analyzed using SF-36 questionnaire.

The study was conducted in the course of one year from June 2023 to May 2024. Study protocol was approved by the Institutional Ethics Committee. The inclusion criteria included; both males and females, age 45 and above, individuals consuming alcohol. Individuals having diagnosis of cerebrovascular diseases (stroke, Parkinson's disease), psychiatric illness (e.g. Schizophrenia), cranial surgeries or trauma, hearing loss, visual deficits and physical disabilities were excluded from the study.

STATISTICAL ANALYSIS

Demographic characteristics of the participants were tabulated using descriptive statistics. Statistical analysis of the data was performed using SPSS 23.0. The categorical variables were presented as frequency and percentage. Continuous variables presented as mean and standard deviation. Comparison between the groups was done using unpaired t test. A p value <0.05 was considered statistically significant.

RESULTS

The analysis showed that CCS, 6MWT, physical functioning, role limitation due to physical health, energy/fatigue and social-functioning were significantly higher in control group when compared to AUD group.

In the control group, the CCS score was 65.17 ± 4.22, while in the AUD group it was 54.58 ± 10.24 (t = 3.311, p = 0.003). For the 6MWT, the control group had a mean of 374.00 ± 73.84, compared to 212.50 ± 120.86 in the AUD group (t = 3.950, p = 0.001).

Variables	Group	Mean	Std. Deviation	t value	p value
COORDINATION-CCS	Control	65.167	4.218	3.311	0.003
	AUD	54.583	10.238		
PHYSICAL FUNCTION-6MWT	Control	374.000	73.841	3.950	0.001
	AUD	212.500	120.859		

Table 1: Comparison of scores between AUD and control group for coordination and physical function

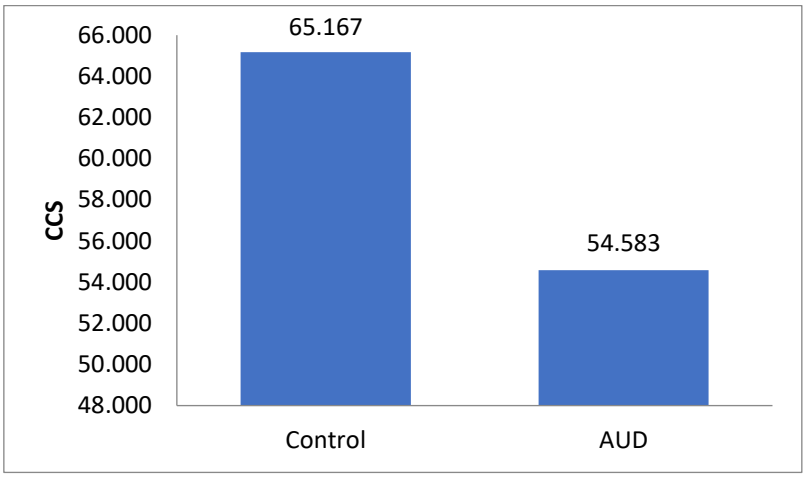

Figure 1: Comparison of CCS scores between the groups for coordination

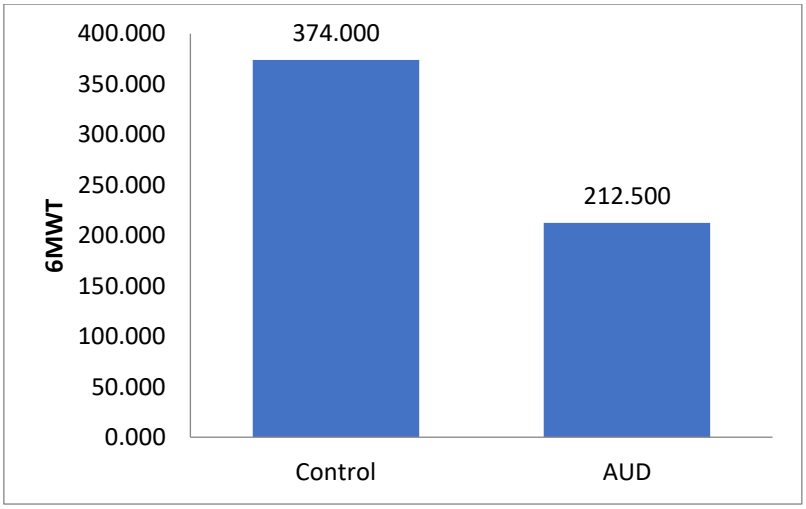

Figure 2: Comparison based on 6MWT (meters) between the groups for physical function

Physical functioning was 73.33 ± 19.46 in the control group and 44.17 ± 34.70 in the AUD group (t = 2.540, p = 0.019). Role limitation due to physical health was 61.25 ± 46.18 in the control group and 22.92 ± 41.91 in the AUD group (t = 2.129, p = 0.045). For Role limitation due to emotional problems, the control group had a mean of 60.83 ± 44.77, while the AUD group had 38.89 ± 48.90 (t = 1.146, p = 0.264). Energy/fatigue in the control group was 70.00 ± 17.71,

compared to 50.00 ± 21.85 in the AUD group (t = 2.464, p = 0.022).

In terms of emotional wellbeing, the control group scored 75.83 ± 21.11, while the AUD group scored 64.67 ± 21.70 (t = 1.278, p = 0.215). Social functioning was 78.13 ± 15.19 in the control group and 52.08 ± 38.00 in the AUD group (t = 2.204, p = 0.038). For pain, the control group had a mean of 85.42 ± 21.13, compared to 89.79 ± 26.81 in the AUD group (t = 0.444, p = 0.661). Lastly, for general health, the control group scored 71.25 ± 21.76, while the AUD group scored 55.00 ± 29.62 (t = 1.532, p = 0.140).

SF-36 DOMAINS	Group	Mean	Std. Deviation	t value	p value
Physical functioning	Control	73.333	19.462	2.540	0.019
	AUD	44.167	34.696		
Role limitation due to physical health	Control	61.250	46.178	2.129	0.045
	AUD	22.917	41.912		
Role limitation due to emotional problem	Control	60.833	44.772	1.146	0.264
	AUD	38.892	48.895		
Energy/fatigue	Control	70.000	17.710	2.464	0.022
	AUD	50.000	21.847		
Emotional wellbeing	Control	75.833	21.105	1.278	0.215
	AUD	64.667	21.698		
Social functioning	Control	78.125	15.193	2.204	0.038
	AUD	52.083	38.002		
Pain	Control	85.417	21.128	0.444	0.661
	AUD	89.792	26.809		
General health	Control	71.250	21.755	1.532	0.140
	AUD	55.000	29.619		

Table 2: Comparison of scores between AUD and control group for QOL

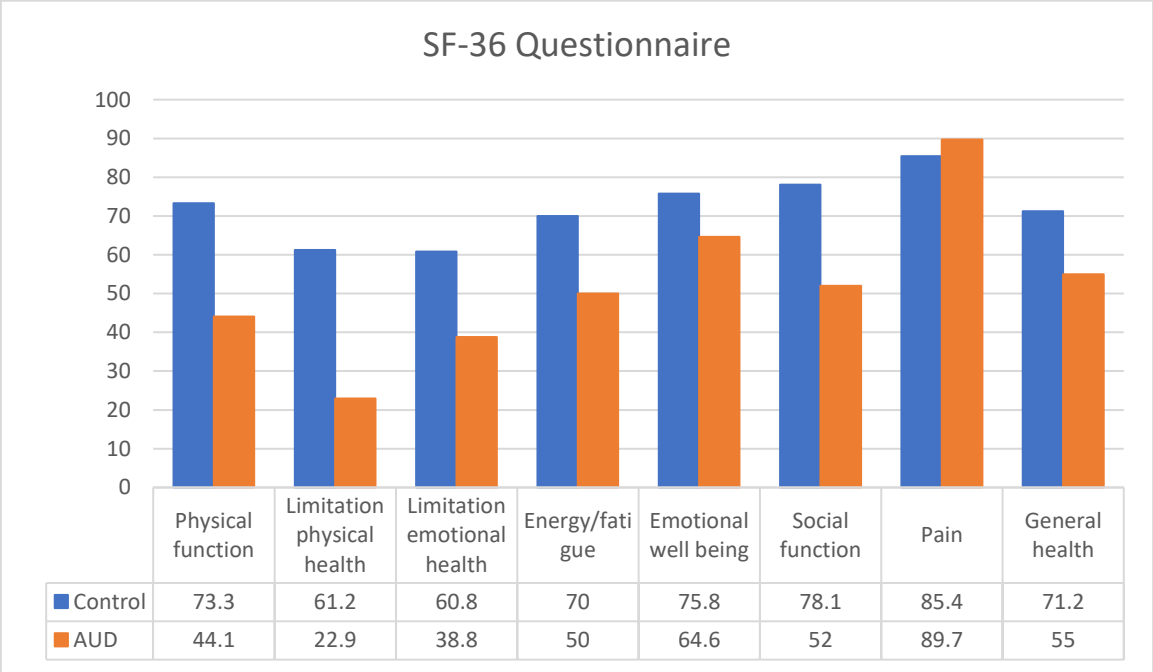

Figure 3: Comparison of SF-36 scores between the groups for QOL

DISCUSSION

In the present study, alcohol consumption was evaluated using AUDIT questionnaire. Individuals scoring 1-14 and 15-40 were categorized as control group and alcohol use disorder group (AUD) respectively. A systematic review by Joseph et al[17] reported that 1 in every 12 persons in India has AUD indicating a high prevalence of this condition. Out of them only 14.6%

individuals receive alcohol treatment leaving a majority of them untreated.[18]

The mean CCS scores were higher in the control group (65.1 ± 4.22) as compared to the AUD group (54.5 ± 10.24). This indicates that individuals consuming low-moderate levels of alcohol had better motor coordination as compared to the individuals who were heavy-drinkers. A lot of individuals in AUD group had poor end point accuracies and difficulty performing interlimb complex activities. More than 50% had tremors while performing the tasks. Trunk stability was good for most of the individuals. Few of them had difficulty in correct sequencing of thumb with fingers during opposition testing. Alcohol-attributable fraction (AAF) of all causes of death was found to be 5.4%. 33.1% of all road traffic accidents was attributed to drunk-driving.[19] A study by Sullivan et al reported that chronic excessive consumption of alcohol lead to worsening of visuospatial and motor abilities leading to functional deficits. The cause of this could be damage to the cerebellar-fronto-parietal connections.[20]

The present study evaluated physical function using 6MWT. The median 6MWT distance differed significantly between the control and AUD groups. In the control group, the median 6MWT distance was 374 ± 73.84 meters, whereas in the AUD group, it was notably lower at 212.5 ± 120.86 meters. The control group covered more distance than the AUD group. Therefore, this study indicated that individuals consuming heavy amounts of alcohol have reduced physical function. Vancampfort D et al reported poor physical fitness in AUD as compared to healthy individuals.[21]

In the present study, quality of life was assessed using SF-36 questionnaire. Statistically significant differences were noted in four out of eight components-physical functioning, role limitation due to physical health, energy/fatigue and social-functioning.

In the control group, mean score of physical functioning was 73.33 ± 19.46, whereas in AUD it was 44.17 ± 34.70 indicating that AUD group had poor physical functioning. Role limitation due to physical health was 61.25 ± 46.18 in the control group and 22.92 ± 41.91 in the AUD group. These findings suggested that limitations were present to perform activities of daily living as compared to individuals in control group.

Energy/fatigue in the control group was 70 ± 17.71, compared to 50 ± 21.85 in the AUD group which suggests that energy was perceived to be less and easy fatiguability was experienced by the AUD individuals. Social functioning was 78.13 ± 15.19 in the control group and 52.08 ± 38.00 in the AUD group which indicates that it was poorer in AUD group. This could be because they would avoid meeting relatives or friends outside their circle since they would inquire about their drinking problems and suggest to cut down.

The other domains i.e. role limitation due to emotional health, emotional well-being, pain and general health, did not show statistically significant difference between the two groups. This finding is corroborated by the findings of Harvard Review of Psychiatry which reported that QoL has been significantly impaired in alcohol abuse and dependence, particularly in the domains of mental health and social functioning.[22]

The present study had few limitations. It was a pilot study limited to a sample size of 24 individuals. The outcome measure SF-36 used for assessing QoL is a questionnaire based on individuals' perception of their health. It cannot be used as an accurate indicator of health as the responses can alter based on mood. Some of the individuals were irritable and were tired because of too many questions. This could have influenced the overall outcome. The Alcohol-quality of life scale (AQoLS) may be used by future researchers as it is more sensitive to alcoholic individuals.

CONCLUSION

The study concluded that there was a detrimental effect of chronic alcohol consumption on motor functions and quality of life among older adults. Coordination and

physical function were better in individuals consuming low-moderate levels as compared to heavy consumption. Quality of life was poorer in the domains of physical functioning, role limitation due to physical health, energy/fatigue and social functioning in AUD individuals.

Declaration by Authors

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