DOI: 10.7860/JCDR/2025/80942.21863

Original Article

Psychiatry/Mental Health Section

Patterns of Executive Function Impairment in Abstinent Individuals with Alcohol Dependence Syndrome: A Cross-sectional Study

TELLCOTT SOLOMON MARIA ANNITA[1], SIVABACKIYA CHITHIRAVELU[2], OT SABARI SRIDHAR[3], KAILASH SURESHKUMAR[4]

ABSTRACT

Introduction: Alcohol has historically been a part of human culture, but chronic alcohol use is linked to a range of neurocognitive and psychological impairments. In recent years, attention has turned to the cognitive effects of sustained abstinence in individuals previously diagnosed with Alcohol Dependence Syndrome (ADS). Executive dysfunction, in particular, remains underexplored in abstinent individuals, especially in Indian clinical settings.

Aim: To assess the pattern of executive function impairments in abstinent individuals diagnosed with ADS and to evaluate associated factors.

Materials and Methods: A prospective cross-sectional study was conducted at a tertiary care hospital over six months among 49 male patients aged 18-59 years, diagnosed with ADS {International Classification of Diseases (ICD)-10 F10.2} and abstinent for at least one month. Patients with psychiatric, neurological, or chronic medical illnesses were excluded. Cognitive assessments included the Digit Symbol Substitution Test (DSST), Trail Making Test Parts A and B (TMT-A and TMT-B), the Benton Visual Retention Test (BVRT), and the Wisconsin Card Sorting Test (WCST). Data were analysed using Statistical Package for the Social Sciences (SPSS) v22.0, and a p-value<0.05 was considered significant.

Results: Cognitive impairment was present on TMT in 14 (28.57%), on the BVRT in 18 (36.73%), and on the WCST in 32 (65.31%) participants. A significant association was found between cognitive impairment and daily alcohol intake (mean±SD: 10.03±4.22 vs 7.06±2.59 units/day; p-value=0.011). Executive dysfunction was significantly associated with occupation but not with educational status, economic status, marital status, past treatment history, nicotine use, or family history of substance use.

Conclusion: Executive dysfunction is prevalent among abstinent patients with ADS and is significantly associated with higher daily alcohol intake and greater dependence severity, highlighting the need for early cognitive screening.

Keywords: Abstinence, Cognitive dysfunction, Neuropsychological test

INTRODUCTION

Alcohol consumption is deeply ingrained in human society, but its misuse has profound public health consequences. Globally, alcohol is responsible for approximately three million deaths each year, accounting for about 5.3% of all deaths and 5.0% of the total disease burden in 2016 [1]. In India, alcohol use disorder has an estimated prevalence of about 14%, with rising trends in consumption patterns among middle-aged adults [2]. Chronic heavy alcohol use causes widespread harm to nearly every organ system; importantly, it is neurotoxic to the brain, leading to cognitive deterioration. Alcohol-related brain damage ranges from acute effects (e.g., intoxication, withdrawal delirium) to long-term neurocognitive disorders [3]. Epidemiological studies [4,5] have yielded mixed findings on the effects of lower levels of drinking on cognition; some longitudinal studies [6] suggest a J-shaped relationship, wherein light-to-moderate alcohol intake might be associated with a slightly lower risk of cognitive decline [7], while others find no cognitive benefits of moderate drinking [8]. However, there is clear consensus that heavy, prolonged alcohol use significantly increases the risk of mild cognitive impairment and dementia in later life [9]. Between 50-80% of alcohol-dependent patients exhibit measurable cognitive deficits if tested, even after weeks or months of abstinence [10]. These impairments predominantly affect higher-order executive functions (such as problem-solving, cognitive flexibility, impulse control and decision-making) as well as episodic memory and visuospatial processing [11].

In India, there is a relative scarcity of data on the cognitive profiles of patients with alcohol dependence in remission. One recent Indian study confirmed significant cognitive deficits (particularly in executive function and working memory) in alcohol-dependent individuals compared to healthy controls [12]. However, large-scale or comprehensive assessments in Indian clinical samples are limited. Moreover, an important yet understudied aspect is the impact of cognitive impairment on Quality of Life (QoL) in individuals recovering from alcohol dependence. Cognitive deficits could conceivably worsen QoL by impairing occupational and social functioning, but this relationship remains unclear [13-15].

The present study was designed to examine the pattern of cognitive impairment in patients with ADS who were currently abstinent and to identify the factors associated with the extent of cognitive deficits.

MATERIALS AND METHODS

This was a cross-sectional study conducted in the Department of Psychiatry at a tertiary care teaching hospital in Kelambakkam, Tamil Nadu, India, over six months from July to December 2021. The study received approval from the Institutional Ethics Committee (IEC) (Approval No: 18/IHEC/3-16). All participants provided written informed consent after a full explanation of the study procedures.

Inclusion criteria: Males patients aged between 18 and 59 years, diagnosed with ADS as per ICD-10 criteria F10.2 [16], and abstinent from alcohol for at least one month after detoxification were included in the study. Patients were recruited from both inpatient and outpatient services.

Exclusion criteria: Patients currently on benzodiazepines, those with a history of other substance dependence (except nicotine), co-

morbid psychiatric disorders, central nervous system or neurological illness, intellectual disability, or chronic medical illness were excluded from the study.

Sample size estimation: Sample size estimation was based on an expected prevalence of cognitive impairment of 14.2%, drawn from the study by Almeida OP et al., [17]. Assuming a 95% confidence level, an absolute precision of 5% and a population size of 500, the required sample size was calculated to be 44 using the finite population correction formula:

$n=[Z^2 P (1-P)]/[d^2 + (Z^2 P (1-P))/N]$,

where Z=1.96, P=0.142, d=0.05, and N=500. Accounting for a 10% non response rate, the final sample size was adjusted to 49 participants.

Study Procedure

All participants underwent structured clinical evaluation and physical examination to confirm the ADS diagnosis and to exclude relapse symptoms. Abstinence status was verified through patient history and corroborated by caregivers when available. Alcohol-use patterns, including daily intake, duration of consumption and severity of dependence {assessed using the Severity of Alcohol Dependence Questionnaire (SADQ)}, along with socio-demographic variables such as age, education, occupation, marital status and economic status, were documented using a structured data-collection proforma. Cognitive assessment was performed one month after detoxification to minimise transient withdrawal effects.

The following validated neuropsychological tests were administered:

- **DSST [18,19]**, a subtest of the Wechsler Adult Intelligence Scale, was used to assess processing speed, attention, visuomotor coordination and set-shifting. Participants were instructed to substitute as many symbols as possible for the corresponding digits within 90 seconds, using a reference key. A practice trial consisting of 10 items was administered prior to the test and excluded from scoring. The total number of correct substitutions completed within the time limit was recorded as the raw score. In this study, a DSST raw score of <15 was considered indicative of cognitive dysfunction, consistent with previously reported thresholds for older adults [20].
- **TMT Parts A and B [21]:** Assesses attention, processing speed and cognitive flexibility. TMT-A measures sequencing and visual scanning, while TMT-B evaluates task-switching ability. The time taken to complete each part is recorded, with longer durations indicating impairment. Indian normative data are available.
- **BVRT [22]:** Evaluates visual perception, visual memory, visuoconstructive abilities, and visuomotor coordination. Participants are shown 10 geometric designs for 10 seconds each and asked to reproduce them. Errors are scored based on distortion, rotation, or omission. A score of ≥ 5 errors is considered impaired [23].
- **WCST [24,25]:** The participant is presented with four stimulus cards differing in colour, shape and number. They are then asked to match each of the 64 response cards to one of the stimulus cards based on a sorting principle (colour, shape, or number), which they must deduce through feedback ("correct" or "incorrect") provided after each trial. Once the participant makes 10 consecutive correct matches based on one principle, the sorting rule changes without warning, requiring the individual to shift strategy accordingly. This process continues until all cards are sorted. The test assesses the ability to display cognitive flexibility, with key measures including perseverative errors and categories completed. A higher number of perseverative errors suggests executive dysfunction, particularly reflecting difficulty in cognitive flexibility and set-shifting [26].

In addition, two other key aspects were evaluated: the severity of alcohol dependence and QoL. Severity of alcohol dependence was assessed using the Severity of Alcohol Dependence Questionnaire (SADQ) [27], a 20-item validated instrument evaluating physical withdrawal, affective withdrawal and frequency of alcohol consumption. Each item is rated on a 4-point Likert scale; higher scores indicate greater severity of dependence. This tool has been previously validated in Indian populations [27]. QoL was measured using the World Health Organization Quality of Life (WHOQOL-BREF) instrument [28]. It comprises 26 items covering four domains: physical health, psychological health, social relationships and environment. Each item is scored from 1 to 5; higher scores indicate better QoL. Cognitive impairment was considered present if a participant scored in the impaired range on any one of the major cognitive tests.

STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS version 22.0. Chi-square tests were used to study the association between sociodemographic or clinical variables and cognitive impairment. A p-value < 0.05 was considered statistically significant.

RESULTS

The study included 49 male participants diagnosed with ADS. Participants were distributed across four age groups: 6 (12.24%) aged 18-29 years, 18 (36.73%) aged 30-39 years, 11 (22.45%) aged 40-49 years, and 14 (28.57%) aged 50-59 years. The mean age of the study population was 41.11±10.38 years. A total of 38 (77.55%) participants were married.

Educational background: 14 (28.57%) participants had completed secondary education, while 11 (22.45%) had completed higher secondary education. In terms of occupation, the sample included 17 (34.69%) skilled workers, 9 (18.37%) semiskilled labourers, and 22 (44.90%) clerical/shop owner/farmer categories. Based on self-reported income, a significant proportion of participants (35, 71.43%) were from the middle socioeconomic class (assessed using the Modified Kuppuswamy Socioeconomic Scale) [29].

A majority of participants (33, 67.34%) reported current nicotine use, and 19 (38.77%) had a family history of substance use. The mean duration of alcohol consumption among participants was 15.08±7.67 years.

According to the TMT, which evaluates attention, processing speed, and task-switching abilities, 14 out of 49 participants (28.57%) had cognitive impairment. The BVRT, which primarily assesses visual memory and visuoconstructive abilities, identified cognitive deficits in 18 participants (36.73%). The WCST, a sensitive indicator of executive dysfunction, showed the highest proportion of cognitive impairment, with 32 participants (65.31%) exhibiting perseverative errors. The DSST indicated impairment in 10 participants (20.41%), reflecting deficits in attention and processing speed. Overall, 32 out of 49 participants (65.31%) were classified as having cognitive impairment [Table/Fig-1].

Test	Cognitive impairment	
	Present n (%)	Absent n (%)
Digit Symbol Substitution Test (DSST)	10 (20.41%)	39 (79.59%)
Trail Making Test (TMT)	14 (28.57%)	35 (71.43%)
Benton Visual Retention Test (BVRT)	18 (36.73%)	31 (63.27%)
WCST - Perseverative Errors	32 (65.31%)	17 (34.69%)

[Table/Fig-1]: Prevalence of cognitive impairment across neuropsychological tests in abstinent alcohol-dependent individuals (N=49).

A significant association was observed between occupation and executive dysfunction (χ^2=8.31, p-value=0.04). Participants with

skilled (46.88%) and clerical/shop owner/farmer occupations (31.25%) showed higher rates of impairment. Educational status (χ^2=4.23, p-value=0.38), economic status (χ^2=2.03, p-value=0.155), marital status (χ^2=2.46, p-value=0.48), past treatment history (χ^2=1.92, p-value=0.16), nicotine use (χ^2=2.66, p-value=0.103), and family history of substance use (χ^2=2.54, p-value=0.11) did not show significant associations [Table/Fig-2]. Mean age and years of education were not compared. No correction for multiple comparisons was applied (e.g., Bonferroni), and the classification of economic status was not explicitly defined, all of which should be considered in future analyses.

Variable	Executive dysfunction Yes	Executive dysfunction No	Chi-square	p-value
Age (years)				
18 to 29	3 (9.38%)	3 (17.65%)	3.772	0.287
30 to 39	13 (40.63%)	5 (29.41%)		
40 to 49	9 (28.13%)	2 (11.76%)		
50 to 59	7 (21.88%)	7 (41.18%)		
Education				
Illiterate	4 (12.5%)	1 (5.88%)	4.23	0.38
Primary	8 (25%)	7 (41.8%)		
Secondary	8 (25%)	6 (35.29%)		
High school certificate	8 (25%)	3 (17.65%)		
Graduate	4 (12.5%)	0		
Occupation				
Not employed	1 (3.13%)	0	8.31	0.04
Semiskilled	6 (18.75%)	3 (17.65%)		
Skilled	15 (46.88%)	2 (11.76%)		
Clerical, Shop owner, Farmer	10 (31.25%)	12 (70.59%)		
Economic status				
Low	7 (21.88%)	7 (41.18%)	2.03	0.155
Middle	25 (78.13%)	10 (58.82%)		
Marital status				
Married	26 (81.25%)	12 (70.59%)	2.46	0.48
Single	4 (12.5%)	2 (11.76%)		
Unmarried	0	1 (5.88%)		
Widower	2 (6.25%)	2 (11.76%)		
Past treatment history				
Yes	16 (50%)	12 (70.59%)	1.92	0.16
No	16 (50%)	5 (29.41%)		
Nicotine use				
Present	19 (59.38%)	14 (82.35%)	2.66	0.103
No	13 (40.62%)	3 (17.65%)		
Family history of substance Use				
Yes	15 (46.88%)	4 (23.53%)	2.54	0.11
No	17 (53.13%)	13 (76.47%)		

[Table/Fig-2]: Association of cognitive impairment with sociodemographic and clinical variables in abstinent alcohol-dependent individuals (N=49).
p-value <0.05 was considered significant

Statistically significant differences were noted in the amount of alcohol consumed per day (10.03±4.22 vs. 7.06±2.59, p-value=0.011) and SADQ scores (27.16±8.04 vs. 20.53±8.92, p-value=0.011) between participants with and without cognitive impairment. No significant differences were found in the duration of alcohol use or the duration of dependence [Table/Fig-3]. Variables such as the duration since abstinence were not analysed and should be considered in future studies. QoL scores measured by the WHOQOL-BREF were not significantly different, but they trended lower in cognitively impaired individuals.

Parameter	Cognitive impairment present	Cognitive impairment absent	Mean difference	p-value
Amount of alcohol consumed/day (units)	10.03±4.22	7.06±2.59	2.97	0.011
Duration of alcohol consumption (years)	14.75±7.64	15.71±7.92	-0.96	0.682
Duration of dependence (years)	4±3.72	3.56±2.05	0.44	0.653
Age of onset of dependence	27.1±6.0	28.3±5.6	-1.2	0.184
Severity of alcohol dependence (SADQ score)	27.16±8.04	20.53±8.92	6.63	0.011
WHOQoL - Physical health	57.43±9.24	56.14±8.94	1.29	0.703
WHOQoL - Psychological domain	63.90±7.87	65.23±8.63	-1.33	0.484
WHOQoL - Social relationship	53.61±5.81	54.75±7.13	-1.14	0.388
WHOQoL - Environment domain	66.49±6.06	68.35±5.97	-2.16	0.129
WHOQoL - Overall score	62.81±5.31	64.94±5.99	-2.13	0.0656
WHOQoL - Overall quality of health	3.46±0.89	3.62±0.91	-0.16	0.292
WHOQoL - Satisfaction	3.34±0.88	3.58±0.83	-0.24	0.113

[Table/Fig-3]: Comparison of alcohol use patterns, dependence severity, and Quality of Life (QoL) with cognitive impairment (N=49).
p-value <0.05 was considered significant

DISCUSSION

Cognitive and executive impairments are well-documented consequences of chronic alcohol use, often persisting even after detoxification and sustained abstinence. The present study reinforces this understanding by documenting notable cognitive dysfunction among abstinent alcohol-dependent individuals using validated tools such as the DSST, TMT, BVRT and WCST. Notably, cognitive impairment was observed in 14 participants (28.57%) on the TMT, 18 (36.73%) on the BVRT, and 32 (65.31%) on the WCST. The results demonstrated a statistically significant association between higher daily alcohol intake and cognitive impairment, with affected individuals consuming an average of 10.03±4.22 units/day, compared with 7.06±2.59 units/day among those without impairment (p-value=0.011). This aligns with findings from Chan KK et al., who reported dose-dependent cognitive impairment among chronic users [30].

Most participants were married (77.55%) and belonged to the middle socio-economic class. Education level and marital status were not significantly linked with cognitive impairment, consistent with prior reports. Occupationally, executive dysfunction was most prevalent among skilled workers (46.88%). Neuropsychological testing revealed significant impairments in executive function. The WCST showed the highest rate of perseverative errors (65.31%), underscoring deficits in mental flexibility and set-shifting. The DSST, reflecting processing speed and attention, identified impairments in 20.41% of subjects. These results mirror findings from Stavro K et al., who observed similar impairments in executive functioning across age groups [31]. Visuospatial deficits (BVRT: 36.73%) also corroborated an earlier study that reported persistent impairments among abstinent alcohol-dependent individuals [32].

QoL assessments using the WHOQOL-BREF have indicated lower scores among participants with cognitive deficits, although these differences were not always statistically significant. This may be attributed to multiple factors, including time since abstinence, compensatory mechanisms in daily functioning, longer follow-up durations and cultural attitudes toward ageing and cognition [33]. Prior literature demonstrates that nicotine use significantly impairs cognitive recovery in substance users [34]. Family history of substance use is associated with deficits in planning and emotional

recognition but not across all executive domains [35]. A greater number of prior deaddiction treatments correlates with poorer executive functioning [36]. Although prior studies have found associations between executive dysfunction and factors such as nicotine use, family history and multiple deaddiction treatments [34-36], the present study did not observe statistically significant relationships with these clinical variables.

This study emphasises the critical need to assess and address cognitive impairment among abstinent alcohol-dependent patients. The use of a battery of neuropsychological tools enabled a multidimensional understanding of patients' cognitive profiles.

Limitation(s)

This study had several limitations. First, only male participants were included, which limits the generalisability of the findings to the broader population. Second, factors such as the exact duration of abstinence and the severity of withdrawal symptoms were not assessed, though they may affect cognitive outcomes. Third, the study did not considered alcohol-related complications such as withdrawal seizures or memory disorders, which could also influence results.

CONCLUSION(S)

This study examined the pattern of cognitive impairment, particularly executive dysfunction, in patients with ADS who were currently abstinent. The findings highlight that higher alcohol intake and greater dependence severity were significantly associated with cognitive deficits, notably in executive functioning and visuospatial abilities. These impairments, detectable even after one month of abstinence, emphasise the need for routine neuropsychological screening during de-addiction treatment. Cognitive dysfunction is a common but often overlooked complication of alcohol dependence. Incorporating cognitive assessments and rehabilitation strategies into addiction treatment protocols may enhance recovery outcomes, reduce relapse rates and improve overall QoL. Future longitudinal studies incorporating larger and more diverse populations, relapse history, duration of abstinence and intervention-based follow-up will be necessary to deepen the understanding of cognitive recovery in alcohol dependence.

REFERENCES

[1] Park SH, Kim DJ. Global and regional impacts of alcohol use on public health: Emphasis on alcohol policies. Clin Mol Hepatol. 2020;26(4):652-61. Doi: 10.3350/cmh.2020.0160.

[2] Joseph J, Varghese A, Vijay VR, Grover S, Sharma S, Dhandapani M, et al. The prevalence of alcohol use disorders using Alcohol Use Disorders Identification Test (AUDIT) in the Indian setting: A systematic review and meta-analysis. J Ethn Subst Abuse. 2024;23(1):02-20. Doi: 10.1080/15332640.2022.2056105.

[3] Sahu P, Verma HK, Bhaskar L. Alcohol and alcoholism associated neurological disorders: Current updates in a global perspective and recent recommendations. World J Exp Med. 2025;15(1):100402. Doi: 10.5493/wjem.v15.i1.100402.

[4] Yen FS, Wang SI, Lin SY, Chao YH, Wei JC. The impact of heavy alcohol consumption on cognitive impairment in young old and middle old persons. J Transl Med. 2022;20(1):155. Doi: 10.1186/s12967-022-03353-3.

[5] Reas ET, Laughlin GA, Kritz-Silverstein D, Barrett-Connor E, McEvoy LK. Moderate, regular alcohol consumption is associated with higher cognitive function in older community-dwelling adults. J Prev Alzheimers Dis. 2016;3(2):105-13. Doi: 10.14283/jpad.2016.89.

[6] Kim JW, Lee DY, Lee BC, Jung MH, Kim H, Choi YS, et al. Alcohol and cognition in the elderly: A review. Psychiatry Investig. 2012;9(1):08-16.

[7] Zhang R, Shen L, Miles T, Shen Y, Cordero J, Qi Y, et al. Association of low to moderate alcohol drinking with cognitive functions from middle to older age among US adults. JAMA Netw Open. 2020;3(6):e207922. Doi: 10.1001/jamanetworkopen.2020.7922.

[8] Wine Information Council. J-curve - can also be found with moderate consumption of alcoholic beverages and neurological disorders [Internet]. Brussels: Wine Information Council; 2024. [cited 2025 Jul 1]. Available from: https://www.wineinformationcouncil.com/j-curve-can-also-be-found-with-moderate-consumption-of-alcoholic-beverages-and-neurological-disorders/.

[9] Rehm J, Hasan OSM, Black SE, Shield KD, Schwarzinger M. Alcohol use and dementia: A systematic scoping review. Alzheimers Res Ther. 2019;11(1):01. Doi: 10.1186/s13195-018-0453-0.

[10] Bernardin F, Maheut-Bosser A, Paille F. Cognitive impairments in alcohol-dependent subjects. Front Psychiatry. 2014;5:78. Doi: 10.3389/fpsyt.2014.00078.

[11] Caneva S, Ottonello M, Torselli E, Pistarini C, Spigno P, Fiabane E. Cognitive impairments in early-detoxified alcohol-dependent inpatients and their associations with socio-demographic, clinical and psychological factors: An exploratory study. Neuropsychiatr Dis Treat. 2020;16:1705-16. Doi: 10.2147/NDT.S254369.

[12] Vijay P, Khan A, Sowmya AV, Chaudhury S, Chaudhari B, Saldanha D. Cognitive deficits in alcohol dependence- A case-control analytical study. Med J Dr DY Patil Vidyapeeth. 2023;16(Suppl 1):S87-S95. Doi: 10.4103/mjdrdypu.mjdrdypu_921_21.

[13] Gómez-Melero S, Caballero-Villarraso J, Escribano BM, Galvão-Carmona A, Túnez I, Agüera-Morales E. Impact of cognitive impairment on quality of life in multiple sclerosis patients: A comprehensive review. J Clin Med. 2024;13(11):3321. Doi: 10.3390/jcm13113321.

[14] Radakovic R, Radakovic C, Abrahams S, Simmons Z, Carroll A. Quality of life, cognitive and behavioural impairment in people with motor neuron disease: A systematic review. Qual Life Res. 2024;33(6):1469-80. Doi: 10.1007/s11136-024-03611-5.

[15] Moryś JM, Pąchalska M, Bellwon J, Gruchała M. Cognitive impairment, symptoms of depression, and health-related quality of life in patients with severe stable heart failure. Int J Clin Health Psychol. 2016;16(3):230-38. Doi:10.1016/j.ijchp.2016.03.002.

[16] World Health Organization. International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10). Geneva: World Health Organization; 1992.

[17] Almeida OP, Hankey GJ, Yeap BB, Golledge J, Flicker L. Alcohol consumption and cognitive impairment in older men: A Mendelian randomization study. Neurology. 2014;82(12):1038-44. Doi: 10.1212/WNL.0000000000000255.

[18] Jaeger J. Digit symbol substitution Test: The case for sensitivity over specificity in neuropsychological testing. J Clin Psychopharmacol. 2018;38(5):513-19. Doi: 10.1097/JCP.0000000000000941.

[19] Porrselvi AP, Shankar V. Status of cognitive testing of adults in India. Ann Indian Acad Neurol. 2017;20(4):334-40. Doi: 10.4103/aian.AIAN_182_17.

[20] Bettcher BM, Libon DJ, Kaplan E, Swenson R, Penney DL. Digit symbol substitution test. In: Kreutzer JS, DeLuca J, Caplan B. (eds) Encyclopedia of clinical neuropsychology. Springer, New York, NY. 2011. Available from: https://doi.org/10.1007/978-0-387-79948-3_1289.

[21] Bhatia T, Shriharsh V, Adlakha S, Bisht V, Garg K, Deshpande SN. The trail making test in India. Indian J Psychiatry. 2007;49(2):113-16. Doi: 10.4103/0019-5545.33258.

[22] Sivan AB. Benton visual retention test: Manual (Fifth Edition). San Antonio (TX): The Psychological Corporation; 1992.

[23] Martin CK, Anton SD, Han H, York-Crowe E, Redman LM, Ravussin E, et al. Examination of cognitive function during six months of calorie restriction: Results of a randomized controlled trial. Rejuvenation Res. 2007;10(2):179-90. Doi: 10.1089/rej.2006.0502. PMID: 17518698; PMCID: PMC2664681.

[24] Miles S, Howlett CA, Berryman C, Nedeljkovic M, Moseley GL, Phillipou A. Considerations for using the wisconsin card sorting test to assess cognitive flexibility. Behavior Research Methods. 2021;53(6):2083-91. Available from: https://doi.org/10.3758/s13428-021-01551-3.

[25] Heaton RK, Chelune GJ, Talley JL, Kay GG. Curtiss G. Wisconsin card sorting test manual: Revised and expanded. Odessa, FL: Psychological Assessment Resources; 1993.

[26] Barceló F, Knight RT. Both random and perseverative errors underlie WCST deficits in prefrontal patients. Neuropsychologia. 2002;40(3):349-56. Available from: https://doi.org/10.1016/S0028-3932(01)00110-5.

[27] Johnson RJ, Dhilip AM, Mysore A. Do SADQ and AUDIT identify independent impacts of alcohol abuse – clinical and biochemical markers respectively? Indian J Psychiatry. 2015;57(3):278-83. Doi: 10.4103/0019-5545.166621.

[28] Aggarwal AN, Agarwal R, Gupta D. Abbreviated World Health Organization Quality of Life questionnaire (WHOQoL-BREF) in north Indian patients with bronchial asthma: An evaluation using Rasch analysis. NPJ Prim Care Respir Med. 2014;24:14001. Doi: 10.1038/npjpcrm.2014.1.

[29] Saleem SM, Jan SS. Modified Kuppuswamy socioeconomic scale updated for the year 2021. Indian J Forensic Community Med. 2021;8(1):01-03.

[30] Chan KK, Chiu KC, Chu LW. Association between alcohol consumption and cognitive impairment in Southern Chinese older adults. Int J Geriatr Psychiatry. 2010;25(12):1272-79. Doi: 10.1002/gps.2470.

[31] Stavro K, Pelletier J, Potvin S. Widespread and sustained cognitive deficits in alcoholism: A meta-analysis. Addict Biol. 2013;18(2):203-13. Doi: 10.1111/j.1369-1600.2011.00418.x.

[32] Fein G, Torres J, Price LJ, Di Sclafani V. Cognitive performance in long-term abstinent alcoholic individuals. Alcohol Clin Exp Res. 2006;30(1):153-63. Doi: 10.1111/j.1530-0277.2006.00021.x.

[33] Kumar PNS, Thomas B, George B. Cognitive dysfunction and quality of life in persons with alcohol dependence. Indian J Psychiatry. 2008;50(3):181-85. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2738356/.

[34] Durazzo TC, Mon A, Gazdzinski S, Meyerhoff DJ. Cigarette smoking exacerbates chronic alcohol-induced brain damage: A longitudinal study of neurocognition in alcohol-dependent individuals during abstinence. Alcohol Clin Exp Res. 2020;44(3):547-58. Available from: https://pubmed.ncbi.nlm.nih.gov/31923562/.

[35] Kranzler HR, Gelernter J, Anton RF, Arias AJ, Herman A, Zhao H, et al. Cognitive and neuropsychological endophenotypes in individuals with a family history of alcohol dependence. Alcohol Clin Exp Res. 2020;44(9):1891-901. Available from: https://pubmed.ncbi.nlm.nih.gov/32662376/.

[36] Ethirajan SK, Ganesh GNK, Sujitha S. Association between executive dysfunction and relapse of alcohol dependence after deaddiction treatment: A cross-sectional study. Indian J Psychol Med. 2022;44(6):609-14. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9378070/.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Psychiatry, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Chengalpattu District, Tamil Nadu, India.
2. Assistant Professor, Department of Psychiatry, SRM Medical College Hospital and Research Centre, SRM Institute of Science and Technology, KattankulathurChengalpattu District, Tamil Nadu, India.
3. Professor and Head, Department of Psychiatry, Sri Ramachandra Medical College and Research Institute, Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai, Tamil Nadu, India.
4. Professor and Head, Department of Psychiatry, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Chengalpattu District, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Tellcott Solomon Maria Annita,
Assistant Professor, Department of Psychiatry, Chettinad Hospital and Research Institute, Chengalpattu District, Kelambakkam-603103, Tamil Nadu, India.
E-mail: drannita@yahoo.co.in

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: May 29, 2025
- Manual Googling: Aug 08, 2025
- iThenticate Software: Aug 13, 2025 (8%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **May 27, 2025**
Date of Peer Review: **Jun 19, 2025**
Date of Acceptance: **Aug 13, 2025**
Date of Publishing: **Oct 01, 2025**