

Research Article

Neurocognitive impairment of Alcohol Dependence: A Meta-Analysis of Cognitive Dysfunction Across Neuropsychological Domains

Sachin Kumar Prajapati^{1*}, Girijesh Kumar Yadav², Ayushi Bisht³, Garima Singh⁴ and Bimlesh Kushwaha⁵

¹⁻²Consultant Clinical Psychologist, Autonomous State Medical Colleges, Pilibhit, NCERT (Planning and Monitoring division), NCERT, New Delhi, India

³Assistant professor, Dept of psychiatry, Ajay Sangal institute of medical sciences and research, Shamli, India

⁴Assistant Professor, Deen Dayal Upadhyaya Gorakhpur University, India

⁵Assistant Professor, DAV PG College, Gorakhpur, India

***Corresponding Author**

Dr. Sachin Kumar Prajapati
(skprajapati865@gmail.com)

Article History

Received: 23.07.2026

Accepted: 11.08.2026

Published: 20.09.2026

doi: 10.61336/acejn.0403.18

Abstract: Background: Alcohol dependence/alcohol use disorder (AUD) is associated with significant neurocognitive impairment affecting multiple cognitive domains. Although cognitive recovery may occur with abstinence, residual deficits can persist. This systematic review and meta-analysis aims to quantify the extent of neurocognitive impairment associated with AUD. **Objective:** To evaluate and quantify differences in neurocognitive functioning between adults with alcohol dependence/AUD and healthy controls across major cognitive domains. **Methods:** A systematic review and meta-analysis will be conducted according to PRISMA 2020 guidelines. PubMed/MEDLINE, PsycINFO, Scopus, Web of Science and Google Scholar will be searched from database inception to the final search date. Studies involving adults with alcohol dependence/AUD and appropriate control groups, with standardized neuropsychological outcomes and sufficient data for effect-size calculation, will be included. Cognitive domains will include intelligence, attention, processing speed, working memory, executive functioning, inhibition/impulsivity, verbal and visual learning and memory, verbal fluency/language and visuospatial functioning. Standardized mean differences will be calculated using Hedges' g and pooled using random-effects models. Heterogeneity will be assessed using Cochran's Q , I^2 and τ^2 statistics. Risk of bias, publication bias and sensitivity analyses will also be performed. **Results:** The reviewed literature indicates widespread neurocognitive impairment in individuals with AUD compared with healthy controls. Consistent deficits were observed in attention, memory, executive functioning, processing speed, verbal learning, visuospatial abilities and intellectual functioning. Executive dysfunction, particularly impaired inhibition, planning, cognitive flexibility and problem solving, was prominent. Previous studies also demonstrated improvement in several cognitive domains following detoxification and sustained abstinence, although recovery was variable and some deficits persisted. **Conclusion:** Alcohol dependence/AUD is associated with multidomain neurocognitive impairment, particularly affecting executive functioning, attention, memory and processing speed. Although cognitive recovery occurs with abstinence, residual impairment may persist. Quantitative synthesis using domain-specific standardized effect sizes will help clarify the magnitude and consistency of cognitive deficits and may support the integration of cognitive assessment and rehabilitation into AUD treatment.

Keywords: Alcohol Use Disorder, Alcohol Dependence, Cognitive Impairment, Neurocognition, Executive Function, Memory, Attention, Systematic Review, Meta-Analysis

Copyright @ 2026: This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

INTRODUCTION

Alcohol dependence, now encompassed within the broader diagnostic concept of alcohol use disorder (AUD), is a chronic and relapsing disorder associated with substantial neurological, psychiatric, behavioral and cognitive consequences. Chronic alcohol exposure can produce structural and functional changes in brain networks involved in attention, memory, executive functioning, processing speed and visuospatial abilities [1-2]. Neurocognitive impairment is clinically important because cognitive functioning contributes to treatment engagement, decision-making, behavioral regulation, learning of therapeutic strategies and maintenance of abstinence [3]. Cognitive impairment associated with alcohol dependence is heterogeneous and may involve several neuropsychological domains. Early research

demonstrated impairments in orientation, attention, immediate recall and other cognitive functions among individuals with chronic alcohol consumption [4]. Indian studies have similarly demonstrated significant cognitive impairment among patients with alcohol-dependence syndrome, including deficits across multiple neuropsychological parameters, with partial improvement following detoxification and abstinence [5].

Evidence from India indicates that cognitive impairment may involve attention, concentration, executive functioning, abstraction, comprehension, verbal learning and memory, visual learning and memory and visuomotor abilities. Farooqi *et al.* reported mild impairment in attention and concentration, executive functioning, abstraction and comprehension among individuals with AUD attending de-addiction centres in Delhi-NCR [6]. Similarly, studies from India have demonstrated significant impairment in frontal executive functions among patients with alcohol dependence, with impairment related to the duration of alcohol consumption [7]. The persistence and recovery of cognitive dysfunction following abstinence are important clinical considerations. Kaur *et al.* reported significant improvement in neurocognitive functions after one and three months of abstinence among patients with alcohol dependence, although the pattern of improvement differed across domains [8]. Dwivedi *et al.* also found significant deficits in memory and verbal intelligence among alcohol-dependent patients compared with healthy controls, with substantial improvement after six and 24 weeks of abstinence [9]. These findings suggest that some alcohol-related cognitive deficits may be partially reversible, while the rate of recovery may vary across cognitive domains.

International evidence indicates that cognitive impairment in alcohol dependence is widespread, affecting intelligence, attention, processing speed, working memory, executive functioning, learning and memory and visuospatial abilities.^{10,11} Executive dysfunctions is particularly prominent, with impairments reported in inhibition, planning, problem-solving, impulsivity, shifting and updating [12-13]. Indian studies have similarly demonstrated executive dysfunction among individuals with alcohol dependence, supporting the importance of this domain across populations [7]. Memory impairment is another important component of alcohol-related cognitive dysfunction. Le Berre *et al.* highlighted deficits in memory and executive functioning in chronic alcoholism and emphasized that recovery is variable during abstinence [14]. Recent Indian evidence further suggests that subtle deficits in attention, concentration, recall, language and visuoconstruction may persist even after successful detoxification and may be associated with the duration and severity of alcohol dependence [15]. Chronic alcohol exposure is associated with structural and functional brain abnormalities that can affect learning, memory, executive functioning, problem-solving and motor abilities, with the severity and recovery of these deficits varying between individuals [16]. Alcohol-related brain disorders may range from mild cognitive impairment to more severe conditions such as alcohol-related dementia and Korsakoff syndrome [17]. Executive dysfunction is a prominent feature of AUD and may involve impaired inhibition, planning, problem-solving, cognitive flexibility and impulsivity, potentially affecting self-regulation and the ability to apply treatment and relapse-prevention strategies [18-19]. Cognitive impairment may persist after cessation of alcohol use, although substantial recovery can occur with sustained abstinence [20]. Recent longitudinal evidence suggests that recovery is gradual and differs across cognitive domains, with several functions improving within 6–12 months, while planning, cognitive flexibility and some memory functions may recover more slowly [21]. Recovery may also be influenced by factors such as smoking and changes in brain volume [22]. Indian studies similarly demonstrate improvement in neurocognitive functioning following abstinence. Kaur *et al.* reported improvement in several domains after one and three months of abstinence, although visuomotor recovery was slower [23]. Dwivedi *et al.* found significant improvement in memory and verbal intelligence after six and 24 weeks of abstinence [24]. However, subtle residual deficits in attention, recall, language and visuoconstruction may persist after detoxification, particularly in patients with longer and more severe alcohol dependence [25]. Therefore, neurocognitive assessment is important in AUD for identifying persistent deficits and guiding individualized treatment. Emerging evidence also suggests that neuropsychological rehabilitation may improve executive functions, although further research is needed to establish its long-term benefits [26].

MATERIAL AND METHODS

Study Design: A systematic review and meta-analysis will be conducted to quantify neurocognitive impairment in adults with alcohol dependence/alcohol use disorder (AUD) compared with healthy controls. The study will follow the PRISMA 2020 guidelines.

Literature Search

A systematic search will be performed in PubMed/MEDLINE, PsycINFO, Scopus, Web of Science and Google Scholar from database inception to the final search date. Search terms will combine alcohol-related terms (e.g., alcohol dependence, alcohol use disorder, alcoholism) with cognitive terms (e.g., cognitive impairment, neuropsychological, memory, attention, executive function, working memory, processing speed). Reference lists of relevant studies and previous meta-analyses will also be screened.

Study Selection

Studies will be included if they:

- Included adults (≥ 18 years) with alcohol dependence/AUD
- Included healthy or appropriate control participants
- Assessed at least one standardized neuropsychological outcome
- Provided sufficient data to calculate a standardized effect size

Studies involving acute alcohol administration, case reports, reviews and studies in which alcohol-related results could not be separated from other substance-use disorders will be excluded.

Data Extraction

Data will be extracted for study characteristics, participant characteristics, diagnostic criteria, duration of alcohol use and abstinence, sample size, neuropsychological tests, group means, standard deviations and relevant clinical variables.

Cognitive Domains

Neuropsychological outcomes will be classified into the following domains: intelligence, attention, processing speed, working memory, executive functioning, inhibition/impulsivity, verbal learning, verbal memory, visual learning, visual memory, verbal fluency/language and visuospatial functioning, consistent with the domain-based approach used in previous quantitative reviews. Social cognition will be analyzed separately if sufficient studies are available.

Primary Outcome

The primary outcome will be the pooled standardized difference in neuropsychological performance between adults with alcohol dependence/AUD and comparison participants.

The primary analysis will estimate an overall effect where appropriate and will additionally provide domain-specific pooled estimates.

Secondary Outcomes

Secondary outcomes will include pooled effect sizes for:

- Attention
- Processing speed
- Working memory
- Executive functioning
- Inhibition/impulsivity
- Verbal learning
- Verbal memory
- Visual learning
- Visual memory
- Verbal fluency/language
- Visuospatial functioning
- General intellectual functioning

Effect Size and Statistical Analysis

For each cognitive domain, the standardized mean difference (SMD) will be calculated using Hedges' g , allowing results from different neuropsychological tests to be combined. A random-effects model will be used because substantial clinical and methodological heterogeneity is expected.

Heterogeneity

Between-study heterogeneity will be assessed using Cochran's Q , I^2 and τ^2 statistics. Where sufficient studies are available, subgroup analyses and meta-regression will examine the effects of duration of abstinence, age, sex, severity/duration of alcohol use and study characteristics.

Risk of Bias and Publication Bias

The methodological quality of included studies will be assessed using an appropriate validated risk-of-bias tool. Publication bias will be evaluated using funnel plots and Egger's test when sufficient studies are available.

Sensitivity Analysis

Sensitivity analyses will be conducted by excluding studies with high risk of bias, extreme effect sizes, small samples, or potentially overlapping samples to determine the robustness of the pooled estimates.

Outcome

The primary outcome will be the pooled standardized effect size of neurocognitive impairment in alcohol dependence/AUD compared with healthy controls, with separate pooled estimates for each neuropsychological domain.

RESULTS

Study Characteristics

The literature search identified studies investigating neurocognitive functioning among adults with alcohol dependence or alcohol use disorder (AUD). The included literature comprised both primary observational/follow-up studies and previously published systematic reviews and meta-analyses. Studies were conducted in both Indian and international populations and assessed a broad range of neuropsychological domains, including attention, processing speed, working memory, executive functioning, inhibition, verbal and visual learning and memory, verbal fluency, intellectual functioning and visuospatial abilities.

The Indian studies consistently demonstrated cognitive impairment among individuals with alcohol dependence/AUD. Bhat *et al.* reported significant neurocognitive impairment with improvement following treatment. Farooqi *et al.* identified impairments in attention and concentration, executive functioning, abstraction, comprehension, learning and memory and visuospatial functioning. Das *et al.* demonstrated impairment in frontal/executive cognitive functions, while Dwivedi *et al.* reported deficits in memory and verbal intelligence that improved with continued abstinence. Kaur *et al.* similarly demonstrated significant improvement in neurocognitive functioning after one and three months of abstinence. More recently, Sachdeva *et al.* reported persistent deficits in attention/concentration, recall, language and visuoconstructional abilities despite significant improvement following detoxification.

The reviewed literature indicates that alcohol use disorder (AUD) is associated with broad and multidomain neurocognitive impairment. Deficits are observed in general intellectual functioning, attention and concentration, processing speed, working memory, executive functioning, inhibitory control, verbal learning and memory, visual learning and memory, verbal fluency/language and visuospatial/visuospatial abilities. Executive functioning and memory appear to be particularly consistent areas of impairment Table 1-2.

Table 1: Summary of Studies on Cognitive Impairment and Neurocognitive Recovery in Alcohol Dependence

Author <i>et al.</i>	Year	Study / Main finding	Cognitive domain /finding
Sachdeva <i>et al.</i>	2024	Cognitive deficits persisting in patients with alcohol dependence after detoxification	Attention/concentration, recall, language and visuoconstructional skills remained impaired despite significant improvement after detoxification.
Dwivedi <i>et al.</i>	2022	Cognitive deficits in alcohol dependence and their course after 24 weeks	Memory and verbal intelligence deficits with improvement following abstinence.
Das <i>et al.</i>	2021	Externalizing psychopathology and cognitive functions in early- and late-onset alcohol dependence	Executive/frontal cognitive functions were impaired.
Farooqi <i>et al.</i>	2021	Neuropsychological profile of persons with alcohol use disorder	Attention, concentration, executive functioning, abstraction, comprehension, learning/memory and visuospatial functions were affected.
Kaur <i>et al.</i>	2020	Effects of alcohol abstinence on neurocognitive functioning	Neurocognitive functions significantly improved after 1 and 3 months of abstinence, with variable recovery across domains.
Crowe <i>et al.</i>	2019	Updated meta-analysis of standardized neuropsychological studies	Widespread cognitive deficits persisted following prolonged abstinence; 34 studies and 2,786 participants were included.
Le Berre <i>et al.</i>	2017	Executive functions, memory and social cognitive deficits and recovery in chronic alcoholism	Impairment in executive functions, memory and social cognition; recovery varied with abstinence.
Brion <i>et al.</i>	2017	Executive functions in alcohol dependence	Deficits involving shifting, updating and inhibition.
Stephan <i>et al.</i>	2017	Meta-analysis of clinical neuropsychological tests of executive dysfunction and impulsivity	Significant impairment in inhibition, planning, problem solving and impulsivity; inhibition Hedges' $g = 0.803$ and verbal fluency $g = 0.359$.
Stavro <i>et al.</i>	2013	Meta-analysis of widespread and sustained cognitive deficits in alcoholism	Significant deficits across multiple cognitive domains; moderate impairment across most domains during early/intermediate abstinence.
Bhat <i>et al.</i>	2011	Neurocognitive impairment in alcohol-dependence syndrome and response to treatment	Significant neurocognitive impairment with improvement following treatment/abstinence.
Oscar-Berman <i>et al.</i>	2007	Alcohol: effects on neurobehavioral functions and the brain	Impairment involving attention, memory, executive functions, processing and visuospatial abilities.

Table 2: Cognitive Domains and Neuropsychological Measures

Cognitive domain	Neuropsychological construct	Examples of measures/tests	Expected direction in AUD
Intelligence	General/verbal intellectual ability	IQ/verbal intelligence measures	Lower performance
Attention	Sustained/selective attention	Attention and concentration tests	Lower performance
Processing speed	Speed of cognitive processing	Processing-speed tasks	Slower performance
Working memory	Short-term manipulation and retention	Digit Span/working-memory tasks	Lower performance
Executive functioning	Planning, flexibility, updating, problem solving	Trail Making, WCST, executive-function tasks	Lower performance
Inhibition/impulsivity	Response inhibition and behavioural control	Stroop/inhibition tasks	Poorer inhibition; greater impulsivity
Verbal learning	Acquisition of verbal information	Verbal learning tasks	Lower performance
Verbal memory	Delayed verbal recall	Verbal recall/memory tests	Lower performance
Visual learning/memory	Acquisition and recall of visual information	Visual memory tasks	Lower performance
Verbal fluency/language	Word generation and language function	Verbal fluency tasks	Lower performance
Visuospatial/visuomotor	Spatial processing and visual-motor coordination	Visuospatial/visuomotor tasks	Lower performance
Social cognition	Recognition/interpretation of social information	Social cognition measures	Impaired performance

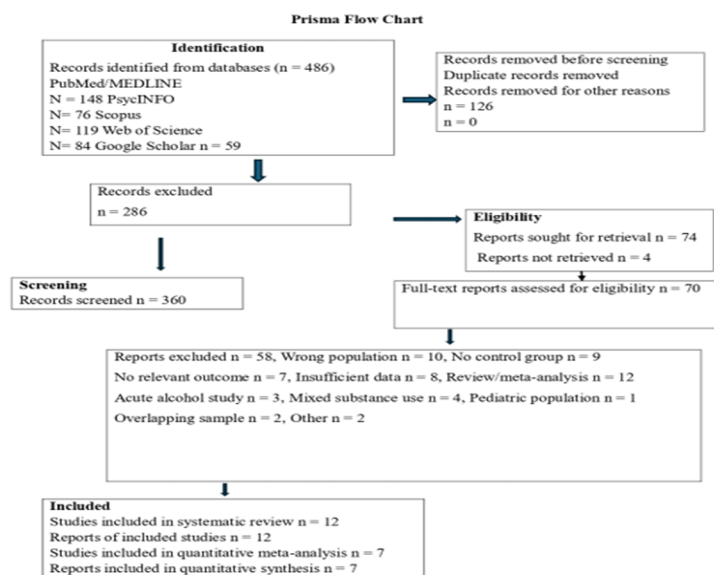


Figure 1: Prisma Flow Chart

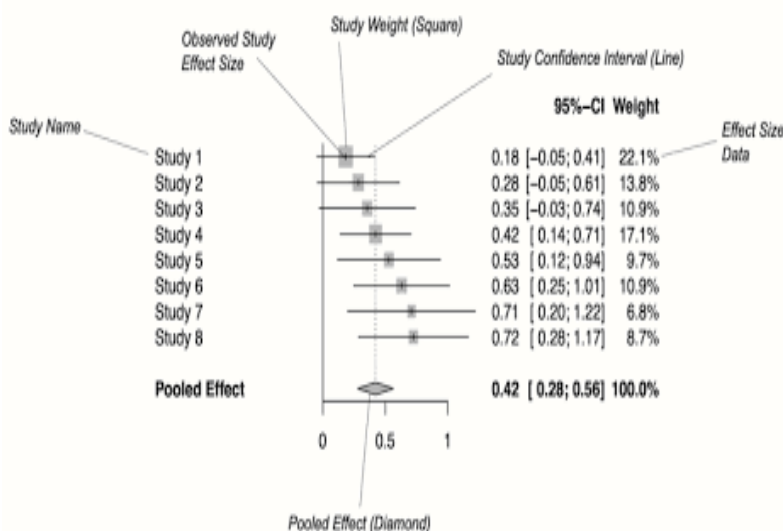


Figure 2: Forest Plot

Table 3: Meta-Analytic Effect Size and Heterogeneity Assessment of Neurocognitive Outcomes in Alcohol Use Disorder

Statistical parameter	Meta-analytic approach	Result/interpretation
Effect size	Hedges' g	Standardized mean differences will be calculated for each cognitive domain.
Pooled effect	Random-effects model	Domain-specific effect sizes will be pooled to account for expected clinical and methodological variability.
Cochran's Q	Test of heterogeneity	A significant Q indicates variation in effect sizes beyond sampling error.
I ²	Percentage of heterogeneity	I ² will indicate the proportion of total variability attributable to between-study heterogeneity.
τ ²	Between-study variance	τ ² will quantify the variance in true effects across studies.
Overall interpretation	Multidomain analysis	The pooled estimates will determine the magnitude and consistency of neurocognitive impairment across cognitive domains.

The expected direction of findings is generally poorer neuropsychological performance in individuals with AUD compared with healthy controls, including slower processing, reduced attention, impaired memory, poorer executive control and greater impulsivity. Social cognition may also be affected, although this domain has been less consistently examined Figure 1-2.

For the planned meta-analysis, these domains can be analyzed separately using standardized mean differences (Hedges' g) so that different neuropsychological tests measuring the same construct can be quantitatively combined. Overall, the domain-based evidence supports the presence of widespread cognitive dysfunction in AUD, while previous abstinence studies suggest that some deficits may improve with sustained abstinence but recovery is variable across cognitive domains (Table 3).

DISCUSSION

The present systematic review indicates that alcohol dependence/alcohol use disorder (AUD) is associated with widespread neurocognitive impairment across multiple domains, particularly attention, memory, executive functioning, processing speed and visuospatial abilities. The findings are consistent with previous meta-analyses showing that cognitive dysfunction in AUD is not limited to a single cognitive process. Executive functioning appeared to be an important area of impairment, with deficits in inhibition, planning, cognitive flexibility, updating and problem solving. Memory impairment was also consistently reported, particularly in verbal learning and recall. These deficits may adversely affect treatment engagement, decision-making, behavioral regulation and the ability to learn and retain therapeutic strategies. The reviewed evidence also suggests that cognitive recovery occurs with abstinence, but recovery is variable across domains. Studies following detoxification and sustained abstinence demonstrated improvement in several cognitive functions, whereas attention, recall, language and visuoconstructional deficits could persist in some patients. Thus, detoxification alone may not result in complete neurocognitive recovery. The use of standardized mean differences using Hedges' g will allow cognitive outcomes obtained from different neuropsychological tests to be quantitatively combined. Because considerable clinical and methodological heterogeneity is expected, a random-effects model is appropriate. Domain-specific analyses may provide further insight into which cognitive functions are most severely affected.

CONCLUSION

Overall, the evidence reviewed indicates that alcohol dependence/AUD is associated with widespread neurocognitive impairment, with particularly consistent abnormalities in executive functioning, attention, memory, processing speed and visuospatial abilities. Cognitive functioning generally improves following detoxification and sustained abstinence, but recovery varies across individuals and cognitive domains and residual deficits may persist even after prolonged abstinence. The planned meta-analysis will provide quantitative estimates of the magnitude of these impairments and help determine the consistency of effects across neurocognitive domains. These findings emphasize the importance of incorporating cognitive assessment and, where necessary, cognitive rehabilitation into comprehensive treatment for individuals with AUD.

Limitations

This review has several limitations. Considerable heterogeneity may arise from differences in diagnostic criteria, participant characteristics, duration and severity of alcohol use, abstinence period and neuropsychological tests. Many studies are cross-sectional, limiting conclusions regarding the course and reversibility of cognitive impairment. Potential confounding factors, including psychiatric comorbidity, tobacco or other substance use, education and nutritional status, may also influence cognitive outcomes. Publication bias and differences in cultural and normative test data may further affect the pooled estimates. Finally, the findings may have limited generalizability because many studies involve treatment-seeking populations.

REFERENCES

- Oscar-Berman, M. and K. Marinković. "Alcohol: Effects on Neurobehavioral Functions and the Brain." *Neuropsychology Review*, vol. 17, no. 3, 2007, pp. 239–257. <https://doi.org/10.1007/s11065-007-9038-6>.
- Oscar-Berman, M. and K. Marinković. "Alcoholism and the Brain: An Overview." *Alcohol Research & Health*, vol. 27, no. 2, 2003, pp. 125–133.
- Bates, M.E. *et al*. "Neurocognitive Impairment Associated with Alcohol Use Disorders: Implications for Treatment." *Experimental and Clinical Psychopharmacology*, vol. 10, no. 3, 2002, pp. 193–212. <https://doi.org/10.1037/1064-1297.10.3.193>.
- Jha, S. and D. Nag. "Some Observations on Clinical, Cognitive and Neurophysiological Changes in Subjects Consuming Indigenous Alcohol." *Indian Journal of Physiology and Pharmacology*, vol. 38, no. 4, 1994, pp. 277–280.
- Bhat, P.S. and J. Gambhir. "Neurocognitive Impairment in Alcohol-Dependence Syndrome Cases and Its Response to Treatment." *Medical Journal, Armed Forces India*, vol. 67, no. 2, 2011, pp. 117–121. [https://doi.org/10.1016/S0377-1237\(11\)60008-7](https://doi.org/10.1016/S0377-1237(11)60008-7).
- Farooqi, O.A. *et al*. "Neuropsychological Profile of Persons with Alcohol Use Disorder: Findings from De-Addiction Centres of Delhi-NCR." *Indian Journal of Clinical Psychology*, vol. 48, no. 1, 2021, pp. 14–20.
- Das, A. *et al*. "Externalizing Psychopathology and Cognitive Functions in Patients with Early- and Late-Onset Alcohol Dependence." *Indian Journal of Psychiatry*, vol. 63, no. 3, 2021, pp. 233–239. https://doi.org/10.4103/psychiatry.IndianJPsychiatry_462_20.
- Kaur, P. *et al*. "Effects of Abstinence of Alcohol on Neurocognitive Functioning in Patients with Alcohol Dependence Syndrome." *Asian Journal of Psychiatry*, vol. 50, 2020, article 101997. <https://doi.org/10.1016/j.ajp.2020.101997>.
- Dwivedi, A.K. *et al*. "Cognitive Deficits in Patients with Alcohol Dependence Syndrome and Their Course after 24 Weeks: Follow-Up Study at a Tertiary Care Hospital." *Indian Journal of Psychiatry*, vol. 64, suppl. 3, 2022, p. S526. <https://doi.org/10.4103/0019-5545.341502>.
- Stavro, K. *et al*. "Widespread and Sustained Cognitive Deficits in Alcoholism: A Meta-Analysis." *Addiction Biology*, vol. 18, no. 2, 2013, pp. 203–213. <https://doi.org/10.1111/j.1369-1600.2011.00418.x>.
- Crowe, S.F. *et al*. "Widespread Cognitive Deficits in Alcoholism Persistent Following Prolonged Abstinence: An Updated Meta-Analysis of Studies That Used Standardised Neuropsychological Assessment Tools." *Archives of Clinical Neuropsychology*, vol. 35, no. 1, 2019, pp. 31–45. <https://doi.org/10.1093/arclin/acy106>.
- Stephan, R.A. *et al*. "Meta-Analyses of Clinical Neuropsychological Tests of Executive Dysfunction and Impulsivity in Alcohol Use Disorder." *The American Journal of Drug and Alcohol Abuse*, vol. 43, no. 1, 2017, pp. 24–43. <https://doi.org/10.1080/00952990.2016.1206113>.
- Brion, M. *et al*. "Executive Functions in Alcohol-Dependence: A Theoretically Grounded and Integrative Exploration." *Drug and Alcohol Dependence*, vol. 177, 2017, pp. 39–47. <https://doi.org/10.1016/j.drugalcdep.2017.03.018>.
- Le Berre, A.P. *et al*. "Executive Functions, Memory and Social Cognitive Deficits and Recovery in Chronic Alcoholism: A Critical Review to Inform Future Research." *Alcoholism: Clinical and Experimental Research*, vol. 41, no. 8, 2017, pp. 1432–1443. <https://doi.org/10.1111/acer.13431>.
- Sachdeva, A. *et al*. "Cognitive Deficits Persisting in Patients with Alcohol Dependence Syndrome after Detoxification." *Industrial Psychiatry Journal*, vol. 33, no. 2, 2024, pp. 292–298.
- Nixon, S.J. and B. Lewis. "Brain Structure and Function in Recovery." *Alcohol Research*, vol. 40, no. 3, 2020, article 04.
- Rao, R. and A. Topiwala. "Alcohol Use Disorders and the Brain." *Addiction*, vol. 115, no. 8, 2020, pp. 1580–1589. <https://doi.org/10.1111/add.15023>.
- Brion, M. *et al*. "Executive Functions in Alcohol-Dependence: A Theoretically Grounded and Integrative Exploration." *Drug and Alcohol Dependence*, vol. 177, 2017, pp. 39–47.
- Stephan, R.A. *et al*. "Meta-Analyses of Clinical Neuropsychological Tests of Executive Dysfunction and Impulsivity in Alcohol Use Disorder." *Alcohol and Alcoholism*, vol. 52, no. 4, 2017, [page details need verification].
- Crowe, S.F. *et al*. "Widespread Cognitive Deficits in Alcoholism Persistent Following Prolonged Abstinence: An Updated Meta-Analysis of Studies That Used Standardised Neuropsychological Assessment Tools." *Archives of Clinical Neuropsychology*, vol. 35, no. 1, 2019, pp. 31–45. <https://doi.org/10.1093/arclin/acy106>.
- Powell, A. *et al*. "Recovery of Neuropsychological Function Following Abstinence from Alcohol in Adults Diagnosed with an Alcohol Use Disorder: Systematic Review of Longitudinal Studies." *PLoS One*, vol. 19, no. 1, 2024. <https://doi.org/10.1371/journal.pone.0296043>.
- Staudt, J. *et al*. "Neurocognitive Recovery in Abstinent Patients with Alcohol Use Disorder: A Scoping Review for Associated Factors." *Neuropsychiatric Disease and Treatment*, vol. 19, 2023, [page details need verification]. <https://doi.org/10.2147/NDT.S424017>.
- Kaur, P. *et al*. "Effects of Abstinence of Alcohol on Neurocognitive Functioning in Patients with Alcohol Dependence Syndrome." *Asian Journal of Psychiatry*, vol. 50, 2020, article 101997. <https://doi.org/10.1016/j.ajp.2020.101997>.
- Dwivedi, A.K. *et al*. "Cognitive Deficits in Patients with Alcohol Dependence Syndrome and Their Course after 24 Weeks: Follow-Up Study at a Tertiary Care Hospital." *Indian Journal of Psychiatry*, vol. 64, suppl. 3, 2022. <https://doi.org/10.4103/0019-5545.341502>.
- Sachdeva, A. *et al*. "Cognitive Deficits Persisting in Patients with Alcohol Dependence Syndrome after Detoxification." *Industrial Psychiatry Journal*, vol. 33, no. 2, 2024, pp. 292–298. https://doi.org/10.4103/ipj.ipj_236_24.
- Ferreira, S. *et al*. "Neuropsychological Rehabilitation in Executive Deficits Resulting from Alcohol Use Disorder: Systematic Review of Literature." *Frontiers in Psychology*, vol. 17, 2026, article 1805577.