

## Prevalence of undiagnosed and untreated attention deficit hyperactivity disorder in men with alcohol dependence: a case-control study

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### Summary

**Aim:** To compare the prevalence of adult attention deficit hyperactivity disorder (ADHD) among male alcohol users and healthy controls.

**Methods:** The current case-control study included 50 male patients with alcohol misuse and 50 age-matched healthy controls. Patients were assessed using the Clinical Institute Withdrawal Assessment of Alcohol Scale-Revised, Severity of Alcohol Dependence Questionnaire, Alcohol Use Disorders Identification Test, Mini-International Neuropsychiatric Interview scale, Adult ADHD Self-Report Scale version 1.1 screener, *Diagnostic and Statistical Manual of Mental Disorders* criteria for adult ADHD, and ADHD-Rating Scale-IV. The data obtained were analyzed using EPIINFO-7 and compared using paired t-test, student's t-test and Pearson's chi-square test ( $P \leq 0.05$ ).

**Results:** The prevalence of undiagnosed ADHD was significantly higher in individuals with alcohol misuse ('cases') when compared with healthy controls (31 vs. 4;  $P < 0.0001$ ). The most common ( $N=16$ ) subtype of ADHD in alcohol misuse cases was the hyperactive/impulsive type, whereas in controls it was the inattentive type ( $N=3$ ). Alcohol dependence was of moderate severity in alcohol misuse cases with adult ADHD ( $N=25$ ), whereas mild dependence was observed in cases without adult ADHD ( $N=9$ ). The SAD-Q ( $34.46 \pm 7.70$  vs.  $32.12 \pm 10.17$ ) and AUDIT-C ( $31.34 \pm 3.63$  vs.  $29.23 \pm 5.43$ ) scores were higher in cases with adult ADHD as compared with cases without ADHD.

**Discussion:** A significant association between alcohol misuse and the prevalence of ADHD was observed. The majority of patients were young adults, indicating that alcohol misuse with or without ADHD tends to commence early in life.

**Conclusion:** Patients diagnosed with alcohol misuse should be screened frequently and treated for ADHD.

**adult attention deficit hyperactivity disorder, alcohol use disorder, substance use disorders, prevalence**

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### INTRODUCTION

Attention deficit hyperactive disorder (ADHD) is a common childhood disorder that persists into adulthood in two-thirds of cases. The most

common and impairing comorbidity of an undiagnosed ADHD in adults is substance use disorder (SUD) [1]. There is a high prevalence of alcohol and other drug misuse in adults with undiagnosed ADHD [2]. Approximately 11–35% of adults with substance misuse have been found to have ADHD [1,3-5]. The prevalence of ADHD in adults with alcohol misuse is as high as 17–45% [6]. ADHD manifests with the core symptoms of hyperactivity, impulsivity, and inattention [7,8], however, the presentation of these symptoms in adults may be different and include chaotic lifestyles, poor time management, lack of motivation, stress, reduced concentration, and impulsive behavior [9].

Although there is a stronger association of ADHD in adults with alcohol misuse [10], studies in this regard are inadequate, especially in India. Therefore, the present study was designed to estimate the prevalence of undiagnosed and untreated ADHD in adults with alcohol dependence, compare the prevalence of adult ADHD in persons with alcohol dependence with that of healthy controls, and see whether comorbid ADHD contributes to a greater impairment in these individuals.

## METHODS

### Sampling and study design

This was a 1-year-long case-control study, conducted in a tertiary care hospital psychiatry unit. There were 100 participants in total: 50 male patients aged 18–60 years with alcohol dependence and 50 age-matched healthy controls. Controls were persons working in different capacity in the study setting, who fulfilled the inclusion criteria and consented to participate. Due to logistic and financial constraints, controls were not recruited from the community *per se*. Participants were recruited with purposive sampling. People in both groups with comorbid psychiatric illnesses, intellectual disability, other substance misuse (except nicotine and caffeine), and serious medical conditions were excluded from the study.

### Procedure

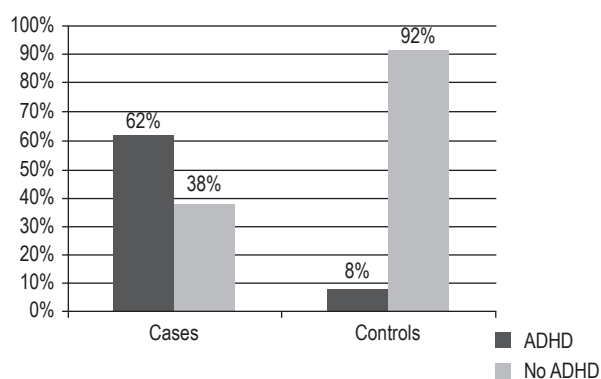
After obtaining ethical clearance, individuals were recruited into the study based on inclu-

sion and exclusion criteria and after giving informed consent. Those diagnosed with alcohol dependence according to DSM-5 were evaluated for alcohol withdrawal using the Clinical Institute Withdrawal Assessment of Alcohol Revised scale (CIWA-AR) [11]. Patients with a CIWA-AR score of less than 9 were taken into the study, in order to exclude those in withdrawal delirium. Alcohol Use Disorders Identification Test (AUDIT-C) [12] and the Severity of Alcohol Dependence Questionnaire (SAD-Q) [13] were used to rate the severity of dependence. The Mini-International Neuropsychiatric Interview (MINI-Plus) [14] scale was used to rule out comorbid psychiatric illnesses in both groups. Further, both groups were screened for ADHD using Adult ADHD Self-Report Scale version 1.1 (ASRS v 1.1) [15] and diagnosis was confirmed by *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) [16] criteria for adult ADHD. Finally, confirmed cases in both groups were subjected to ADHD-Rating Scale-IV (ADHD-RS-IV) [17] to assess the severity of symptoms. Data were recorded on a predesigned and pretested form and analyzed using the EPIINFO-7 software. Variables between cases and controls were compared using paired t-test, student's t-test, and Pearson's chi-square test ( $P \leq 0.05$ ).

## RESULTS

### Adult ADHD prevalence

The mean age of cases and controls was 32.06 (SD±7.22) and 32.06 (SD±10.15) years, respectively. Out of 50 patients in the case group, 31 (62%) were diagnosed with adult ADHD, in contrast to only 4 (8%) in the control group. The difference



**Figure 1:** Prevalence of adult ADHD in cases and controls

was statistically significant ( $P < 0.0001$ ), suggesting that there is a strong association between alcohol dependence and adult ADHD.

Based on the ASRS-v 1.1 screener, all patients with adult ADHD in the case group ( $N=31$ ) and in the control group ( $N=4$ ) were reported to have six of the major ADHD symptoms: difficulty wrapping up final details of a project once the challenging parts have been completed, difficul-

ty in arranging things in order in tasks requiring organization, problems in remembering obligations and appointments, avoiding tasks requiring a lot of thought, fidgeting or squirming when asked to wait, and feeling overactive and almost compelled to do things, as if driven by a motor. The majority of patients in the case group had ADHD of a hyperactive/impulsive subtype rather than other subtypes (Table 1).

**Table. 1** Prevalence of DSM-5 subtypes of ADHD

Type	Cases (N=31)	Controls (N=4)
Predominantly inattentive type	12 (38.70%)	3 (75 %)
Predominantly hyperactive/impulsive type	16 (51.61%)	1 (25%)
ADHD combined type	3 (9.69%)	0

The DSM-5 criteria were used to assess the type of ADHD – inattentive or hyperactive, as shown in Table 2 (a) and (b). Based on the ADHD-RS scoring system, the mean values of hyperactive/impulsive type of presentation in cas-

es and control were 16.532 ( $SD \pm 2.07$ ) and 13, respectively. The mean values of the inattentive type of presentation were 11.27 ( $SD \pm 3.37$ ) and 15 ( $SD \pm 2.92$ ) in cases and controls, respectively.

**Table. 2 (a)** DSM-5 symptoms in adult ADHD patients: inattentive

DSM-5 symptoms: inattentive	Cases (N=12)	Controls (N=3)
1d. Fails to finish work	12	3
1e. Difficulty sustaining attention	12	3
1f. Avoids/dislikes tasks requiring sustained mental effort	12	3
1i. Easily distracted	12	2
1h. Leaves seats in situation in which remaining seated is expected	12	2
1a. Fails to give attention to detail or makes careless mistakes	12	2
1b. Difficulty in organization	8	2
1g. Loses things	8	1
1c. Does not seem to listen when spoken to directly	5	1

**Table. 2 (b)** DSM-5 symptoms in adult ADHD patients: hyperactive/impulsive

DSM-5 symptoms: hyperactive/impulsive	Cases (N=16)	Controls (N=1)
2a. Fidgets/squirms	16	1
2d. Difficulty engaging in leisure activities	16	1
2e. "On the go" or "driven by a motor"	4	0
2b. Forgetful	16	1
2h. Difficulty waiting in turn	16	1
2g. Blurts out answers	16	1
2i. Interrupts or intrudes	16	0
2c. Inner restlessness	5	0
2f. Talks excessively	4	0

### Demographic and clinical variables in alcohol dependence cases with and without adult ADHD

As shown in Table 3, out of 50 cases with alcohol dependence, 31 were diagnosed with ADHD and 19 did not have ADHD. Variables such as

place of residence and education level were compared in this group; it emerged that education level was better in cases without ADHD. Alcohol consumption was similar in cases with or without ADHD, however, tobacco use was greater in the ADHD group.

**Table 3** Comparison between personal variables of alcohol users with and without ADHD

Variable	ADHD positive (N=31)	ADHD negative (N=19)	P-value
Age, years (mean $\pm$ SD)	30.2 $\pm$ 8.20	34 $\pm$ 10.24	0.1547
Residence, N (%)			
Rural	17 (54.84%)	9 (47.37%)	0.9995
Urban	14 (45.16%)	10 (52.63%)	
Education*, N (%)			
<10 <sup>th</sup>	13 (41.93%)	2 (10.52%)	0.3709
10 <sup>th</sup>	11 (35.48%)	3 (15.78%)	
12 <sup>th</sup>	6 (19.35%)	9 (47.36%)	
Graduate	1 (3.24%)	5 (26.34%)	
Alcohol consumption			
Units (mean $\pm$ SD)	5.81 $\pm$ 1.20	5.24 $\pm$ 1.7	0.1712
Tobacco misuse			
Present	19 (61.29%)	6 (31.57%)	0.080
Absent	12 (38.70%)	13 (68.42%)	

\*Years in education

SAD-Q scoring was applied to assess the severity of alcohol dependence in cases with and without adult ADHD. The majority of cases with ADHD (N=25) and 7 cases without ADHD had moderate alcohol dependence. The mean SAD-Q scores (34.46  $\pm$  7.70 vs. 32.12  $\pm$  10.17) and AUDIT-C scores (31.34  $\pm$  3.63 vs. 29.23  $\pm$  5.43) were higher in cases with adult ADHD than in cases without adult ADHD. More adult ADHD cases (N=19) had nicotine dependence than no-adult ADHD cases (N=6).

### DISCUSSION

The present study revealed a significant association between alcohol misuse and the prevalence of adult ADHD. The majority of patients were young adults, indicating that alcohol misuse with or without ADHD tends to commence early in life. In a similar study, the mean age of patients with ADHD varied between 37 and

43 years [18]. Similarly, a study conducted by Ganesh et al. [19] on 240 patients observed for early onset of SUD the majority of cases (N=209) had a mean age of 32.75 (SD  $\pm$ 11.14) years.

In the present study, a high prevalence of ADHD was observed in alcohol misuse cases compared with healthy controls. Childhood ADHD is a known risk factor in the pathogenesis and development of alcohol use and misuse in adults [19]. In the current study, the diagnosis of childhood ADHD was not established; however, adult ADHD can be presumed to be a continuation of a psychopathology of childhood ADHD [20]. Our findings suggest that, if ADHD symptoms go undetected in childhood, this not only leads to continuation of ADHD symptoms into adulthood, but it will also make way to complications such as substance misuse. The combined effect would be serious psychosocial issues affecting the personal, occupational, and family life of the individual.

Similar findings were reported by Ohlmeier et al., who observed that habit-forming illnesses can be associated with a high comorbidity with ADHD, expressed in the form of alcohol misuse [10]. In a study conducted by Huntley et al., in 226 alcohol-dependent individuals, 27 (12%) reported with untreated ADHD [21]. In a recent meta-analysis conducted by van de Glind et al., the prevalence rate of ADHD was reported to be approximately 23.3% in patients with SUD seeking treatment [22]. According to Matsumoto et al., the prevalence rate of ADHD in alcohol and substance misuse patients can vary from 2 to 85% [23].

The present study showed that the level of education was comparatively better in alcohol misuse cases without ADHD than in alcohol misuse cases with ADHD. As mentioned earlier, it may be attributed to undetected childhood ADHD symptoms, which might have affected the person's education very early in life. According to Beiderman et al., individuals with adult ADHD can experience academic, occupational and financial difficulties [24].

Assessment of ADHD subtype revealed that in alcohol misuse cases comorbid adult ADHD was of the hyperactive/impulsive subtype, whereas in controls ADHD was of the inattentive subtype. Clinical studies involving adult ADHD have reported that approximately half of the population had clinically important levels of hyperactivity and impulsivity. The impulsivity subtype of ADHD plays an important role in the drinking behavior of alcohol misusers [24]. According to Reinhardt et al., the presence of ADHD hyperactivity subtype and alcohol misuse could lead to accidents and dental trauma, and hence ADHD assessment of alcohol users is essential [25]. It is important to regularly screen patients with alcohol dependence for hyperactivity/impulsivity. Management of alcohol dependence will be incomplete if underlying impulsivity is not addressed properly, as impulsivity has a causal relationship with high-risk behaviors such as alcohol misuse.

Greater tobacco use in patients with alcohol dependence and adult ADHD leads us to conclude that there are pathophysiological connections between alcohol and nicotine dependence in patients with ADHD. The findings indicate that substance misuse, including alcohol and

nicotine, can be taken up as a form of 'self-medication' [26]. Alternatively, it is hypothesized that early exposure to nicotine and alcohol may result in neuronal sensitization and initiation, and further pre-disposes to habit-forming behaviors linked to ADHD. From a standpoint of prevention, reducing the manifestation of psychiatric symptoms such as those in ADHD may result in a decrease in both alcohol and nicotine consumption [22,27].

The findings of the present study confirmed that a high percentage of alcohol misuse cases fulfilled the DSM-5 diagnostic criteria for the presence of adult ADHD. The reasons for high prevalence of undiagnosed adult ADHD in alcohol misuse cases in the current study could be many. Firstly, in India, ADHD is not a well-known entity and hence reporting to healthcare facilities is limited. Secondly, healthcare personnel are not sufficiently trained to identify ADHD symptoms. Lastly, only a few studies are performed using the scoring systems used in the present study, and prevalence rates we have thus obtained are more specific, which may account for the discrepancies with results obtained in previous studies in this area [28].

## LIMITATIONS

The findings of the study should be interpreted with its limitations in mind. The study was done in a tertiary care hospital, where more severe cases of alcohol dependence are referred for treatment. Hence, our cases may not be representative of patients with alcohol dependence in the community. The second limitation is that controls were recruited from a pool of hospital employees. This again may not be a sample representing the community, due to different educational and financial backgrounds. Lastly, it being a cross-sectional pilot study, our findings need to be validated in large, long-term cohort studies.

## Conclusions

Patients diagnosed with alcohol misuse should be screened frequently for ADHD, and if diagnosed positive for ADHD, then treatment



should be provided for alcohol misuse as well as ADHD, for a better prognosis. Identification of these cases could reduce high relapse rates associated with alcohol, reduce the burden of the disorder and help in better management.

#### Conflicts of interest

*None declared.*

#### REFERENCES

1. Wilens TE. Attention deficit hyperactivity disorder and substance use disorders. *Am J Psychiatry*. 2006; 163(12): 2059-2063.
2. Said Z, Huzair H, Helal MN, et al. Attention deficit hyperactivity disorder (ADHD) in children and adolescents. *Prog Neurol Psychiatry*. 2015; 19(3): 16-23.
3. Kessler RC, Adler L, Barkley R, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. *Am J Psychiatry*. 2006; 163(4): 716-723.
4. Schubiner H, Tzelepis A, Milberger S, et al. Prevalence of attention-deficit/hyperactivity disorder and conduct disorder among substance abusers. *J Clin Psychiatry*. 2000; 61(4): 244-251.
5. Kalbag AS, Levin FR. Adult ADHD and substance abuse: diagnostic and treatment issues. *Subst Use Misuse*. 2005; 40(13-14): 1955-1981.
6. Wilens TE. Attention-deficit/hyperactivity disorder and the substance use disorders: the nature of the relationship, subtypes at risk, and treatment issues. *Psychiatr Clin North Am*. 2004; 27(2): 283-301.
7. Polanczyk G, Rohde LA. Epidemiology of attention-deficit/hyperactivity disorder across the lifespan. *Curr Opin Psychiatry*. 2007; 20(4): 386-392.
8. Kessler RC, Adler LA, Barkley R, et al. Patterns and predictors of attention-deficit/hyperactivity disorder persistence into adulthood: results from the national comorbidity survey replication. *Biol Psychiatry*. 2005; 57(11): 1442-1451.
9. Barkley RA, Fischer M, Smallish L, et al. The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. *J Abnorm Psychol*. 2002; 111(2): 279.
10. Ohlmeier MD, Peters K, Te Wildt BT, et al. Comorbidity of alcohol and substance dependence with attention-deficit/hyperactivity disorder (ADHD). *Alcohol Alcohol*. 2008; 43(3): 300-304.
11. Sullivan JT, Sykora K, Schneiderman J, et al. Assessment of alcohol withdrawal: the revised clinical institute withdrawal assessment for alcohol scale (CIWA-Ar). *Br J Addict*. 1989; 84(11): 1353-1357.
12. Saunders JB, Aasland OG, Babor TF, et al. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption. *Addiction*. 1993; 88(6): 791-804.
13. Stockwell T, Murphy D, Hodgson R. The severity of alcohol dependence questionnaire: its use, reliability and validity. *Addiction*. 1983; 78(2): 145-155.
14. Sheehan D, Lecrubier Y, Sheehan KH, et al. Diagnostic Psychiatric Interview for DSM-IV and ICD-10. *J Clin Psychiatry*. 1998; 59: 22-33.
15. Kessler RC, Adler L, Ames M, et al. The World Health Organization Adult ADHD Self-Report Scale (ASRS): a short screening scale for use in the general population. *Psychol Med*. 2005; 35(02): 245-256.
16. Association AP. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)*. Washington DC: American Psychiatric Pub; 2013.
17. Adler L, Spencer T, Biederman J, et al. The internal consistency and validity of the attention-deficit/hyperactivity disorder rating scale (ADHD-RS) with adult ADHD prompts as assessed during a clinical treatment trial. *J ADHD Relate Disord*. 2009; 1(1): 14-24.
18. van de Glind G, Konstenius M, Koeter MW, et al. Variability in the prevalence of adult ADHD in treatment seeking substance use disorder patients: results from an international multi-center study exploring DSM-IV and DSM-5 criteria. *Drug Alcohol Depend*. 2014; 134: 158-166.
19. Ganesh S, Kandasamy A, Sahayaraj US, et al. Adult attention deficit hyperactivity disorder in patients with substance use disorders: a study from Southern India. *Indian J Psychol Med*. 2017; 39(1): 59.
20. Singeri SKR, Rajkumar RP, Muralidharan K, et al. The association between attention-deficit/hyperactivity disorder and early-onset alcohol dependence: a retrospective study. *Indian J Psychiatry*. 2008; 50(4): 262.
21. Huntley Z, Maltezos S, Williams C, et al. Rates of undiagnosed attention deficit hyperactivity disorder in London drug and alcohol detoxification units. *BMC Psychiatry*. 2012; 12(1): 223.
22. van Emmerik-van Oortmerssen K, van de Glind G, van den Brink W, et al. Prevalence of attention-deficit hyperactivity disorder in substance use disorder patients: a meta-analysis and meta-regression analysis. *Drug Alcohol Depend*. 2012; 122(1): 11-19.
23. Matsumoto T, Kamijo A, Yamaguchi A, et al. Childhood histories of attention-deficit hyperactivity disorders in Japanese methamphetamine and inhalant abusers: preliminary report. *Psychiatry Clin Neurosci*. 2005; 59(1): 102-105.
24. Wilens TE, Faraone SV, Biederman J. Attention-deficit/hyperactivity disorder in adults. *JAMA*. 2004; 292(5): 619-623.
25. Reinhardt MC, Reinhardt CA. Attention deficit-hyperactivity disorder, comorbidities, and risk situations. *J Pediatr*. 2013; 89(2): 124-130.

26. Kandel DB, Logan JA. Patterns of drug use from adolescence to young adulthood: I. Periods of risk for initiation, continued use, and discontinuation. *Am J Public Health.* 1984; 74(7): 660-666.
27. Fung YK, Lau Y-S. Effects of prenatal nicotine exposure on rat striatal dopaminergic and nicotinic systems. *Pharmacol Biochem Behav.* 1989; 33(1): 1-6.
28. Wilens TE, Adler LA, Tanaka Y, et al. Correlates of alcohol use in adults with ADHD and comorbid alcohol use disorders: exploratory analysis of a placebo-controlled trial of atomoxetine. *Curr Med Res Opin.* 2011; 27(12): 2309-2320.