

# Association of Childhood Attention Deficit Hyperactivity Disorder Symptoms with Academic and Psychopathological Outcomes in Indian College Students: a Retrospective Survey

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## Abstract

**Objective:** To survey the prevalence of retrospectively recalled clinically significant symptoms of attention deficit hyperactivity disorder (ADHD) in childhood and determine the association of ADHD symptoms in childhood with current academic achievement and psychopathological outcomes among college students in the state of Kerala, India.

**Methods:** A self-administered questionnaire was distributed to 5784 students from 58 colleges selected by cluster random sampling. The Barkley Adult ADHD Rating Scale-IV was used for recollection of childhood ADHD symptoms; a total score of  $\geq 60$  (indicating the 99 percentile) was taken as the cut-off for clinically significant ADHD symptoms in childhood. The Alcohol, Smoking and Substance Involvement Screening Test was used to assess lifetime use of alcohol and tobacco. The Kessler Psychological Distress Scale was used to assess non-specific psychological distress. Lifetime suicidality and exposure to sexual abuse were assessed by asking relevant questions. Students who recalled having clinically significant ADHD symptoms in childhood were compared with those who did not.

**Results:** Of 5784 students, 639 (11.5%) did not complete the questionnaire. Of the remaining 5145 students, 1750 (34.8%) were men and 3395 (65.2%) were women, with a mean age of 19.4 years. 143 (2.8%) students reported clinically significant ADHD symptoms in childhood. Childhood ADHD symptoms were significantly more common in men and in those living in urban areas. In the bivariate analysis, those with clinically significant ADHD symptoms in childhood had significantly higher odds of poorer academic performance, alcohol use, tobacco use, psychological distress, suicidal thoughts, suicidal attempts, and contact and non-contact sexual abuse, after adjusting for sex and residence.

**Conclusions:** Clinical evaluation and appropriate management may be warranted for adults who retrospectively recall clinically significant ADHD symptoms in childhood.

**Key words:** Attention deficit disorder with hyperactivity; India

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## Introduction

Attention deficit hyperactivity disorder (ADHD) is a prevalent neurodevelopmental disorder characterised

by persistent pattern of inattention, hyperactivity, and impulsivity that interferes with functioning or development. ADHD symptoms usually manifest in childhood and tend to persist in adolescence and young adulthood in 40% to 70% of cases.<sup>1</sup> The prevalence of ADHD among children and adolescents is 4% to 7% in most population surveys,<sup>2</sup> with a worldwide prevalence of 5.29%.<sup>3</sup> The prevalence of ADHD among adults is 1% to 7.3% based on the DSM IV criteria,<sup>2,4</sup> with a pooled prevalence of 2.5%.<sup>5</sup> Approximately one in five adult psychiatric patients have a diagnosis of ADHD.<sup>6</sup> In India, the prevalence of ADHD has been reported to be 1.5% to 7.2% among children,<sup>7,8</sup> 5.48% among students in a single college,<sup>9</sup> and 11.32% among 283 men.<sup>10</sup>

Childhood ADHD is associated with high comorbidity.<sup>11</sup> It is associated with poor mental health and social outcome in young adults, including poor academic outcome,<sup>12,13</sup> increased risk of substance use,<sup>10,14</sup> psychological distress,<sup>9,15</sup> suicidality,<sup>15-17</sup> and sexual abuse.<sup>18</sup> ADHD is a major public health problem owing to its prevalence, morbidity, and negative outcomes. The present study aimed to retrospectively survey the

prevalence of clinically significant ADHD symptoms in childhood among college students in the state of Kerala, India and to determine the association of childhood ADHD with academic achievement, substance use, psychological distress, suicidality, and sexual abuse. We hypothesised that those who reported a history of childhood ADHD symptoms were more likely to have negative academic and psychological outcomes.

## Methods

This study was approved by the ethics committee of Government Medical College, Ernakulam (CMC/C1-2220/2011). Verbal informed consent was obtained from each participant. This survey was conducted in 58 of 123 colleges in the district of Ernakulam, Kerala, India. Stratified random sampling was used, with at least 40% of colleges in each of the categories of medical, dental, nursing, engineering, law, arts and sciences, homoeopathy, Ayurveda, and fisheries being selected. In each college, a single class of students in year 1 and 3 or year 2 and 4 were randomly selected. A sample size of 3520 was calculated to identify 1% prevalence (95% confidence interval, 0.75%-1.25%).

A self-administered questionnaire was designed in English and translated to Malayalam and back translated to English. Mental health professionals from the Department of Psychiatry, Government Medical College, Ernakulam distributed the questionnaire to all students in the class and explained the survey objectives and informed that the survey was anonymous and had no impact on their college work or assessment. Teachers or college administrators were not involved. Those who did not want to participate were free to leave the classroom or not to complete the questionnaire. The time to complete the questionnaire was 50 minutes, and the entire survey was conducted over a period of 3 months.

Sociodemographic data (age, sex, area of residence, economic indicators) were recorded using a checklist. Academic performance was assessed by asking whether the students failed any subject in the ongoing academic year.

The only instrument validated for assessing ADHD in the Indian population is the INCLIN Diagnostic Tool for Attention Deficit Hyperactivity Disorder,<sup>19</sup> but it is for assessment of current symptoms in children only. Instead, we used the Barkley Adult ADHD Rating Scale-IV, which was validated for retrospective recall of childhood symptoms of ADHD.<sup>20</sup> It has high reliability with internal consistency of 0.95, interobserver agreement of 0.70, and test-retest reliability of 0.79. Students were asked to rate their behaviour for features of ADHD between age 5 to 12 years. There were 9 questions for inattention and 9 questions for hyperactivity-impulsivity, with four Likert-scale responses from 'never' to 'always'. The total score (the sum of inattention score and hyperactivity-impulsivity score) was used because the survey was not for diagnosing ADHD in children but for retrospective recall of childhood

ADHD symptoms. Total scores range from 18 to 72; higher scores indicate more severe symptoms. A total score of  $\geq 60$  (indicating the 99 percentile) was taken as the cut-off for clinically significant ADHD symptoms in childhood.<sup>20</sup>

The Alcohol, Smoking and Substance Involvement Screening Test was used to assess lifetime use of alcohol and tobacco.<sup>21</sup> The tool has been validated to screen for substance use in developing countries including India.

The Kessler Psychological Distress Scale was used to assess non-specific psychological distress in the past month. It has been widely used in large epidemiological studies and has been validated to screen for common mental disorders in developing countries including India.<sup>22</sup> Although psychological distress is not diagnostic for mental illness, high Kessler scale scores are associated with a diagnosis of anxiety and affective disorders based on the Composite International Diagnostic Interview.<sup>23</sup>

Lifetime suicidality was assessed by asking two questions: (1) Have you ever thought of killing yourself? (2) Have you ever made an attempt to kill yourself?

Lifetime exposure to sexual abuse was assessed by asking four questions taken from the Child Abuse Screening Tool Children's Version<sup>24</sup>: (1) Has someone misbehaved with you sexually against your will? (2) Has someone forced you to look at pornographic materials against your will? (3) Has someone forced you to fondle or fondled you against your will? (4) Has someone forced you to a sexual relationship against your will?

Statistical analysis was performed using SPSS (Windows version 15; SPSS, Chicago [IL], US). The prevalence of clinically significant ADHD symptoms in childhood was calculated. Those with or without clinically significant ADHD symptoms in childhood were compared in terms of sociodemographic variables (using chi-square test) and academic performance, substance use, psychological distress, suicidality, and sexual abuse (using bivariate analysis after controlling for significant sociodemographic variables). All tests were two-tailed and a *p* value of  $<0.05$  was considered statistically significant.

## Results

Of 5784 students participated, 639 (11.5%) did not complete the questionnaire. Of the remaining 5145 students, 1750 (34.8%) were men and 3395 (65.2%) were women, with a mean age of 19.4 (standard deviation, 1.6; range, 18-25) years. The higher proportion of women was representative of college students in the state of Kerala where the number of women in colleges/higher education outnumbered that of men.<sup>25</sup>

Of the 5145 students, 143 (2.8%) reported clinically significant ADHD symptoms in childhood (with a total score of  $\geq 60$ ). Childhood ADHD symptoms were more common in men than in women (*p* = 0.002) and in those living in urban than rural area (*p* < 0.001) [Table 1]. The ADHD and non-ADHD groups were comparable in terms of other sociodemographic variables.

In the bivariate analysis, those with clinically significant ADHD symptoms in childhood had significantly higher odds of poorer academic performance (odds ratio [OR] = 1.65), alcohol use (OR = 1.69), tobacco use (OR = 1.96), psychological distress (OR = 1.14), suicidal thoughts (OR = 4.19), suicidal attempts (OR = 5.06), contact sexual abuse (OR = 3.10), and non-contact sexual abuse (OR = 3.29), after adjusting for sex and residence (Table 2).

## Discussion

There have been conflicting findings on the reliability of adult recall of childhood ADHD symptoms.<sup>26</sup> In our study, 2.8% of participants recalled clinically significant symptoms of ADHD in childhood, but the diagnosis of childhood ADHD or adult ADHD had not been made and current symptoms were not assessed. This study was cross-

**Table 1. Sociodemographic variables in participants with or without clinically significant attention deficit hyperactivity disorder (ADHD) symptoms in childhood.**

Sociodemographic variables	ADHD (n = 143)*	Non-ADHD (n = 5002)*	$\chi^2$	p Value
Sex			9.98	0.002
Male	67 (3.8)	1716 (96.2)		
Female	76 (2.3)	3286 (97.7)		
Family status			0.86	0.65
Living with both parents	124 (85.7)	4390 (88.2)		
Single parent family	9 (6.8)	296 (5.8)		
Living with relatives/others	10 (7.5)	306 (6.0)		
Socioeconomic status			1.96	0.161
Above poverty line	125 (87.1)	4132 (82.6)		
Below poverty line (eligible for government subsidies)	18 (12.9)	870 (17.4)		
Residence			17.35	<0.001
City	53 (4.4)	1142 (95.6)		
Town	29 (3.1)	894 (96.9)		
Village	59 (2.1)	2785 (97.9)		

\* Data are presented as No. (%) of participants

**Table 2. Academic and psychological correlates in participants with or without clinically significant attention deficit hyperactivity disorder (ADHD) symptoms in childhood.**

Correlates	ADHD (n = 143)*	Non-ADHD (n = 5002)*	Adjusted odds ratio (95% confidence interval) <sup>†</sup>
Failed in a subject	88 (4.3)	109 (2.6)	1.65 (1.12-2.42)
Tobacco use	28 (6.2)	117 (2.5)	1.96 (1.21-3.16)
Alcohol use	50 (4.6)	93 (2.3)	1.69 (1.15-2.47)
Psychological distress score	27.71 ± 9.79	17.53 ± 7.53	1.14 (1.12-1.16)
Suicidal thoughts	75 (6.6)	72 (1.8)	4.19 (2.98-5.90)
Suicidal attempt	23 (10.6)	124 (2.4)	5.06 (3.13-8.16)
Non-contact sexual abuse	48 (7.5)	99 (2.2)	3.29 (2.28-4.77)
Contact sexual abuse	38 (7.1)	109 (2.4)	3.10 (2.10-4.57)

\* Data are presented as mean ± standard deviation or No. (%) of participants

<sup>†</sup> Adjusted for sex and residence

sectional in nature and thus the findings cannot be used to support causality. Yet, the findings suggest that childhood ADHD symptoms are associated with negative academic and psychopathological outcomes in young adults. Childhood ADHD symptoms have been reported to be associated with poor academic performance.<sup>12,27</sup> Other factors contributing to poor academic functioning include deficits in selective and sustained attention, inhibition, and working memory.<sup>12</sup>

In our study, those who reported childhood ADHD symptoms had significantly higher use of alcohol and tobacco than non-ADHD group. Substance use disorder has been reported to be strongly associated with ADHD.<sup>10,14</sup> The association may be contributed to shared neurobiological, neurotransmitter, genetic, and early vulnerabilities.<sup>28</sup> In addition, those who reported childhood ADHD symptoms had higher psychological distress scores. The greater risk for stressful life events in those with ADHD may indirectly contribute to higher levels of psychological distress.<sup>29,30</sup> Those with childhood ADHD symptoms also had 4- to 5-fold increased risk of lifetime suicidal thoughts and attempts; the rate of suicidality is higher than that reported in another ADHD study.<sup>16</sup> This could be due to the difference in study design and other correlates such as substance use and psychological distress, which are risk factors for suicidality.<sup>31</sup> Those who reported childhood ADHD symptoms were more likely to be sexually abused. Nonetheless, this finding has not been universally replicated,<sup>18,32</sup> unlike the consistently reported finding that those with ADHD symptoms have high rates of psychiatric comorbidity.<sup>4,16</sup>

This study has limitations. The diagnosis of childhood ADHD should be based on parents, teachers, and self-reports, but all of these were unavailable in this study. This could have led to recall bias. Child and adolescent psychiatric services are limited in India. We had to rely on the retrospective self-reports by students. All outcome measures were self-reported and no diagnostic evaluation was carried out by mental health professionals. Assessment of lifetime suicidality and sexual abuse was by few questions. Many correlates specific to ADHD such as learning difficulties were not examined. Young adults not in college were excluded who may have more severe ADHD symptoms.<sup>29</sup> Nonetheless, the sample was large and representative of college students in the Kerala state. When an ADHD total score of  $\geq 60$  (indicating the 99 percentile) is used as the cut-off for clinically significant ADHD symptoms in childhood, the prevalence and correlates of childhood ADHD in our college students are consistent with those reported in other international studies.

## Conclusion

Child and adolescent mental health services in most low- and middle-income countries are limited. Patients' first contact with services is often delayed to adulthood with little ancillary information available. Self-reported childhood ADHD symptoms are often discounted owing

to recall bias. Our findings suggest that clinical evaluation and appropriate management may be warranted for adults who retrospectively recall clinically significant ADHD symptoms in childhood.

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This study is a part of a large study that assesses common psychological issues (ADHD symptoms, substance use, psychological distress, suicidality, obsessive-compulsive disorder, gambling, and sexual abuse) among college students in the state of Kerala, India.

## Declaration

The authors have no conflict of interest to disclose.

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