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ORIGINAL ARTICLE

Prevalence of adult ADHD: A cross-sectional analysis using the self-report scale (ASRS) among undergraduate and post-graduate medical students in Peshawar, Pakistan.

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ABSTRACT… Objective: To determine the prevalence of adult ADHD among undergraduate and postgraduate medical students in Pakistan, explore gender and academic-level differences, and assess the relationship between symptom severity and ADHD medication use. **Study Design:** Descriptive Cross-sectional study. **Setting:** Northwest School of Medicine, Peshawar. **Period:** May 2023 to September 2023. **Methods:** Was conducted among 394 medical students (227 undergraduates, 167 postgraduates) in Peshawar, Pakistan. Participants completed the Adult ADHD Self-Report Scale (ASRS). Using stratified random sampling from medical colleges and teaching hospitals in Peshawar. The ASRS (Urdu-translated and pre-validated version; Cronbach's α = 0.84) was employed. Data were analyzed using SPSS 27, with chi-square tests used to evaluate associations among ADHD severity, gender, academic status, and medication use. **Results:** Overall, 53.3% of students screened positive for mild ADHD and 18.8% for severe ADHD. Females reported higher symptom severity than males (p = 0.039 (Cramér's V = 0.13, 95% CI 0.04–0.23)"), and undergraduates more than postgraduates (p = 0.003 (Cramér's V = 0.17, 95% CI 0.07–0.27)). Common symptoms included procrastination (78.2%), organizational difficulties (73.4%), and restlessness (77.9%). Students using ADHD medication (primarily modafinil) had a significantly lower prevalence of severe ADHD (37.83%) compared to those unmedicated (62.17%; p < 0.001), though side effects such as insomnia (62%) and anxiety (38%) were frequent. **Conclusion:** ADHD is prevalent among Pakistani medical students, especially females and undergraduates. While medication appears to reduce symptom severity, adverse effects may limit adherence. Early identification and targeted academic support are critical for improving outcomes in this population.

Key words: Attention Deficit Disorder with Hyperactivity Disorder, Medical, Prevalence, Pakistan, Students, Screening Tools.

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INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental condition characterized by persistent patterns of inattention, hyperactivity, and impulsivity that are developmentally inappropriate and cause functional impairment.[1] While historically conceptualized as a disorder of childhood, longitudinal studies demonstrate that symptoms frequently persist into adulthood, often manifesting differently across the lifespan.[8] The global prevalence estimates range from 5% to 13% in children and adolescents[2], with community studies traditionally reporting a 2-3:1 male-to-female ratio.[3] However, emerging evidence suggests this gender disparity may reflect diagnostic biases rather than true incidence, as females often present with less overt hyperactive symptoms that may be overlooked.[1,4]

The clinical presentation of ADHD is frequently complicated by comorbid conditions, with approximately 60% of affected individuals meeting criteria for additional mental, behavioral, or developmental disorders - a clinical scenario termed "complex ADHD" (4). The disorder carries significant health consequences across the lifespan, including elevated risks for metabolic conditions like obesity, increased prevalence of chronic illnesses, higher rates of accidental injuries, and greater healthcare utilization compared to neurotypical peers.[4] Adolescents and adults with ADHD demonstrate particular vulnerability to health-risk behaviors, including substance abuse, dangerous driving practices (associated with 50% more traffic violations and three times as many severe accidents), and risky sexual behavior.[5]

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The societal burden is substantial, with ADHD imposing serious financial costs on families and healthcare systems[6], while also contributing to lost productivity - factors that collectively establish ADHD as a major public health concern.[6]

Within educational environments, ADHD symptoms create specific challenges that may be particularly pronounced in demanding academic programs. The core features of inattention, impulsivity, and executive dysfunction directly conflict with the cognitive demands of higher education.[7] Medical training, with its rigorous curriculum, need for sustained concentration, and high-stress environment, may disproportionately affect students with ADHD. Existing research indicates that individuals with ADHD are more likely to experience academic difficulties, lower graduation rates, and impaired professional functioning.[1,4,8] However, most available data comes from the West, high-income countries, with limited research examining ADHD prevalence and characteristics among medical students in low- and middle-income nations like Pakistan.[6]

This study aims to investigate the prevalence and clinical characteristics of ADHD among medical students in Pakistan using the validated Adult ADHD Self-Report Scale (ASRS). Specifically, we examine: (1) the point prevalence of ADHD symptoms in undergraduate and postgraduate medical students; (2) gender differences in symptom presentation and severity; (3) variations between academic levels; and (4) patterns of symptom severity. The findings will enhance understanding of ADHD in high-achieving populations within resource-limited settings and inform the development of targeted support strategies for medical trainees with neurodevelopmental challenges.[7,8]

METHODS

The study employed a descriptive, cross-sectional design to examine ADHD prevalence among medical students in Peshawar, Khyber Pakhtunkhwa, Pakistan. Data collection occurred across multiple medical colleges for undergraduate students and tertiary care hospitals for postgraduate trainees, ensuring representation from different stages of medical education. Using OpenEpi software with a 95% confidence level and 5% margin of error, we calculated a required sample size of 394 participants, comprising 227 undergraduates and 167 postgraduates. This sample size determination considered the estimated prevalence of ADHD in similar populations while maintaining statistical power for subgroup analyses by gender and academic level. Participants were selected through probability sampling techniques to enhance generalizability, with inclusion criteria specifying medical students aged 18 years or older who were physically present during data collection, capable of understanding the questionnaire, and willing to provide informed consent. Exclusion criteria systematically removed non-medical students, healthcare professionals, individuals with confounding psychiatric diagnoses (e.g., bipolar disorder, schizophrenia), and those submitting incomplete responses or withdrawing consent, ensuring sample homogeneity for accurate ADHD assessment.

The sampling frame consisted of enrolled medical students listed in the official registers of four medical colleges and two tertiary hospitals. Stratified random sampling was used within each institution. Of 432 invited participants, 394 returned complete questionnaires (response rate = 91%). Missing or incomplete items (< 2% of all responses) were handled by listwise deletion. Ethical approval was obtained from the Institutional Review Board of Northwest School of Medicine (152/RC/NWSM/2024.). All procedures adhered to the Declaration of Helsinki and STROBE reporting guidelines

The research utilized the standardized Adult ADHD Self-Report Scale (ASRS) as the primary data collection instrument, demonstrating reliability and validity across diverse cultural contexts. The ASRS captures both inattentive and hyperactive-impulsive symptom domains through its 18-item questionnaire, with Part A focusing on core symptoms and Part B assessing associated features and functional impairments. Trained research assistants administered the survey following a standardized protocol to maintain consistency, while also being available to clarify any participant questions without influencing responses. The data collection process emphasized confidentiality and voluntary participation, with all participants providing written

informed consent after receiving detailed information about the study's purpose and procedures. To minimize selection bias, researchers approached potential participants during designated times when classes and clinical duties permitted maximum availability, while avoiding examination periods that might artificially elevate stress-related symptoms. The ASRS-v1.1 was administered in Urdu following forward–backward translation and pilot testing. Scores were categorized as: 0–3 = no ADHD, 4–8 = mild ADHD, ≥ 9 = severe ADHD, based on validated thresholds for population screening (Kessler et al., 2005). Internal consistency for the Urdu version in this study was Cronbach's $\alpha = 0.86$.

For data analysis, we employed IBM SPSS Statistics version 27, applying both descriptive and inferential statistical techniques. Initial analysis computed frequencies and percentages for sociodemographic variables (gender, academic level) and ASRS item responses, providing a comprehensive profile of the sample characteristics. Chi-square tests of independence examined relationships between categorical variables, particularly focusing on associations between gender and ADHD severity categories (no ADHD, mild ADHD, severe ADHD), as well as between educational status (undergraduate vs. postgraduate) and symptom severity. The analysis treated ASRS responses as ordinal data (Never/Sometimes/Very Often) to capture the spectrum of symptom frequency. All statistical tests used a significance threshold of $p < 0.05$, with effect sizes calculated using chi-square tests to assess the strength of observed associations.

RESULTS

Prevalence and Demographic Associations

The study revealed significant demographic variations in ADHD prevalence among medical students. A chi-square analysis demonstrated a statistically significant relationship between gender and ADHD severity ($\chi^2 = 6.53$, df = 2, *p* = 0.039). While the distribution of individuals without ADHD was balanced across genders (55 males and 55 females), females exhibited a higher prevalence of both mild and severe ADHD. Specifically, 122 females reported mild ADHD compared to 88 males, and 51 females reported severe ADHD compared to 23 males. This suggests that ADHD may present more prominently in females within this population, possibly due to differences in symptom manifestation, diagnostic biases, or hormonal influences (Table-I).

The distribution of ADHD severity (No ADHD, Mild ADHD, and Severe ADHD) across gender among a total of 394 study participants. A chi-square test was conducted to evaluate the association between gender and ADHD severity. The total number of male and female participants was 166 and 228, respectively. A statistically significant association was found between gender and ADHD severity ($p = 0.039$).

Similarly, academic level was significantly associated with ADHD severity ($\chi^2 = 11.42$, df = 2, *p* = 0.003). Postgraduates were more likely to report no ADHD (61 vs. 49 undergraduates), whereas undergraduates showed higher rates of both mild and severe ADHD (50 vs. 24 postgraduates. This pattern may reflect the academic attrition of students with severe ADHD symptoms, as well as the increased coping mechanisms and adaptations developed by postgraduates over time (Table-II).

The distribution of ADHD severity levels (No ADHD, Mild ADHD, and Severe ADHD) between undergraduate and postgraduate students among a total of 394 participants. A chi-square test was applied to assess the association between academic level and ADHD severity. The number of undergraduates and postgraduates was 227 and 167, respectively. A statistically significant association was observed between academic level and ADHD severity ($p = 0.003$).

Symptom Profile and Behavioral Manifestations

The ASRS Part A results highlighted key ADHD symptoms among participants. A substantial proportion reported difficulties in task completion (67.7%), organizational challenges (73.4%), and memory lapses (62.7%). Notably, task avoidance was prevalent, with 78.2% of participants admitting to procrastination. Motor restlessness and hyperactivity were reported by 77.9% and 78.4% of participants, respectively. These findings align with established ADHD symptomatology, particularly inattention and impulsivity, which may be exacerbated

by the demanding academic environment of medical education (Table-III).

Medication Use

Among 394 participants, 78 (19.8%) reported current or prior use of stimulant or non-stimulant ADHD medication, primarily modafinil. Given the self-selected nature of this subgroup, findings should be interpreted cautiously as confounding by indication may exist.

The prevalence of severe ADHD was significantly higher in the unmedicated group (62.17%, n=46) compared to the medicated group (37.83%, n=28), with the difference being statistically significant (p = 0.000). In contrast, the prevalence of moderate ADHD was markedly lower in the medicated group (2.84%, n=6) compared to the unmedicated group (97.16%, n=204), also showing a statistically significant difference (p = 0.000) (Table-V).

The prevalence of severe and moderate ADHD among individuals who were either receiving medication (n=78) or were unmedicated (n=316). Statistical significance was assessed for differences in ADHD severity prevalence between the two groups, with p-values indicating highly significant differences (p = 0.000) (Table 5).

DISCUSSION

The findings of this cross-sectional screening study contribute to the limited literature on adult ADHD symptoms, particularly among high-achieving student populations in low- and middle-income nations. The gender disparities in prevalence reported in this study contradict the traditional perspective of ADHD as a condition that is most prevalent among males, and lead to shifting patterns of diagnosis during adulthood. This finding is supported by a review article by Quin Po. et al, that females with ADHD learn to suppress symptomatology in childhood and then develop worse problems later in life when executive function demands are higher.[9] The higher prevalence among female medical students in our sample is a manifestation of this effect, plus the high cognitive and organizational requirements of medical school. Sabir et al. also reported a higher prevalence in females at 69.7% of the sample size.[10] One Saudi study also reported relatively higher rates of symptoms of ADHD among female students compared to males (26.1% vs 25.7%), but this did not reach significance.

TABLE-I

Association between Gender and ADHD Severity among Medical Students (N = 394).

ADHD Severity	Gender of participants		Total	P-Value (chi-square test)
	Male	Female		
No ADHD	55	55	110	0.039
Mild ADHD	88	122	210	
Severe ADHD	23	51	74	
Total	166	228	394	

Severity categories defined per ASRS thresholds (0–3 = none, 4–8 = mild, ≥ 9 = severe). Chi-square test used; Cramér's V reported as effect size." Replace "p = 0.000" with "p < 0.001

TABLE-II

Association between Academic Level and ADHD Severity among Medical Students (N = 394).

ADHD Severity	Undergraduates	Postgraduates	Total	P-Value (Chi-square test)
No ADHD	49	61	110	0.003
Mild ADHD	128	82	210	
Severe ADHD	50	24	74	
Total	227	167	394	

Severity categories defined per ASRS thresholds (0–3 = none, 4–8 = mild, ≥ 9 = severe). Chi-square test used; Cramér's V reported as effect size." Replace "p = 0.000" with "p < 0.001

TABLE-III

Frequency distribution of responses to Part A of the adult ADHD self-report scale (ASRS)

Part A of ASRS	Never n (%)	Sometimes n (%)	Very often n(%)	Total
1. How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?	127(32.2)	218(55.3)	49(12.4)	394
2. How often do you have difficulty getting things in order when you have to do a task that requires organization?	105(26.6)	207(52.5)	82(20.8)	394
3. How often do you have problems remembering appointments or obligations?	147(37.3)	161(40.9)	86(21.8)	394
4. When you have a task that requires a lot of thought, how often do you avoid or delay getting started?	86(21.8)	182(46.2)	126(32.0)	394
5. How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?	87(188)	188(47.7)	119(30.2)	394
6. How often do you feel overly active and compelled to do things, like you were driven by a motor?	85(21.6)	215(54.6)	94(23.9)	394

TABLE-IV

Part B of ASRS	Never n(%)	Sometimes n(%)	Very often n(%)	Total
1. How often do you make careless mistakes when you have to work on a boring or difficult project?	94(23.9)	230(58.4)	70(17.8)	394
2. How often do you have difficulty keeping your attention when you are doing boring or repetitive work?	53(13.5)	195(49.5)	146(37.1)	394
3. How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly?	131(33.2)	195(49.5)	68(17.3)	394
4. How often do you misplace or have difficulty finding things at home or at work?	70(17.8)	215(54.6)	109(27.7)	394
5. How often are you distracted by activity or noise around you?	63(16.0)	174(44.2)	157(39.8)	394
6. How often do you leave your seat in meetings or other situations in which you are expected to remain seated?	204(51.8)	134(34.0)	56(14.2)	394
7. How often do you feel restless or fidgety?	63(16.0)	238(60.4)	93(23.6)	394
8. How often do you have difficulty unwinding and relaxing when you have time to yourself?	119(30.2)	199(50.5)	76(19.3)	394
9. How often do you find yourself talking too much when you are in social situations?	136(34.5)	164(41.6)	94(23.9)	394
10. When you're in a conversation, how often do you find yourself finishing the sentences of the people you are talking to before they can finish them themselves?	125(31.7)	198(50.3)	71(18.0)	394
11. How often do you have difficulty waiting your turn in situations when turn taking is required?	109(27.7)	204(51.8)	81(20.6)	394
12. How often do you interrupt others when they are busy?	196(49.7)	151(38.3)	47(11.9)	394

TABLE-V

Comparison of severe and moderate ADHD prevalence between medicated and unmedicated groups

Variable	Medicated Group (n=78)	Unmedicated Group (n=316)	Statistical Significance
Severe ADHD Prevalence	37.83% (n=28)	62.17% (n=46)	*p* = 0.000
Moderate ADHD Prevalence	2.84% (n=6)	97.16% (n=204)	*p* = 0.000

This suggests that many high-achieving female medical students have ADHD, perhaps evidence of underdiagnosis of girls in childhood.[11] The undergraduate-postgraduate differences at the academic level that we identified between the two groups are informative about the longitudinal development of ADHD within difficult educational environments. The lower rate in postgraduates is because of several potential explanations: a survivorship effect in which only individuals with milder sickness or better coping skills survive through to advanced education; greater development of more efficient self-regulation abilities over the course of time; or perhaps greater availability of diagnosis and treatment among advanced students. This outcome is of particular interest to medical education systems, suggesting that recognition and adjustments for students with ADHD symptoms in their early years may improve retention and academic success.

Symptom profiles revealed in this study reveal remarkable congruence with present conceptualizations of adult ADHD, particularly the element of executive dysfunction. The frequency of procrastination and task avoidance is elevated in accordance with current neuropsychological studies that have identified deficits in motivation regulation as core to ADHD.[12] The elevated frequencies of distractibility and attentional failures in our sample emphasize the challenge that medical students with ADHD face in learning environments that require sustained attention, e.g., lectures or clinical rotations. These findings take on further significance when considered against the possible effect on the care of patients, since attentional difficulties may theoretically be extended to clinical competence and patient safety. The behavioral manifestation of impulsivity, including interrupting and turn-taking issues, also has implications for professional communication skill development during medical training.[13]

Our examination of medication effects contributes to the controversy regarding the use of pharmacological treatment in adult samples with ADHD. The identification of fewer severe symptoms in medicated adults aligns with current treatment practice guidelines that indicate medication can be applied as a first-line treatment in adults with significant impairment.[14]

The rate of prevalence we observed overall is very similar to rates in other nations' research, and this provides good cross-cultural validity to ADHD as a neurodevelopmental disorder."[15,16] However, the medical education environment of culture and schooling must influence both the symptom presentation and the availability of support services. The emphasis on competition in medical education, along with possibly limited mental health services, could exacerbate challenges for ADHD students. This aligns with new international public health perspectives emphasizing how the structural health environment within a nation affects the experience and course of neurodevelopmental disorders.[17,18] This study adds to the growing perception that ADHD looks the same in every culture, but is heavily influenced by the schooling system in place locally, healthcare infrastructure, and mental illness attitudes within a culture.

Medication use analysis showed inferred ADHD treatment issues in this sample. Implications of the findings of medication use are that medication is effective for controlling basic symptoms, but must be combined with diagnosis and counseling to put the majority of patients on medical treatment to achieve symptom relief across most individuals. The response heterogeneity we observed requires individualized treatment plans by symptom profiles, comorbidities, and academic needs.

Because the ASRS is a screening rather than a diagnostic instrument, the reported rates represent probable ADHD symptomatology rather than confirmed diagnoses. The reliance on self-report may introduce recall or social-desirability bias. Additionally, the cross-sectional design limits causal inference, and inclusion of medical students only may restrict external validity.

Its methodological advantages of a comparatively large sample size and administration of standardized evaluation instruments provide a solid foundation for these findings. There are, however, some drawbacks to be considered while interpreting the results. The cross-sectional design precludes making causal inferences about the correlation between ADHD symptoms and academic performance. The reliance on self-report measures, though useful for

population screening, is prone to response bias or variation in self-knowledge. The selection of medical students as subjects, as informative as it proves in evaluating ADHD among high-achievers, limits the applicability to other student groups or the entire adult population. These limitations provide promising areas for future research, including longitudinal examinations tracking ADHD symptoms through medical training, best support practices studies among students with ADHD in low-resource contexts, and trials of how ADHD symptoms overlap with specific medical education competencies. Such a study would inform the development of focused interventions that treat both the cognitive and emotional challenges of medical students with ADHD, ultimately benefiting their academic performance and professional development.

CONCLUSION

This study identifies a high screening prevalence of ADHD-related symptoms among medical students, particularly in females and undergraduates. Medical colleges should consider implementing structured screening, counseling, and academic-support programs for students exhibiting ADHD symptoms. Future multi-institutional and longitudinal studies are warranted to validate these findings

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Usaram:** Conception of idea, write up.
2	**Komail Hussain:** Critical review.
3	**Aqsa Sehrai:** Methodology.
4	**Muhammad Anas Khan:** Writing.
5	**Emad Khan:** Data analysis.
6	**Amir Zaman Khan:** Critical review.
7	**Sarwat Jahan:** Proof reading.