

ORIGINAL ARTICLE

Prevalence of adult attention deficit hyperactivity disorder among medical students in Riyadh City

Nader Alrahili^{1*}, Abdulrahman A. Aldakheel¹, Abdullah AlUbied¹, Abdulaziz Almalki¹, Abdullah AlBarрак¹, Bandar Al-Dosari¹, Weam Alhemaidi², Abdullah S. Alamro³, Asem A. Alageel¹

ABSTRACT

Background: Attention deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder characterized by the inability to sustain attention, hyperactivity, and impulsivity. Recent studies showed that it can persist in adulthood. The modification of the “Diagnostic and Statistical Manual of Mental Disorders” in its fifth edition has a significant impact on detecting adult ADHD. To the best of our knowledge, there are no studies done on adult ADHD among medical students in the Gulf region.

Methodology: A cross-sectional study was conducted on 487 medical students from all academic year from February 1, 2018, until March 31, 2018, in two governmental and one private medical school in Riyadh city. Self-reported English questionnaire paper used for the study was composed of two parts; socio-demographic and adult ADHD screening scale of DSM-5 version.

Results: Fifty-three students (10.9%) reported symptoms of ADHD. Concerning the prevalence and percentage, there was no noticeable difference in gender (p value = 0.364), academic year (p value = 0.666), nationality (p value = 0.379), colleges (p value=0.836), and age (p value = 0.992). History of early life ADHD was significantly associated with adult ADHD (p value = 0.012), along with student's grade point average, mainly from a score of three and above out of five (p value = 0.024).

Conclusion: Our study found a higher prevalence of ADHD among medical students compared with worldwide prevalence. This difference could be due to social and cultural factors. Those individuals may have difficulty in communication and learning which can disturb academic efficiency, lengthen their study, and even disturb their development.

Keywords: Adult ADHD, ADHD, medical students, Riyadh City, prevalence.

Introduction

Attention deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder characterized by the inability to sustain attention, hyperactivity, and impulsivity [1]. ADHD was until recently, erroneously perceived as only present in young people, with little or no impact later in life. Recent studies showed that it can persist in adulthood [2]. The estimated prevalence of ADHD among adults is 3.4% in the United States of America, 7.3% in France, 1.1% in Australia, and 1.8% in Lebanon [3,4]. Moreover, there is emerging evidence of how common is it for the disease to be underdiagnosed and or undertreated. A study has been conducted in the US to estimate the prevalence of current adult ADHD, in which it was found 4.4%, where most of the cases were either

untreated, mistreated, or/and treated for other common co-morbid disorders that usually presents with ADHD (such as major depressive disorder, anxiety disorder, and alcohol abuse) [5,6]. The clinical prognosis for the

Correspondence to: Nader Alrahili

*College of Medicine, Imam Muhammad Ibn Saud Islamic University, Riyadh, Saudi Arabia.

Email: al.rahili@gmail.com

Full list of author information is available at the end of the article.

Received: 07 December 2018 | **Accepted:** 20 January 2019

co-morbid group is relatively poor (even if the co-morbid disorder is being treated) [6].

DuPaul et al. [7] also stated that approximately 2% to 8% of the college population reports clinically significant levels of ADHD symptomatology and at least 25% of the college students with disabilities are diagnosed with ADHD. Kessler et al. [1] stated that the estimated prevalence of current adult ADHD was 4.4%. The significant correlation included being male, previously married, unemployed, and non-Hispanic white. Polanczyk et al. [9] have undertaken a systematic review and stated that the worldwide prevalence of ADHD was 5.29%. This suggests that the geographic conditions play a limited role in ADHD/HD prevalence estimates worldwide.

Nevertheless, adult ADHD has been associated with poorer functional, emotional, and educational outcomes, it affects the patient's quality of life in many aspects [6], given the fact that it can progress from high-school level of age to the college level of age, it might affect their ability to compete with their partners, make them less advocate for achieving higher grades, as it also might lengthen their stay at the college level [6], in which it might affect their future career life in a negative manner. Those whom at higher risk of developing adult ADHD should be addressed early in life and intervention with a multidisciplinary plan should be provided to improve the net outcome for them. ADHD is increasingly being diagnosed in adulthood. The previous criteria for the diagnosis of ADHD known as the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) have been developed and validated for children and are inappropriate for adults [1]. DSM-IV had a number of significant limitations when used to diagnose the adult onset of ADHD, where some listed symptoms were inappropriate for adults (e.g., "has difficulty playing quietly") [1]. However, with multiple and major adjustments in the DSM-5, another leap toward a better identification and diagnosis of the disorder by medical practitioners has taken place.

These adjustments include the definition, where the experience of the individual is addressed in a more precise manner. The category of disorders first diagnosed in infancy, childhood, or adolescence was transformed into a neurodevelopmental disorder as a better expression of the disorder. Also, adult ADHD (17 years and above) diagnosis is now established with five or more features out of a total of nine features on each domain. Nevertheless, the addition of examples while preserving the phrases came in advantage for both clinicians and researchers, respectively. The change in the age of onset of some symptoms before the age of seven has now been removed to the age of twelve since most adults recall the onset in age 12 rather than 7 years. In the context of the addition of specifiers to decide if predominant or combined domains form the clinical picture and if it is a possible remission period, in addition, to assess the severity of the disorder. One exclusion criterion removed

is Autism spectrum disorder [8]. One of the significant and critical populations that we can study adult ADHD prevalence is medical field students and practitioners, given the fact of the importance of their mental and physical health to serve the community individuals in a safe manner. Since adult ADHD might have a greater impact on the function of these individuals, estimates of adult ADHD prevalence rates in medical science students was 16.5% and 13.4% based on adult ADHD self-report scale (ASRS) (as a self-report) (DSM IV) and Wender Reimherr structured interview (experts' ratings), respectively [10], which was a significantly higher than meta-analytic review done in 2012 on adults with ADHD which was 5% [11]. Another study was done on medical students in Kenya and demonstrated a self-reported ADHD symptoms prevalence of 23.7% based on WHO validated ASRS v1.1 (derived from DSM-IV-TR) screener [12], while 15.4% of medical science students had symptoms of ADHD in Zahedan University of Medical Sciences [13]. According to the US report published in 2010 done on medical students, that 5.5% reported a previous diagnosis of ADHD [14]. Other studies also were conducted in a variety of areas, including Hamadan University of Medical Sciences on 400 students in Iran showed a prevalence rate of 16.5% [10]. Another cross-sectional study involving 400 medical students was conducted to screen students using ASRS screening tool in the Department of Pharmacology, University of Al-Mustansiriya, Iraq, showed again a prevalence of 16.6% of ADHD symptoms (19.8% male and 12.1% females) [15]. Most of the articles included in the literature of this study were done by using the DSM-5 criteria, considering that the adult ADHD was recently added. Moreover, children, adolescent, and adult share the same diagnostic criteria, however, the number of symptoms being the key factor. Children or adolescents should meet six or more symptoms in one or both domains to be diagnosed with ADHD. On the other hand, adults should meet five or more symptoms. A period of 6 months is mandatory for a diagnosis to be made for all the age groups.

Many studies conducted around globe state importance of recognizing the disorder, at an early stage and at the same time to lessen the impact and harm that might lead to a repetitive negative influence on individuals. To the best of our knowledge, there are no studies has been conducted that support the importance of addressing the disorder early in life, also there is no data of the prevalence of adult ADHD disorder in Saudi Arabia, as well as there are no studies that have been done for ADHD among adults or medical students in the Gulf region. Due to this, lack of epidemiological data of ADHD among medical students in Saudi population makes this study important.

Methodology

A cross-sectional study incorporating 3,880 medical students from every academic year from February 1, 2018, until March 31, 2018, was done. Overall, the

selected colleges are two governmental medical schools, Imam Mohammed Ibn Saud Islamic University College of Medicine, Princess Nourah bint Abdulrahman College of Medicine, and one private medical school, Alfaisal University College of Medicine, in Riyadh, Kingdom of Saudi of Arabia. A stratified random sampling has been used to achieve a sample size of 350 students according to their associated universities with a confidence level of 95% and 5% margin of error. In each stratum, an equivalent proportion of students was randomly chosen from their following number. Inclusion criteria: to involve adult male and female medical students from all academic years who agreed to cooperate in the research. Exclusion criteria: any student who declines to cooperate. Research Ethics Committee at Imam Mohammed Ibn Saud Islamic University, College of Medicine approval was taken.

A self-reported paper-and-pen English questionnaire composed of two parts was used for the data collection process. The first part included a structured seven-item socio-demographic data (age, gender, nationality, medical year, grade point average (GPA) grade, medical history of ADHD diagnosis, and stage of life when first diagnosed with ADHD). The second part was an adult ADHD screening scale of the DSM-5 version consisting of six items asking how common the symptom appeared over the past 6 months. The answers to the questions are: never, rarely, sometimes, often, and very often within square brackets, resulting in scores ranging from 0 to 24 (Table 1).

Prior to the students' response, their cooperation will be declared confidential without force. Research members will be observant to administer questionnaires to the students between lectures. Face validity of the questionnaire will be interpreted by an experienced research psychiatrist. Then, a pilot study will be performed on 10 students and their perspectives will be considered for the revision. Descriptive analysis of data will be gathered in the Statistical Package for Social Sciences and variables will be correlated using the chi-square. A *p*-value of less than 0.05 will be defined as statistically significant.

Results

This exploration was accomplished on 487 volunteers; out of 2,180 medical students from the selected colleges in Riyadh, Saudi Arabia listed herein (Table 2). Concerning the prevalence and percentage, there was no noticeable difference in gender (*p*-value = 0.364), medical year (*p*-value = 0.666) nationality (*p*-value = 0.379), colleges (*p*-value = 0.836), and age (*p* value = 0.992).

Figure 1 shows the prevalence of students, 53 (10.9%) appeared to have symptoms of ADHD. Student's answers to the paper-based questionnaire were screened in agreement with the ASRS-5. History of ADHD was significantly associated with adult ADHD (*p*-value = 0.012), along with student's GPA, mainly from a score of three and above out of five (*p*-value = 0.024; see Table 2). There was no association between participants who showed signs of ADHD and their medical year (*p*-value = 0.364), as well as the time of identifying the illness, was not related with students who have had existing ADHD (*p*-value = 0.646).

Discussion

Our study aim was to determine the prevalence of ADHD among the medical students in Riyadh, which was estimated 10% of medical students in Riyadh. Compared with previous studies, our study shows a higher prevalence compared with the worldwide prevalence of ADHD in the previous studies. This difference could be due to social and cultural factors. Approximately, half of the student who scored high on ASRS were females. According to the National Comorbidity Survey Replication [5], 38% of adult ADHD were female, which is much lower than our findings. Around more than half of the students who score high on ASRS were 21–23 years old. Prevalence of ADHD among Saudi and non-Saudi students was similar. Some evidence demonstrates that cultural and contextual aspects (psychosocial adversity) are predisposing risk factors.

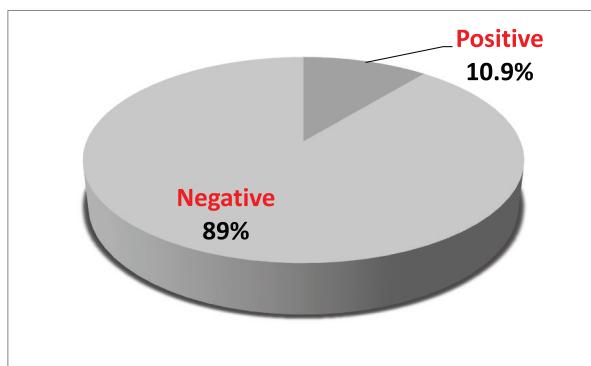
There was no association between participants who showed signs of ADHD and their medical year (*p*-value = 0.364), as well as the time of identifying the illness, was not related with students who have had existing ADHD (*p*-value = 0.646). But, rather, past history of ADHD

Table 1. Questions of the DSM-5 ASRS.

Questions of the DSM-5 ASRS
1. How often do you have difficulty concentrating on what people are saying to you even when they are speaking to you directly?
2. How often do you leave your seat in meetings or other situations in which you are expected to remain seated?
3. How often do you have difficulty unwinding and relaxing when you have time to yourself?
4. 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 themselves?
5. How often do you put things off until the last minute?
6. How often do you depend on others to keep your life in order and attend to details?

Table 2. Demographic features of volunteering students.

Variables	Level of variable	Positive n (%)	Negative n (%)	Total N (%)
Gender	Female	30 (6.1)	217 (44.5)	247 (50.7)
	Male	23 (4.7)	217 (44.5)	240 (49.3)
Year level	First year	6 (1.2)	83 (17%)	89 (18.3)
	Second year	10 (2)	89 (18.3)	99 (20.3)
	Third year	12 (2)	87 (18.3)	99 (20.3)
	Fourth year	13 (2)	87 (18.3)	100 (20.3)
	Fifth year	12 (2)	88 (18.3)	100 (20.3)
Nationality	Saudi	34 (6.9)	304 (64)	338 (70)
	Non-Saudi	19 (3.9)	130 (26)	149 (30)
College	Alfaisal University	28 (5.7)	221 (45)	249 (51)
	Imam Mohammed Ibn Saud Islamic University	11 (2.2)	106 (21.7)	117 (24.2)
	Princess Nourah bint Abdulrahman University	14 (2.8)	107 (22)	121 (24.8)
Age (mean)				23.7 (5)
Total		53 (10.9)	434 (89.1%)	487 (100)

**Figure 1.** Percentage of adults aged 18–32 years with symptoms ADHD, Saudi Arabia, 2018.

was significantly linked with present ADHD (p -value = 0.012), along with student's GPA, mainly from a score of three and above out of five (p -value = 0.024).

This exploration was accomplished on 487 volunteers, out of 2,180 medical students from the selected colleges in Riyadh participants were eliminated from our study due to not completing the questionnaires. They might have also been suffering from ADHD disorder; the selected colleges were two governmental medical schools, Imam Mohammed Ibn Saud Islamic University College of Medicine, Princess Nourah bint Abdulrahman College of Medicine, and one private medical school, Alfaisal University College of Medicine, in Riyadh, Kingdom of Saudi of Arabia. The symptoms can disturb students' academic efficiency, lengthen their study, and even disturb their development. ADHD are associated with lower levels of education. People with ADHD symptoms, particularly attention deficit disorders, have difficulty in communication and conversation; in addition, many

of these patients suffer from learning impairments. The use of ASRS in our country is a minor limitation, as the native language is Arabic, where the ASRS language is English although the primary language in medical schools in Riyadh is English, it is expected for some individuals to face difficulty in understanding the question. We have overcome this limitation partially by advising the data collectors to explain the questions (in English) for those who have faced difficulty in understanding it appropriately. On the other hand, the study was done in one city only and represents medical students in Riyadh city only. Further studies should be done in different cities to make the percentage representative for the larger populations.

Conclusions

ADHD is increasingly being diagnosed in adulthood, where most of the cases where either untreated, mistreated or\and treated for other common co-morbid disorders. The estimated prevalence of ADHD among adults is 3.4% in the United States, 7.3% in France, 1.1% in Australia, and 1.8% in Lebanon. A cross-sectional study with estimation of 2,180 medical students was done using self-reported English questionnaire paper composed of two parts; socio-demographic and adult ADHD screening scale of DSM-5version. Estimated 11% of medical students in Riyadh have ADHD symptoms. Our study shows a higher prevalence compared with worldwide prevalence. This difference could be due to social and cultural factors. Those individuals may have difficulty in communication and learning which can disturb students' academic efficiency, lengthen their study, and even disturb their development. Further studies should be done in other cities and involve other institutes such as universities and workplaces.

Table 2. Well-established correlation between childhood ADHD and adult ADHD, including the interaction of existent ADHD with GPA.

Variable	Level of variable	Positive	Negative	Total
		n (%)	n (%)	N (%)
GPA	1/5	2 (0.4)	1 (0.2)	3 (0.6)
	2/5	2 (0.4)	9 (1.8)	11 (2.2)
	3/5	16 (3.3)	111 (23.8)	127 (26)
	4/5	17 (3.5)	158 (32.4)	175 (35.9)
	5/5	16 (3.3)	155 (31.8)	171 (35.1)
Past history of ADHD	Yes	5 (1.0)	9 (1.8)	14 (3.0)
	No	48 (9.9)	425 (87.3)	473 (97)
Total		434 (89.1)	53 (10.9)	487 (100)

List of Abbreviations

n Partial number
N Total number
p Probability

Funding

None.

Declaration of conflicting interests

The authors declare that there is no conflict of interest regarding the publication of this article.

Consent for publication

Informed consent was obtained from all the participants.

Ethical approval

Research Ethics Committee at Imam Mohammed Ibn Saud Islamic University, College of Medicine approved the study No. 03-2019, January 17, 2019.

Author details

Nader Alrahili¹, Abdulrahman A. Aldakheel¹, Abdullah AlUbied¹, Abdulaziz Almalki¹, Abdullah AlBarraak¹, Bandar Al-Dosari¹, Weam Alhemaidi², Abdullah S. Alamro³, Asem A. Alageel¹

- College of Medicine, Imam Muhammad Ibn Saud Islamic University, Riyadh, Saudi Arabia
- College of Medicine, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia
- Psychiatry Department, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

References

- Kessler RC, Adler L, Ames M, Demler O, Faraone S, Hiripi E, 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(2):245–56. <https://doi.org/10.1017/S0033291704002892>
- Simon V, Czobor P, Bálint S, Mészáros A, Bitter I. Prevalence and correlates of adult attention-deficit hyperactivity disorder: meta-analysis. *Br J Psychiatry.* 2009;194(3):204–11. <https://doi.org/10.1192/bjp.bp.107.048827>
- Fayyad J, De Graaf R, Kessler R, Alonso J, Angermeyer M, Demyttenaere K, et al. Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. *Br J Psychiatry.* 2007;190:402–9. <https://doi.org/10.1192/bjp.bp.106.034389>
- Ebejer JL, Medland SE, van der Werf J, Gondro C, Henders AK, Lynskey M, et al. Attention deficit hyperactivity disorder in Australian adults: prevalence, persistence, conduct problems and disadvantage. *PLoS One.* 2012;7(10):e47404. <https://doi.org/10.1371/journal.pone.0047404>
- Kessler RC, Adler L, Barkley R, Biederman J, Conners CK, Demler O, 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):716–23. <https://doi.org/10.1176/ajp.2006.163.4.716>
- Ginsberg Y, Quintero J, Anand E, Casillas M, Upadhyaya HP. Underdiagnosis of attention-deficit/hyperactivity disorder in adult patients. *Prim Care Companion CNS Disord.* 2014;16(3). <https://doi.org/10.4088/PCC.13r01600>
- DuPaul GJ, Weyandt LL, O'Dell SM, Varejao M. College students With ADHD. *J Atten Disord.* 2009;13(3):234–50. <https://doi.org/10.1177/1087054709340650>
- Zalsman G, Shilton T. Adult ADHD: a new disease? *Int J Psychiatry Clin Pract.* 2016;20(2):70–6. <https://doi.org/10.3109/13651501.2016.1149197>
- Polanczyk G. The worldwide prevalence of ADHD: a systematic review and metaregression analysis. *Am J Psychiatry.* 2007;164(6):942. <https://doi.org/10.1176/ajp.2007.164.6.942>
- Jahangard L, Haghghi M, Bajoghli H, Holsboer-Trachsler E, Brand S. Among a sample of Iranian students, adult attention deficit hyperactivity disorder (ADHD) is related to childhood ADHD, but not to age, gender, socio-economic status or birth order—an exploratory study. *Pharmacopsychiatry.* 2013;17:273–8.
- Willcutt EG. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: a meta-analytic review. *Neurotherapeutics.* 2012;9(3):490–9. <https://doi.org/10.1007/s13311-012-0135-8>

Prevalence of adult ADHD among medical students in Riyadh City

12. Atwoli L, Owiti P, Manguro G, Ndambuki D. Attention deficit hyperactivity disorder symptom self-report among medical students in Eldoret, Kenya. *Afr J Psychiatry.* 2011;14(4):286–9. <https://doi.org/10.4314/ajpsy.v14i4.5>
13. Mosalanejad M, Mosalanejad L, Lashkarpour K. Prevalence of ADHD among students of zahedan university of medical science in iran. *Iran J Psychiatry Behav Sci.* 2013;7(2):83–90.
14. Tuttle JP, Scheurich NE, Ranseen J. Prevalence of ADHD diagnosis and nonmedical prescription stimulant use in medical students. *Acad Psychiatry.* 2010;34(3):220–3. <https://doi.org/10.1176/appi.ap.34.3.220>
15. Ashor AW. Variable influence of the degree of smoking dependence on adult attention deficit/hyperactivity disorder in Iraqi medical students. *Neurosciences (Riyadh).* 2012;17(3):241–7.