ORIGINAL ARTICLE

Frequency of Attention Deficit Hyperactivity Disorder Symptoms in Medical Students and Associated Factors-A Cross Sectional Study

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ABSTRACT

Objective: To study the frequency of ADHD symptoms in medical students and its association with their physical activity, screen time and sleep pattern.

Study Design: Cross sectional descriptive study.

Place and Duration of Study: This study was carried out among first year and second-year medical students of Rawalpindi Medica l University, Rawalpindi from June 2017 to August 2017.

Materials and Methods: Data was collected using a self-administered questionnaire derived from literature. Sleep deprivation was assessed using Epworth Sleepiness Scale. ADHD symptoms were assessed using Adult ADHD Self Report Scale (ASRS-V1.1) Symptom Checklist. Significance value was set at p<0.05. The questionnaires were distributed among three hundred medical students and sample size of 271 was met after discarding responses with missing information and not meeting inclusion criteria. Data was analyzed using SPSS version 23. Chi square test was used to determine the association of ADHD symptomology with sleep pattern, physical activity, and screen time.

Results: 12.17% (n=33) respondents fell in ADHD spectrum as they scored more than 4 in ASRS V1.1. Significant relation was not established between ADHD symptoms and sleep deprivation (p=0.58). The relation between physical activity and ADHD symptom turned out to be significant (p=0.045). Total screen time and ADHD did not show a significant relation(p=0.266). Similarly, TV hours were not significantly associated with ADHD symptoms (p=0.932). However, laptop usage hours per day (p=0.04) and phone usage hours per day (p=0.007) were significantly related to ADHD symptoms.

Conclusion: Lack of physical activity and prolonged screen time have significant correlation with self-reported ADHD symptoms in medical students. However, sleep deprivation is not significantly associated with ADHD symptomology. Hence, cutting down the screen time particularly laptop and mobile usage hours and increasing the time of physical activity might help in preventing and alleviating ADHD symptoms.

Key Words: *Attention Deficit Hyperactivity Disorder, Exercise, Preclinical years, Screen time, Sleep.*

Introduction

ADHD is amongst common chronic neuro developmental disorder, which is characterized primarily by impulsivity, hyperactivity, and inattention.[1] Two third of the children diagnosed with ADHD experience persistence of the symptoms in adulthood as well.[2] The prevalence of ADHD in adults varies from 1.2% to 7.3%[14]. Adults show a broad spectrum of behavioral and psychiatric issues comprising of anxiety, depression, memory deficits

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and academic incompetence. ADHD has the potential to make an individual more susceptible to substance abuse disorders as well.[3] The mean prevalence of pediatric mental problems in Pakistan is estimated to be 15.8% with ADHD being the most common diagnosis.[4] Growing evidence suggests that individuals with probable ADHD show more involvement in sedentary lifestyle.[5,6] Similarly, screen time has also been reported to have significant association with ADHD symtoms.[7] Sleep disturbances act as an independent risk factor for ADHD or they may appear as a symptom.[8,9] A study disclosed that students with ADHD had lower scores in adaptation to college, self-esteem and social skills compared with the control. The gradual decline in the grades of ADHD identified students owes to their inability to focus during lectures in the classrooms, lack of interest in task completion and task

comprehension.[11,12]

ADHD in adults has not been extensively studied in Pakistan. Limited number of research are available especially in adult students. The negative impact of ADHD symptoms on academic performance and learning abilities has been well documented which rationalizes the need for further research in this domain. The occupational and social implications of ADHD impair quality of life to a great extent and if left undiagnosed can adversely impact an individual's life. Given the lack of evidence, this study was designed to find the frequency of ADHD symptomology in medical students and to determine its association with physical activity, sleep pattern and screen time. In case positive associations are found, the standard protocol and guidelines should be modified in a way that any individual diagnosed with ADHD should be screened for abnormal patterns or duration of screentime, physical activity and sleep. The objective of this study was to determine the frequency of ADHD in medical students and its association with physical activity, sleep pattern and screen time.

Materials and Methods

It was a cross-sectional study, carried out among first- and second-year medical students at Rawalpindi Medical University, Rawalpindi and extended from June 2017 to August 2017. Data was collected from first- and second-year students only because of division of preclinical and clinical year students into distant campuses. Therefore, collection of data got limited to preclinical years only because of constraint of distance. The sample size was calculated using WHO calculator which came out to be 271. However, proformas were initially distributed among 300 students via nonrandomized convenient sampling technique. Confidentiality and anonymity of the respondent was maintained, and participant provided a response upon his consent. After filtering out responses with missing information, 271 out of 300 proformas were considered appropriate for analysis based on inclusion and exclusion criteria. The student with preexisting diagnosed psychiatric illness or sleep disorder and with exam score of less than 70% was excluded from study. Questionnaire with missing information was also excluded. The proforma was reviewed by Institutional Research Forum for ethical

issues and was approved for administration after gaining ethical approval from Institutional Ethical Research Forum (Ref.RMU/PR-15 /2018, Date: 10th February ,2018). The Adult ADHD Self-Report Scale-Version 1.1 (ASRS-v1.1) Screener[15] was used to screen adults with ADHD. ASRS-v1.1 Screener is a symptom checklist of the 18-question World Health Organization ASRS, which evaluates all 18 *Diagnostic and Statistical Manual of Mental Disorders, Text Revision*, 4th edition, Criterion A symptoms of ADHD. Data was collected by distributing proformas in medical students manually. With 45 responses collected initially, Cronbach's alpha was calculated for determining internal consistency. It came out to be 0.74. Only then was ASRS administered in targeted audience.

The proforma consisted of four sections. First section comprised of demographic profile asking the subject's name, age, MBBS year, academic scores, and status (day scholar or boarder). Second section included questions about subject's physical activity and screen time in a week. Physical activity status was evaluated as sedentary or active by considering number of times a student exercised a week for at least 30 minutes. Laptop, television, and phone usage hours per day were determined separately and later summed up to determine their total daily screen time. The third section was a standardized Epworth Sleepiness Scale comprising of eight questions aimed at evaluating subject's tendency to doze off while being engaged in eight different situations. Score ranging from 0 to 3 was to be assigned to each situation based on criteria; 0 if the subject never dozed off, 1 if there was slight chance of dozing, 2 if there was moderate chance of dozing and 3 if there was high chance of dozing. Later all the item scores were summed up to acquire a grand score. Three score ranges categorized sleep habits as normal, borderline or abnormal based on the criteria: 0-10 Normal, 10-12 Borderline and 12-24 Abnormal. The fourth section of the form was Adult ADHD Self Report Scale (ASRS-V1.1) Symptom Checklist consisting of eighteen questions consistent with the DSM-V criteria. However, this questionnaire is a general assessment and not a confirmatory tool. Its results only declared the patient as being either symptomatic or not. Out of the eighteen questions, first six questions were stronger predictors of ADHD.

The questions generally were about attention span, ability to remember important things, ability to procrastinate on important tasks and patience. The scoring scheme was based on five-point Likert scale consisting of five response levels namely never, rarely, sometimes, often, very often. If four or more question statements received often/very often response, the subject was considered to have symptoms highly consistent with ADHD.

Data was then entered into SPSS. Nonparametric data was analyzed using SPSS version 20 for a confidence interval of 5 and confidence level of 95%. Association of screen time, physical activity and sleep pattern with ADHD symptoms was determined using chi square test. The significance value was set at p<0.05.

Results

Relation of ADHD Status with Demographic Characteristics

The frequency of self-reported ADHD symptoms was 12.17% (n=33). These ADHD vulnerable students met the criteria of DSM V. Remaining 87.8% (n=238) did not meet the screening criteria of ADHD and thus were not considered ADHD vulnerable. Out of the total sample size of 271, 30.6% (n=83) participants were 1st year MBBS students while 69.4% (n=188) were 2nd year MBBS students. Out of 83 first year MBBS students, almost 10% (n=)8 were ADHD symptomatic. Whereas 13.5% (n=25) of 188 second year MBBS students showed ADHD symptoms. ADHD status did not vary significantly between first- and second-year students (p=0546). 44.6% (n=121) participants were non-boarders while 55.4%(n=150) were boarders. 12.5% (15 out of 121) of the day scholars were diagnosed with ADHD symptoms. On the other hand, 12% (18 out of 150) of the boarders

Table I: Relation of Total ADHD Score with Demographic Characteristics

Demographic Variable	Mean ADHD Score	P value
Gender		
Male	50.1 + 8.68	0.227
Female	51.6 + 10.22	
MBBS year		
1st year	49.4 + 8.98	0.058
2nd year	51.8 + 9.96	
Boarding status		
Boarder	51.4 + 9.02	0.474
Day scholar	50.6 + 10.54	

exhibited the symptoms. However, the relation was not significant (p=1.00). 65.5% (n=25) of ADHD vulnerable were female but relationship was not significant (p=0.117).

Relation of ADHD Symptomology with Sleep

Mean Epworth scale score came out to be 9.69 (SD=3.36). 53.9% (n=146) had normal sleep pattern, 26.6% (n=72) had borderline pattern and 19.6% (n=53) had abnormal sleep pattern. Mean Epworth scale score did not vary significantly between males and females (p=0.668), between day scholars and boarders (p=0.802) and between first- and second-year students (p=0.0,321). A significant relation was not found between self-reported ADHD status and sleep pattern (p=0.58). However, total ADHD score had positive correlation with total Epworth scale score (r=0.158, p=0.009) showing greater tendency of respondents with disturbed sleep pattern to develop ADHD symptoms. Among ADHD symptomatic students, about 42% (n=14) had normal sleep pattern while 56% (n=132) of those without ADHD symptoms had normal sleep pattern. 42.42% (n=14) of ADHD vulnerable students had normal sleep pattern,9 (27.27%) was at the borderline while 10 (30.30%) turned out to have abnormal sleep.

Table II: Relationship of ADHD Symptomology with Sleep

Sleep Pattern	ADHD Status		Total	P value
	Symptomatic N (%)	Asymptomatic N (%)		
Normal	14 (42.42%)	134 (56.30%)	146 (53.87%)	
Border Line	9 (27.27%)	62 (26.05%)	71 (26.19%)	0.58
Abnormal	10 (30.30%)	42 (17.64%)	52 (19.18%)	
Total	33 (100%)	238 (100%)	271 (100%)	

Relation of ADHD Symptomology with Screen Time

Mean total screen time was 6.75 hours per day (SD=2.24). Mean screen time of males was significantly higher than females (p=0.006). Mean screen time of day scholars and boarders was found to be same (6.7 hours, SD 2.2, p=0.574). Similarly, mean screen time did not vary significantly between first- and second-year students (p=0.992). Mean screen time of ADHD symptomatic students (7.4

hours, SD 2.76) was slightly higher than those with no ADHD symptomology (6.7 hours, SD 2.15). However, relationship was not significant (p=0.078). Out of 33 ADHD symptomatic students, a vast majority i.e., 85% (n=28) had screen time of more than 2 hours a day. Total ADHD score showed significant positive correlation with total screen time (r=0.176, p=0.004). This leads us to an inference that those with higher screen time are more vulnerable to develop ADHD symptoms.

Table III: Relation of ADHD Symptomology with Screen Time

| Screen Time | ADHD Status | | P value |
	Symptomatic (Mean, SD)	Asymptomatic (Mean, SD)	
Total Screen Time	7.39 + 2.76	6.65 + 2.15	0.078
TV Screen Time	1.55 + 0.97	1.51 + 0.88	0.824
Mobile Screen Time	3.94 + 1.49	3.87 + 1.31	0.069
Laptop Screen Time	1.91 + 1.44	1.66 + 1.02	0.223

Relation of ADHD Status with Physical Activity

Out of total 271 students, 42.8% (n=116) did not exercise at all, 23.6% (n=64) exercised once, 21% (n=57) two to three times weekly, 5.5% (n=15) four times and 7% (n=18) more than five times weekly. A significant relation was found between physical exercise and ADHD symptoms (p=0.045). Among ADHD symptomatic respondents, 51.5% (n=17) reported to have never exercised regularly. Whereas, among ADHD asymptomatic individuals, 41% (n=99) had never exercised regularly. 27.3% (n=9) of the

Table IV: Relation of ADHD Symptomology with Physical Activity

| Physical Activity (at least 30 minutes) | ADHD Status | | P value |
	Symptomatic N (%)	Asymptomatic N (%)	
Never	17 (51.5)	99 (41.6)	
Once	9 (22.27)	55 (23.30)	
2-3 times	1 (3.03)	56 (23.53)	
4 times	1 (3.03)	14 (5.88)	0.045
5 or more times	5 (15.15)	14 (5.88)	
Total	33 (100)	238 (100)	

ADHD vulnerable students exercised once per week for half an hour and 21.2 (n=7) exercised twice or more than twice weekly on regular basis. A significant correlation was not found between total physical activity hours and total ADHD score (r= -0.31, p=0.606).

Discussion

The objective of this study was to study the presence of ADHD symptoms in medical students and contribute to this domain of research in medicine left partially and incompletely addressed as compared to the Western world.[13] The frequency of self-reported ADHD came out to be 12.17% which was high in comparison to 7.6% in Korean college students[10]. Physical activity and laptop and mobile usage hours were found to have significant association with ADHD symptomology in our study. Significant relationship did not exist between abnormal sleep time and ADHD. However, growing evidence suggests that sleep disorders are more common in individuals with ADHD. It was depicted in a research that those with clinically relevant ADHD symptoms had high prevalence of insomnia and reported longer as well as shorter sleep duration more often[16]. A research claimed that ADHD identified children had an average total sleep time of 8 hours 19 minutes whereas the individuals in control group had average sleep time of 8 hours 52 minutes.[17] ADHD suspects find it hard to go to sleep. One research stated that treating sleep problems may eventually lead to diminution of inattention and hyperactivity in children.[18]

Our study revealed a significant relationship between physical activity and ADHD symptoms. In a recent study, it was shown that those with ADHD were significantly less likely to meet recommended levels of physical activity as compared to those without ADHD.[20] Interventional studies have also demonstrated that physical activity helps in improving ADHD symptoms.[19] However, it has also been observed that a significant relationship between physical activity and ADHD symptoms does not exist[5]. To facilitate the respondents, separate questions were designed to inquire about laptop, mobile and television usage time. Later, each time span was added up to evaluate overall screen time. Significant relations were only obtained between ADHD and laptop and mobile usage hours

independently. A significant relationship between high screen time and ADHD symptoms has been found in previous studies also.[5] A recent study also revealed that children with ADHD are less likely to limit screen time to less than 2 hours per day.[21]

The findings of our study support the need for ongoing efforts to address lifestyle factors among the medical students. They also stimulate further investigation about the needs of youth with ADHD from both public health and clinical perspectives.

Limitations

Our research study has few limitations. The research results cannot be generalized due to small sample size and usage of nonrandom convenient sampling technique owing to constraint of time. We also had no information about occurrence of ADHD symptoms in childhood of the participants.

Conclusion

ADHD is found to have high prevalence in our study signifying the need to address it at a profound level in our society via thorough investigations. Prolonged screen exposure and lack of physical activity have significant association with ADHD symptomology. This highlights the importance of cutting down the screen time of the suspects and increasing their time of physical activity. Further epidemiological studies are warranted to determine the exact prevalence of ADHD in general population, to estimate ADHD burden in our society and to evaluate whether interventions could have a positive influence on the associations.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

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