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Prevalence of anxiety symptoms among caregivers of children with ADHD attending pediatric and speech therapy departments

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Abstract

Background Attention deficit hyperactivity disorder (ADHD) is a prevalent mental diagnosis among children. This leads to a persistent pattern of hyperactivity and inattention that hinders functioning and development and places strain on parents. The goal of this study was to assess the incidence of ADHD symptoms in a pediatric population and to measure anxiety, depression, and the burden of caregiving in parents.

Methods This study included 44 families with children who were monitored at King Hamad University Hospital's (KHUH) pediatric and speech therapy departments. In addition to sociodemographic questions, parents were required to complete scales including the parental ADHD diagnostic scale, the Screen for Child Anxiety Related Disorders (SCARED), anxiety (GAD7), depression (PHQ9), and burden of care (MCSI).

Results 18% of the young people ($n=8$) were formally diagnosed with ADHD. A regression analysis was performed on the population of those with ADHD, considering their sociodemographic traits and the outcomes of other scales. This revealed that children with ADHD and high scores on the SACRED questionnaire had a statistically significant relationship (p value of 0.012). The GAD-7 ($p=0.942$), PHQ-9 ($p=0.671$), and MCSI ($p=0.167$) questionnaires, on the other hand, were not significantly related. The study revealed that although parents did not exhibit any increased level of generalized anxiety, depression, or burden of care, they were more anxious about their children's health.

Conclusion Parents of children with ADHD have more anxiety regarding their children's health, but they do not experience more depression, anxiety, or excessive caregiving burdens because their children have symptoms of ADHD.

Keywords ADHD, Anxiety, Depression, Parental burden of care

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Attention-deficit/hyperactivity disorder (ADHD) is a common psychiatric disorder that is often diagnosed in the pediatric population. This results in an ongoing pattern of inattention that interferes with functioning and development. According to the Diagnostic and Statistical Manual of Mental Disorders [1]. ADHD is classified as a neurodevelopmental disorder that requires symptoms to be present for at least six months to fulfill diagnostic criteria. Children with ADHD have difficulty focusing and tend to act impulsively, which is then reflected in their self-esteem, social skills, and overall academic performance [2].

ADHD is classified into three main categories: (1) inattentive, (2) hyperactive-impulsive, and (3) a combination of both inattentive and hyperactive-impulsive. Based on its presentation [3], patients with ADHD may suffer from several comorbid conditions, with common characteristics such as poor frustration tolerance, aggressive behavior, extreme excitability, and emotional lability. Gallo and Posner also established the foundation for the observed correlations between emotion dysregulation and ADHD. Various studies have demonstrated that social and occupational difficulties are often associated with both hyperactive-impulsive and inattentive subtypes of ADHD. Researchers have explored the distinct relationships between comorbidities in children with and without ADHD, as well as the impact that ADHD has on parents [4]. Compared with parents of children without ADHD, parents of children with ADHD devote more time and energy to their children's academic lives.

When researchers examined the comorbidities of ADHD in children, they discovered that children with ADHD had significantly higher rates of comorbid anxiety disorders (27%) and depression disorders (18%), whereas children without ADHD had significantly lower rates or did not meet the clinical criteria for anxiety or depressive disorders [4]. According to Mitchison and Njardvik's research, ADHD was also found to cooccur in 19.3% of subjects with Oppositional Defiant Disorder (ODD), 41.96% with anxiety, and 21.43% with depression [5]. Moreover, Radmanovi and Burgi reported that those with ADHD are more likely to have language difficulties, disruptive mood dysregulation disorders, and chronic tic disorders. ADHD has also been linked to epilepsy, persistent inner ear infections and inflammation, early respiratory ailments and infections, trauma, poisoning, burns, and central nervous system abnormalities [6]. This risk of comorbidities has reflected a considerable increase in parental stress, as parents have reported feeling anxious because of the heightened scrutiny they receive due to their child's physiological and behavioral difficulties [7].

ADHD is one of the most common psychiatric disorders, with studies revealing that 60–90% of those with ADHD have a positive family history [3]. A large community study revealed that ADHD was diagnosed more frequently in boys than in girls. The male-to-female prevalence ratio was 4:1 [8]. Early intervention would undoubtedly benefit the progression of ADHD in children and prevent a late diagnosis in adulthood.

In terms of ADHD within the region, one study revealed an increasing prevalence of mental health issues among Gulf Cooperation Council (GCC) countries compared with existing international trends. ADHD diagnostic rates in the GCC range from 4.3 to 9% [9]. This range serves as a foundation for studies on ADHD in the region. According to a study conducted in Qatar, the incidence of ADHD in school-aged children is 8.3% [9]. A Saudi Arabian study that focused on the comorbidity of ADHD with ODD, conduct disorder (CD), anxiety disorders, and depressive disorders reported a 73% incidence rate between ADHD with ODD and CD [10]. Furthermore, anxiety and depressive disorders were found in 36% of the ADHD participants in the present study. The author emphasized the need to investigate mild ADHD manifestations that may lead to a diagnosis at an earlier developmental stage, as earlier treatments and resource allocations could have a major impact on management if successfully implemented.

Hence, the purpose of this study was to investigate the prevalence of ADHD symptoms reported by parents in the pediatric population at King Hamad University Hospital (KHUH) in the Kingdom of Bahrain. Additionally, this study examines the presence of depression and anxiety symptoms in parents of children with ADHD and ascertains the prevalence of perceived stress and burden in parents of children with ADHD. We hypothesize that parents of children with ADHD will report higher levels of depression, anxiety, perceived stress, and burden than parents of children without ADHD.

Materials and methods

Participants

Primary caregivers (either the mother or father of the patient) of 44 children attending the pediatric and speech therapy outpatient departments of KHUH were included in our study.

In accordance with our inclusion and exclusion criteria, Bahraini parents of children aged 2–14 years who were attending the pediatric or speech therapy department at KHUH were included in this study.

Selection criteria

We included those who met the following criteria: (1) their child was under clinical follow-up at KHUH's pediatric or speech therapy departments, and (2) the child had no history of marked developmental delays, syndromic/non-syndromic intellectual disabilities, or current/past treatment for psychological disorders with

psychotropic medication. Parents were informed about the study's purpose and procedures, provided an opportunity to ask questions, and accepted to provide written informed consent prior to participation.

Ethics

All methods were conducted in accordance with the guidelines and regulations of the King Hamad University Hospital (KHUH) and its Ethics Committee. The experimental protocols received approval from the KHUH Ethics Committee. Informed consent was obtained from all the subjects and/or their legal guardians, ensuring adherence to ethical standards.

Procedure

Parents were asked to complete a sociodemographic questionnaire and six quantitative scales that have been validated in the Arabic language, including the Vanderbilt ADHD Diagnostic Parent Rating Scale [11], the General Anxiety Disorder 7 (GAD7) [12], the Patient Health Questionnaire 9 (PHQ9) [13], the Screen for Child Anxiety Related Disorders (SCARED) Parent Version [14], the Pittsburgh Quality Sleep Index (PSQI) [15], and the Modified Caregiver Strain Index (MCSI) [16].

The data were entered into our database after all original surveys were anonymized. The statistical analysis was performed via SPSS v25 [17].

Scales

The Vanderbilt ADHD Diagnostic Parent Rating Scale is used to detect attention deficit/hyperactivity disorder (ADHD) in children between the ages of 6 and 12. It has a total of 55 questions, including all 18 of the DSM criteria for ADHD and should be completed by a parent of the child. On this scale, higher scores indicate a more severe diagnosis of ADHD. This provides us with structured, semi-objective, comprehensive information on the symptomatology and behavior of a particular patient, as observed by their caregivers. There is also a school version of the Vanderbilt ADHD Diagnostic Rating Scale, which was not used in our study.

One of the most widely used diagnostic scales for the diagnosis and severity evaluation of generalized anxiety disorder is the GAD7. The scores correspond to the following levels of anxiety: 0–5 mild, 6–10 moderate, 11–15 moderately severe, and 15–21 severe. This scale was completed by all parents who took part in the study.

The PHQ9 scale was used to evaluate symptoms of depression in our cohort of caregivers. The PHQ-9 is a 9-item scale with scores ranging from 0 to 3 for each item and a maximum score ranging from 0 to 27. For any given item on the scale, a score of zero indicates that the parents did not experience that particular symptom of depression, whereas a score of three indicates that they did so frequently. A total score of 1–4 is considered normal, but scores of 5–9, 10–14, 15–19, and 20–27 are considered mild, moderate, moderately severe, and severe depression, respectively.

SCARED is a screening tool for stress in children with childhood anxiety disorders such as generalized anxiety disorder, separation anxiety disorder, panic disorder, and school and social phobias. This was completed by the parents of the children enrolled in our study. An anxiety disorder may be present if the final score is greater than or equal to 25. However, the subgroups of anxiety disorders, such as separation anxiety disorder, panic disorder, social phobia, and school phobia, are more specific to those with scores higher than 30. The anxiety levels of children with ADHD were assessed via parental reports via this scale.

The PSQI was used to measure sleep quality. Each of the sleep components yields a score ranging from 0 to 3, with 3 indicating the greatest degree of dysfunction. The sleep component scores are summed to yield a total score ranging from 0 to 21. This scale was utilized to measure the quality of life of parents of children with ADHD.

Finally, the MCSI is a technique that may be used to swiftly screen for carer strain with long-term family carers. Having a child with ADHD adds stress to the family, especially parents. The MCSI is a 13-item instrument that assesses carer stress. A score of 7 or higher indicates a significant degree of stress, necessitating discussion and prioritization of psychological support techniques with carers to assist them as needed. The lowest score on this scale is zero, which indicates that the care provided does not have a negative psychological impact on caregivers.

Statistical analyses

The statistical analysis was conducted via SPSS version 25. The significance level was set at a p value of < 0.05. Descriptive statistics were used to summarize the demographics and baseline characteristics of the study population. Categorical variables are expressed as frequencies and percentages, whereas continuous variables are presented as the means and standard deviations. A regression analysis was performed to assess the relationships between ADHD diagnosis and various sociodemographic and clinical factors. This method was chosen because of its ability to evaluate the influence of multiple independent variables on a single dependent variable, making it suitable for analyzing the complex interactions in our dataset. Additional analyses included chi-square tests for categorical variables to determine associations between ADHD and other comorbid conditions. These statistical methods were appropriate for our study design, allowing for robust analysis of the relationships and differences within our sample, thereby providing insights into the prevalence of ADHD and its impact on caregivers.

Table 1 Sociodemographic information and chronic illnesses in the children

Child's Rank			0.160
Only Child ($n=3$, 6.8%)			
First Child ($n=12$, 27.2%)			
Middle Child ($n=7$, 15.9%)			
Last Child ($n=19$, 43.1%)			
Number of Siblings			0.488
Only Child ($n=7$, 15.9%)			
2–3 Children ($n=20$, 45.4%)			
4 or more Children ($n=15$, 34.0%)			
Number of siblings under the age of 5			0.605
One ($n=12$, 27.2%)			
Two or more ($n=4$, 9.0%)			
Variable	**Yes**	**No**	**P value**
Allergies (Child)	3 (6.8%)	41 (93.2%)	0.267
Medication (Child)	2 (4.5%)	42 (95.5%)	0.055
Previous Operations (Child)	5 (11.4%)	39 (88.6%)	0.560
Parental employment	27 (61.4%)	17 (39.6%)	0.767
Home Support	10 (22.7%)	34 (77.3%)	0.895
Social Support	13 (29.5%)	31 (70.5%)	0.646
Chronic illnesses in children reviewed in our study			
Variable	**Yes**	**No**	**Missing/Not completed**	**P value**
Psychological	2 (4.5%)	41 (93.2%)	1 (2.3%)	0.188
Medical	2 (4.5%)	40 (90.9%)	2 (4.6%)	0.773
Other	1 (2.3%) [G6PD]	43 (97.7%)	0 (0,0%)	-
ADHD	8 (18.2%)	30 (68.2%)	6 (15.6%)	-
Learning Disabilities	9 (20.5%)	33 (75.0%)	2 (4.6%)	0.068

Results

Our sample included 44 parents of children who were attending pediatric or speech therapy outpatient clinics at KHUH with their children. The sample included 36 (81.1%) male and 8 (18.9%) female children. The median age for the cohort was 3 years, with a range from 2 years to 10 years. Mothers more commonly bring children to their appointments, as 65.9% ($n=29$) of the parents were females, whereas 34.1% ($n=15$) of the parents were males. The most common age in the parental population was 40 years, with an age range of 25–49 years. Most parents (97.7%) were together; there was only one child with separated parents (2.2%). The remainder of the socioeconomic information of the participants is displayed in Table 1.

Most of the participants' parents were healthy, and only a few were diagnosed with diabetes (DM), hypertension (HTN), asthma, hypercholesterolemia, or a different chronic illness. Other chronic illnesses included, but were not limited to, PCOS, G6PD deficiency, or eczema. Parental asthma appeared to be a statistically significant factor for ADHD in our surveyed population ($p=0.057$), we had 6 participants who did not complete the ADHD scale for their children. Chronic illnesses were generally seen in parents above the age of 39, with only one case of asthma recorded at the age of 26. The marital status of the parents was not significantly different in this population relative to the child's diagnosis of ADHD ($p=0.178$). The assessment of the children's chronic illnesses revealed that most of the children were physically healthy, with only two cases reporting a diagnosis of G6PD deficiency. The data for chronic illnesses, including mental health diagnoses in the children, are also summarized in Table 1 above.

Developmental milestone achievements for children were solicited from their parents, and most indicated that their children had achieved sitting, walking, and talking milestones at an appropriate age. One case indicated that the child did not reach their talking developmental milestones in time. Two parents indicated cases of speech delay.

Parents were asked about the diagnosis of ADHD or other learning disabilities that their children may have. The prevalence of ADHD was 18% ($n=8$). Regression analysis was conducted on the ADHD population with a set of questionnaires that were given to the parents at the time of consent. The results showed that the SCARED questionnaire was significant, with a p value of 0.012. On the other hand, the GAD7 ($p=0.942$), PHQ9 ($p=0.671$), and MCSI ($p=0.167$) questionnaires did not achieve statistical significance. Further regression analysis of subscales of the questionnaires that screened ADHD symptom clusters like attention deficit, hyperactivity, and impulsivity symptoms, did not demonstrate statistical significance. They were reported as ($p=0.710$), ($p=0.060$) and ($p=0.267$) respectively. The Pittsburgh Sleep Quality Index components were not significantly different.

As part of our study, parents took the Screen for Child Anxiety Related Emotional Disorders (SCARED) questionnaire, which, as the name suggests, screens children to identify those likely to harbor anxiety disorders [14, 18]. This method has been shown to have great effects and has been cross-culturally validated in various diverse settings [19, 20]. As these results show, parents had concerns regarding the emotional health of their children; the scores showed partial significance in children who had been diagnosed with ADHD ($p=0.012$). These scores reflect the emotional burden on parents caring for children with ADHD. Exploring this broader finding in the context of their GAD-7 results, which generally showed that parents did not suffer from a baseline anxiety

disorder themselves, demonstrated that the potential emotional upset of their children was a cause for concern in otherwise psychologically well parents.

Discussion

Our study revealed that 18% of children were formally diagnosed with ADHD. This prevalence aligns with regional studies indicating a rising trend in ADHD diagnoses within Gulf Cooperation Council (GCC) countries. The significant relationship between ADHD and anxiety, as revealed by the SCARED questionnaire ($p = 0.012$), suggests that children with ADHD are more prone to anxiety disorders. This finding underscores the necessity for clinicians to screen for anxiety symptoms in children diagnosed with ADHD to provide comprehensive care.

Previous studies have reported that ADHD is often comorbid with anxiety disorders, with rates approaching 25% [21]. The findings of this study also support the notion that children with ADHD are at greater risk of exhibiting anxiety symptoms compared to children without ADHD. This finding reinforces that the comorbidity of ADHD and anxiety symptoms needs more attention than the comorbidity of ADHD with externalizing disorders, such as conduct and oppositional defiant disorders. The comorbidity rate of ADHD with externalizing symptoms is approximately double the rate of the comorbidity of ADHD and anxiety symptoms. However, the latter comorbidity deserves careful attention and awareness because it may have important implications for etiology, assessment, and treatment [22].

A systematic review study has reported that social functioning (SF) deficits are common in both ADHD and anxiety populations. This may indicate that social functioning can be a common denominator for the comorbidity of ADHD with anxiety symptoms in the children in our study [23]. Comorbidity continues throughout the life span with an interesting overlap. For example, in childhood, the presence of anxiety could prevent the typical inhibitory dysfunction present in ADHD, in adolescence it can increase the deficit of working memory, while in adulthood it may enhance the presence of sleep problems. This comorbidity has been reported to have worse outcomes compared to children who do not have ADHD [24].

Therefore, in along with cognitive behavioural treatment, people with comorbid ADHD and anxiety disorders would benefit from additional psychosocial or pharmacological approaches [25].

Parents did not show increased generalized anxiety or depression according to the GAD-7 and PHQ-9 scales. This can be interpreted as that parents are more concerned about their children's health rather than their own mental well-being. This highlights the importance of addressing parental concerns as part of a holistic approach to managing ADHD in children. Offering parental support and counseling may help alleviate these concerns, contributing to better outcomes for both children and their families.

The study also examined the burden of caregiving through the Modified Caregiver Strain Index (MCSI). Contrary to our hypothesis, parents of children with ADHD did not report an excessive caregiving burden ($p = 0.167$). This could be due to the availability of support systems or coping strategies developed by these families. Further research is needed to explore these factors, which could inform interventions aimed at reducing caregiver strain in more affected populations.

These findings emphasize the critical need for early intervention and comprehensive screening in children suspected of having ADHD. Identifying ADHD and cooccurring anxiety disorders early can lead to timely interventions that may prevent the development of more severe psychological issues. Educational programs for parents and healthcare providers can increase awareness and improve management strategies for ADHD. The diagnosis of ADHD was predicated on the presence of significant and impairing levels of inattentiveness, impulsive and hyperactive behavior, beyond what would be expected for the child's normal stage of development. These behaviors can have a significant impact on an additional 5% of children who are just short of the criteria for full diagnosis. ADHD often continues to impact individuals into adulthood; it also constitutes a risk factor for other psychiatric disorders, such as defiant, disruptive, and antisocial behaviors; emotional problems; self-harm; and substance misuse. This may further lead to broader negative outcomes such as educational underachievement and exclusion from school, difficulties with employment and relationships, and criminality [26]. As suggested by Alqahtani et al., early recognition and management of ADHD behaviors provide healthcare workers, patients, parents, and social services workers with the opportunity to improve overall long-term outcomes [10].

The results of this study illustrated that children with ADHD were more likely to experience anxiety. This finding was most apparent when highlighting the results obtained from the SCARED questionnaire, which demonstrated that children who fit the criteria for ADHD also displayed traits of childhood anxiety disorders. Moreover, the SCARED questionnaire revealed that parents themselves were anxious with respect to the health of their child; however, these same parents had no generalized anxiety traits when the GAD-7 was used.

The findings also revealed that most children whose parents had long-term illnesses were healthy and exhibited no symptoms of ADHD. This study can educate the community on the importance of diagnosing ADHD in children to prevent future negative outcomes. More

studies on this topic are crucial, as the prevalence of children with ADHD is increasing. In conclusion, it will help guide appropriate screening, thus contributing to early detection for more effective management.

The SCARED questionnaire results showed a statistically significant link between ADHD diagnoses and increased anxiety symptoms among children, as reported by parents. This tool measures children's anxiety through parent reports, but the higher scores might also indicate parents' worries about their child's emotional and behavioral issues. For example, if parents are worried about symptoms like separation anxiety or social phobia in their children, it could be due that they are overly vigilant or preoccupied with their child's well-being, even though their own anxiety level was not significant according to parents' GAD-7 and PHQ-9 scores.

This is important because it reveals that while parents may not suffer from generalized anxiety or depression, their intense concern for their child's health could not be assessed by SCARED, which may signify a subtle form of caregiver stress. Anecdotal evidence gathered during data collection, such as parents expressing concerns about their child's future, adds depth to this interpretation. However, a significant limitation is the absence of direct measures for parental health-related anxiety for their children. This indicates that future research should consider including validated tools that assess specific caregiver concerns, like the Parenting Stress Index.

Limitations

This study is limited by its small sample size and data collection from a single hospital, which makes the results difficult to extend to the general population of Bahrain. Future research should consider replicating this study and recruiting participants from a larger pool in the community, including educational settings. Assessing social functioning of the children would have added more insight about the comorbidity of ADHD and anxiety.

However, in our cohort, there was a link between formally diagnosed ADHD and learning disabilities (LDs) ($p = 0.068$). This finding is in line with previous research on ADHD, where as many as a third of children and adolescents with ADHD are also reported to have difficulties with learning, with the exact prevalence varying depending on definitions of LDs. Therefore, future studies would benefit from looking more closely at the links among ADHD, LD, and possible interventions in that regard.

ADHD assessments relied solely on parent-reported symptoms without teacher input or comprehensive clinical evaluation, meaning the findings reflect only parental perceptions rather than confirmed diagnoses.

The hospital-based clinical sample may not fully represent the broader population of children with ADHD, as those attending specialized hospital departments and delayed speech, might differ from those managed in community or school settings in terms of symptom severity, comorbidities, or access to care.

Conclusion

Parents of children with ADHD have more anxiety regarding their children's health, but they do not experience more depression, anxiety, or excessive amounts of caregiving burden as a result of their children having symptoms of ADHD.

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N/A.

Author contributions
Aldana Zayed1 participated in the research idea conception, supervised the data collection, analyzed the results and wrote the manuscript.*Mariwan Husni1,2,3 and Haitham Jahrami2,6 participated in the research idea conception, supervised the data collection, analyzed the results and wrote the manuscript.Mohammed Al Montasser Mahmoud4 participated in the research idea conception, supervised the data collection, analyzed the results and wrote the manuscript.Maryam Fakri5: Literature review, data collection and manuscript writing. Fateh Khan5 assisted in the literature review, collected the data and wrote the manuscript.Yousif AlMaskati5, Zainab Shamlan5, Aysha Shujaie5, Shoug AlGhazal5, Yasmeen Abusiyam 5, and Fatima AlMoqahwi5, these authors all helped collect data and approach participants of the study. They helped with data insertion and organizing, preparing and reviewing the manuscript and references. They were all very active in the study.

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Data availability
All data and materials are available upon request without participants' identifiable information.

Declarations
All methods were carried out in accordance with the KHUH hospital and ethics committee guidelines and regulations. All experimental protocols were approved by the KHUH Ethics Committee. We confirm that informed consent was obtained from all the subjects and/or their legal guardian(s).

Ethics approval and consent to participate
We obtained formal approval from the King Hamad University Hospital (KHUH) Ethics Committee. We also obtained written consent from all study participants.

Consent for publication
Not applicable. A publication does not identify information/images in an online open-access publication. This point is not relevant to our study.

Competing interests
The authors declare no competing interests.

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