Exploring Sleep Patterns of Children with ADHD: Mothers' Perspectives in Saudi Arabia

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ABSTRACT

Context: ADHD, a neuro-developmental disorder, is characterized by core psychopathological features including inattention, hyperactivity, and impulsivity. Sleep disturbances are commonly observed among children with ADHD, resulting in heightened consequences such as compromised impulse control, difficulties in sustaining attention, and long-term impacts on academic performance, social interactions, and overall well-being.

Aim: Explore the sleep patterns of children with ADHD from their mothers' perspectives in Saudi Arabia.

Methods: A quantitative, cross-sectional research methodology was employed in this study, with a sample comprising 103 mothers whose children have been affected by ADHD. Data for the study was obtained through the utilization of online structured questionnaires as the primary data collection tool.

Results: The study reveals that more than half of the children, specifically 58%, fell within the 6-12-year-old age range, boys constituted the predominant group, accounting for 74% of the children. 18% of mothers reported their children usually had sleeping problems, 49% reported their children had sleeping problems. 87% of mothers do not know about ADHD disorder, also 44% of them do not know about sleep problems. In terms of maternal interventions, a significant proportion of participants, namely 89%, took proactive measures, such as reading stories (89%), maintaining consistent sleep schedules, and creating a serene environment, as reported by 74% of the participants. The study identified several challenges associated with sleep, with bedtime resistance being the most reported issue at 74%.

Conclusion: A significant number of mothers reported that their children with ADHD often experience significant sleep disturbances. This finding is particularly evident in boys aged 6 to 12, who are more susceptible to both ADHD symptoms and related sleep issues. Addressing these sleep challenges is crucial for improving their overall well-being. Parents need to understand the relationship between sleep disturbances and ADHD to implement healthy sleep habits. Interventions such as reading bedtime stories, co-sleeping, and adjusting head positions can be beneficial.

Keywords: ADHD, children, mothers, Saudi Arabia, sleep pattern

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1. Introduction

Attention Deficit Hyperactivity Disorder (ADHD), known as a neurodevelopmental disorder, is characterized by core symptoms such as difficulty paying attention, excessive activity, and impulsivity *(Bond et al., 2024).* The persistence of ADHD is negatively correlated with the quality of life for both individuals and their families. Furthermore, sleep duration may influence how well a patient responds to treatment, as ADHD is associated with various sleep-related issues *(Kwon et al., 2022).*

Research suggests that improving sleep may help alleviate symptoms of ADHD. Understanding the reasons behind the coexistence of ADHD and sleep problems, as well as identifying individuals with ADHD who are particularly vulnerable to these issues, is essential *(Kwon et al., 2022).* Approximately 5% of the global population of school-age children is affected by ADHD, with a significantly higher diagnosis rate in boys compared to girls, who are three times more likely. Therefore, effective management of ADHD is crucial for enhancing an individual's quality of life and daily functioning *(Bond et al., 2024*).

Additionally, around 30% of children with ADHD experience the disorder in varying degrees of severity. Those with ADHD are at an increased risk of sleep issues and often face behavioral challenges, difficulties with attention, irritability, emotional instability, and lower frustration tolerance. While the causes of ADHD are complex, studies suggest a shared neurological connection between sleep disturbances and ADHD *(Yin et al., 2022).*

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However, fewer researchers discussed sleeping problems among ADHD children in Saudi Arabia. According to another study done on 83 children with ADHD, ages ranging from 6 years to 18 years, most reported sleeping problems were related to the onset of sleep and its duration, mainly short sleep duration and long sleep onset. Additionally, it is often accompanied by daytime sleepiness. The study found that 84% of participants experienced sleep problems *(Bond et al., 2024).*

2. Significance of the study

Research indicates that up to 70% of children with ADHD experience sleep disturbances. These issues can exacerbate ADHD symptoms, leading to challenges in behavior, academic performance, and social interactions. Sleep problems significantly affect the quality of life for both children and their families. Children may face increased emotional distress and difficulties in forming relationships, while parents often experience heightened stress and anxiety due to their child's struggles. The economic burden associated with ADHD is substantial. Families may incur costs related to healthcare, educational support, and lost productivity, which can total thousands of dollars annually. This financial strain can further exacerbate the stress levels within the family *(Bondopandhyay et al., 2024).*

First and foremost, this study offers valuable insights for mothers of children with ADHD, enabling them to comprehend the connection between sleep problems and the subsequent effects on ADHD symptoms. Armed with this knowledge, mothers can effectively adopt various strategies to enhance the quality of their children's sleep.

3. Aim of the study

This study aims to explore the sleep patterns of children with ADHD from their mothers' perspectives in Saudi Arabia.

3.1. Research question

What are the sleep patterns of children with ADHD in Saudi Arabia from their mothers' perspectives?

4. Subjects & Methods

4.1. Research Design

A quantitative, cross-sectional design was implemented. A cross-sectional study is an observational study in which the researcher collects data on a group of participants at a single point in time *(Thomas, 2023).* The design will explore the sleep patterns among different ages and genders in children with ADHD in Saudi Arabia from their mothers' perspectives.

4.2. Study Setting

In this study, data collection encompassed the entire country of Saudi Arabia. To reach participants nationwide, targeted outreach was conducted through various social media platforms, including WhatsApp, Twitter, Snapchat, and Instagram. Engaging posts and invitations were created and shared in relevant groups and communities across these platforms. Additionally, hashtags pertinent to the study's theme were utilized to enhance visibility and attract a broader audience. To maintain randomness, invitations to participate were distributed at different times and on various days, minimizing selection bias. This approach allowed for a broad representation of mothers within the specified parameters, ensuring relevant insights into the experiences of those caring for children with ADHD in Saudi Arabia.

4.3. Subjects

The sample size for this study consisted of 103 mothers of children diagnosed with ADHD. The participants were selected through a convenient sampling method, utilizing questionnaires derived from prior research

Inclusion criteria

- Saudi mothers caring for children aged 3 to 12 years with ADHD.
- No restrictions based on ethnicity, socioeconomic status, or educational background.
- A diverse age range of mothers.

Exclusion criteria

- Non-Saudi mothers.
- Children older than 12 years.

4.4. Tools and Data Collection

4.4.1. Online Structured Questionnaire

The questionnaire is adopted from *Metwally et al., (2023).* It consists of 19 questions distributed as follows: Mother's demographics (6 MCQs) to assess the sociodemographic characteristics of the mothers, children's characteristics (4 MCQs) to assess the sociodemographic characteristics of the children, mothers' knowledge assessment regarding ADHD (8 MCQs) was used to assess mothers' knowledge regarding ADHD and sleeping problems among their children with ADHD, and mothers were allowed to select all answers that applied to their children's problems. Also, the questionnaire include section for mothers' interventions (5 questions) for evaluating a mother's intervention for her child's sleep habits, each with multiple response options. The last section includes questions about the child sleeping habits (2 questions). In this section, mothers were allowed to select all answers that applied to their children's sleeping problems.

Scoring system

Each knowledge question (for ADHD and its sleep problems) was scored on a yes or no basis. The frequency of sleep problems was rated on a three-point scale: "usually" if the sleep behavior occurred five to seven times/week; "sometimes" for two to four times/week; and "rarely" for zero to one time/week. A higher score indicates more disturbed sleep.

4.5. Procedures

Ethical considerations: The study seeks ethical approval from the Ethics and Research Committee of the Faculty of Nursing at King Abdulaziz University in Jeddah, Saudi Arabia. It is important to note that the participants' rights are upheld and protected, ensuring their privacy. The researchers are committed to maintaining the confidentiality of participants' information. It is emphasized that participation

in the study is voluntary, and all the necessary information about the study is provided at the beginning of the online survey. By completing the survey, participants are considered to have given their informed consent.

Validity and reliability: Three experts from Cairo and Ain Shams Universities—two professors of pediatric nursing and one lecturer in psychiatric medicine—tested and evaluated the tools for face and content validity. In addition, to determine the relevance, clarity, and completeness of the tools, experts elicited responses that were either 'agree' or 'disagree' for the face and content validity. The suggested tools encompassed topics on which at least 85% of the experts agreed. As a result, the necessary adjustments and changes were made. Utilizing the Cronbach's alpha test, the dependability of the suggested tool was evaluated; tool's score was 0.98.

The pilot study conducted with 10 mothers with no significant changes in the questionnaire responses. The pilot sample were later included in the main study sample. The researcher uses an online questionnaire distributed through social media platforms like WhatsApp, Instagram, Facebook, and Twitter, over a period of two months.

4.6. Strengths and limitation

The study possesses notable strengths, as it addresses a significant gap in the existing literature. There is a scarcity of research examining the effects of Attention-Deficit/Hyperactivity Disorder (ADHD) on children of varying ages and genders in the context of Saudi Arabia. Consequently, our study aims to contribute to the current knowledge base by exploring the sleeping patterns of children with ADHD across different age groups and genders in Saudi Arabian children.

Despite the strengths, the study findings are subject to several limitations that should be acknowledged. Firstly, the sample size consisted of only 103 mothers, which may limit the generalizability of the results to larger populations. Secondly, due to time constraints, the researchers were unable to collect data beyond a specific timeframe, which may have limited the comprehensive nature of the findings. Lastly, the study did not investigate the long-term impact of Attention-Deficit/Hyperactivity Disorder (ADHD) among adolescence, leaving room for future research to explore this aspect in greater detail.

4..7. Data analysis

Descriptive statistics were applied to sociodemographic variables, the mother's knowledge, the mother's interventions for sleeping problems, and sleep habits. Data were reported as percentages and frequencies. The data entry and analysis were conducted using the most up-to-date version of the Statistical Package for the Social Sciences (SPSS), version 28. Descriptive statistics, including means, medians, percentages, frequencies, and standard deviations, were employed for the analysis.

5. Results

Table 1 represents the frequency and percentage distribution of mother's demographics. A total of 103 mothers of children with attention deficit hyperactivity disorder participated in this study. In the sample, mothers' ages were less than 25(4.85%), between 25-45 (74.75%), and more than 45 years 21(20.39%). For the educational level, most mothers had bachelor's degree 85.44%, high school was reported by 9.71%, and middle school by 4.85%. Mostly mothers reported that they had no work by 58.25%, and mothers had work by 41.75%. For the social status, 90.29% of mothers were married, and 5.82% were divorced and 3.88% were widowed.

Table 2 demonstrates the frequency and percentage distribution of children's characteristics**.** The children's characteristics indicate that most of the children were aged 6-12 years, accounting for 58.25%. 41.75% of the children were between 3 and 6 years of age. Child rank was the first at 49.51%, 15.53% of children were second in rank, 12.62% of the children were third in rank, and 22.33% is in more than third rank. For child gender, most children were boys at 74.76%, and 25.24% were girls. For child education, 64.08% of the children were in the primary level, 31.07% were in the preliminary level, and 4.85% were in the nursery level. For living, the place is Saudi Arabia; 63.11% of the children were in the western region, 26.21% in the middle, and 10.68% in the eastern region. Most of them have no family history of ADHD, at 71.84% and 28.16% have a history of ADHD.

Table 3 demonstrates the frequency and percentage distribution of sleep problem among the children with ADHA. 18.4% of mothers reported their children usually had sleeping problems, 47.57% reported their children sometimes had sleeping problem and 33.98% reported rare sleeping problems.

Table 4 displays the sleep problems experienced by children with ADHD. The table shows that bedtime resistance (73.79%), sleep onset delays and duration issues (33.98%), sleep anxiety (52.43%), waking during the night (11.65%), parasomnias (44.66%), sleep-disordered breathing (77.67%), and daytime sleepiness (87.38%).

Table 5 clarifies the mother's knowledge about ADHD disorder and related sleep problem. The table shows that 72.82% understand the meaning of ADHD, 66.05% were aware of its causes, 53.40% are familiar with ADHD clinical manifestations, 43.69% are aware of its treatment, and 86.41% did not aware of various aspects of ADHD disorder. Regarding to mother knowledgeable about sleep problems, the table shows that 65.05% know the meaning of sleep problems, 85.44% know about the causes of sleep problems, 71.85% know about clinical manifestations, 64.08% know about treatment, and 39.81% do not know about sleep problems.

Table 6 reveals the frequency and percentages distribution of mothers' interventions to manage the sleep problem among their children with ADHD. The results reveal that a considerable majority of participants, namely 88.35% engaged in activities such as reading stories and maintaining consistent sleep schedules, and creating a serene environment (73.79%), as well as exercising (74.76%).

To promote a sense of calmness if they had a nightmare, 89.32% of mothers sleep with their children when they have

a nightmare, 82.52% talk to their children, and 72.82% cuddle with their children.

When a child has difficulty breathing during sleep, 89% of mothers intervene by providing relaxation and deep breathing exercises, 69.90% contact a medical professional, and 66.99% elevate the child's head. The findings indicated that 89.32% of mothers reported waking their child during the night, with 76.70% engaging in conversation with the child, while 39.81% reported taking no specific action. 40.78% of mothers do nothing when the child grinds his or her teeth during sleep; 76.70% move the child's head; and 66.99% use a tongue depressor.

Table (1): Frequency and percentage distribution of mother's demographics (n=103).

Demographic Variables	Frequency	Percentage
Age		
less than 25	5	4.85
25-45	77	74.75
More than 45	21	20.39
Education level		
Bachelor	88	85.44
High school	10	9.71
Middle school	5	4.85
Work status		
Yes	43	41.75
No	60	58.25
Social status		
Married	93	90.29
Divorced	6	5.82
Widowed	4	3.88

Table (2): Frequency and percentage distribution of children characteristics (n=103).

Characteristics	Frequency	Percentage
Age		
3-6 year	43	41.75
6-12 year	60	58.25
Child Rank		
First	51	49.51
Second	16	15.53
Third	13	12.62
More	23	22.33
Gender		
Male	77	74.76
Female	26	25.24
Child education level		
Primary	66	64.08
Preliminary	32	31.07
Nursery	5	4.85
Living		
Western	65	63.11
Middle	27	26.21
Eastern	11	10.68
Family History of ADHD:		
No	74	71.84
Yes	29	28.16

Table (3): Frequency and percentage distribution of sleeping problems among children with ADHD (n=103).

Sleep problem frequency	Frequency	Percentage
Rarely	35	33.98
sometimes	49	47.57
Usually	19	18.44

Table (4): Frequency and percentage distribution of sleeping problems among children with ADHD (n=103).

Sleep problems	Frequency	Percentage
Bedtime resistance	76	73.79
Sleep onset delay	35	33.98
Sleep anxiety	54	52.43
Waking during the night	12	11.65
Parasomnias	46	44.66
Sleep disordered breathing	80	77.67
daytime sleepiness	90	87.38

Table (5): Frequency and percentage distribution of Mother's Knowledge about ADHD and related sleep problems (n=103).

Knowledge elements	Frequency	Percentage
ADHD		
Meaning of ADHD	75	72.82
Cause of ADHD	67	66.05
Clinical Manifestation of ADHD	55	53.40
Treatment of ADHD	45	43.69
Don't know	89	86.41
ADHD related sleeping problem		
Meaning of sleeping problems	67	65.05
Causes of sleeping problems	88	85.44
Clinical Manifestation of sleeping problems	74	71.85
Treatment of sleeping problems	66	64.08
Don't know	41	39.81

Table (6): Frequency and percentage distribution of mother's interventions to manage sleep problems (n=103).

Interventions	Frequency	Percentage
Interventions to promote sleep		
Exercise	77	74.76
Maintaining consistent sleep schedules, and creating a serene environment	76	73.79
Read stories	91	88.35
Interventions in case of nightmare		
Sleep with the child	92	89.32
Taking with child	85	82.52
Cuddle	75	72.82
Interventions in case of difficulty breathing		
Elevate child head	69	66.99
Provide relaxation and deep breathing exercises	91	88.35
Call a doctor	72	69.90
Wake up the child	92	89.32
Talk with child	79	76.70
None	41	39.81
Interventions in case of teeth grinding		
Move child's head	79	76.70
Place tongue depressor	69	66.99
Do nothing	42	40.78

6. Discussion

Attention deficit hyperactivity disorder (ADHD) and sleep disturbances are mutually influential. The symptoms associated with ADHD, including hyperactivity, can disrupt the ability to initiate sleep and negatively impact sleep quality *(Joseph et al., 2022).* Children diagnosed with ADHD often encounter sleeping problems such as resistance at bedtime, delayed sleep onset, and breathing difficulties with sleep. This study aims to explore the sleep patterns of children with ADHD from their mothers' perspectives in Saudi Arabia.

The study assessed the demographics of 103 mothers of children with ADHD in Saudi Arabia, revealing that most of the mothers were aged between 25-45 years, indicating they are in their prime parenting years. A significant majority held a bachelor's degree, suggesting higher awareness and access to ADHD-related resources, while a few had only a high school or middle school education. Employment status reveals that more than half of the mothers were unemployed, which potentially limited their access to support services and increased their stress.

Additionally, the majority were married, which could provide a supportive environment; however, a few mothers were divorced or widowed. These findings underscore the importance of considering socioeconomic and educational factors when addressing the needs of families affected by ADHD. A study indicates that specific and accurately assessed parental social disadvantages, such as unemployment, relative income poverty, and low educational attainment, each have a distinct impact on the likelihood of ADHD *(Keilow et al., 2020).*

According to the study results, in child gender distribution, it was noted that a significant majority of the children were boys, making up more than half of the total, corroborating previous research findings indicate a higher prevalence of ADHD among boys *(Bond et al., 2024).* However, in the past 20 years, research has revealed that ADHD is not solely a disorder that affects males. Females are also significantly impacted by ADHD, and in some cases, they may be affected even more than males *(Faheem et al., 2022).* Recent studies have provided credible evidence that females with ADHD face significant challenges in various aspects of their lives, such as academics, cognition, psychosocial functioning, and mental health, at rates similar to males with ADHD compared to females without the disorder *(Faheem et al., 2022).*

The findings show that a significant number of children diagnosed with ADHD are aged between 6 and 12 years, a critical time for their educational and social growth. This stage coincides with the beginning of formal schooling, where expectations for attention, organization, and impulse control intensify. As a result, symptoms of ADHD often become more noticeable, leading to diagnosis and necessary interventions, corroborating previous research that involved preschool-aged children diagnosed with ADHD demonstrated heightened levels of nocturnal motor activity and significant night-to-night variability in both sleep duration and motor activity *(Melegari et al., 2020).* Another study showed that age differences or variations in behavioral and emotional issues were not linked to these sleep issues (results were confirmed even after adjusting for internalizing and externalizing symptoms) *(Saccani et al., 2022).*

The current study reveals that most of the mothers under study reported their children have usually and sometimes experience sleep difficulties. These difficulties were in terms of daytime sleepiness, sleep disordered breathing, bedtime resistance, sleep anxiety, parasomnias, sleep onset delay, and walking during the night. Children with ADHD experience sleep difficulties due to a combination of neurological, behavioral, and psychological factors including brain regulation issues, delayed internal clocks, poor bedtime routines, and coexisting conditions like anxiety. Stimulant medications and movement disorders can also disrupt sleep. These factors make it harder for them to fall asleep, stay asleep, or wake up refreshed, creating a cycle that worsens ADHD symptoms. Similar study reported that ADHD symptoms, specifically hyperactivity, can lead to an extended period required to fall asleep, heightened frequency of awakenings during the night, and diminished overall sleep quality *(Breaux et al., 2020).*

The results also align with a study *by Rolling et al. (2022)*, which reported that children with ADHD frequently experience sleep challenges, including resistance at bedtime and breathing difficulties. Another study reported that various studies have failed to find consistent differences in sleep architecture between individuals with and without ADHD. Still, a few distinctions have surfaced *(Wajszilber et al., 2018; Breaux et al., 2020).*

These studies' findings highlight the need for mothers to receive further education and support regarding the sleep problems among children with ADHD, as well as the utilization of various strategies to promote healthy sleep habits in children. Regarding maternal knowledge of ADHD, the findings indicate that many mothers recognize the disorder's definition and understand its causes and clinical manifestations. However, awareness of treatment options is comparatively lower. Notably, a significant number of mothers demonstrate a lack of overall knowledge regarding ADHD, highlighting a critical area for educational intervention and awareness initiatives. This gap suggests the need for targeted efforts to enhance understanding of ADHD among mothers, which could ultimately benefit children affected by the disorder.

The interventions employed by mothers to address their child's sleep issues reveal significant variability, with most of them opting to read stories, exercise, and maintaining consistent sleep schedules, and creating a serene environment, as indicated by our findings. This finding aligns with research by *Breaux et al. (2020),* which noted that parental intervention strategies such as co-sleeping and reading bedtime stories are common among families dealing with sleep disturbances. Recent research in this field indicates that several key elements necessary for establishing and sustaining effective bedtime routines are already present, parents understand the importance of optimal bedtime routines and they know the steps involved in creating such routines, parents struggle to find reliable information on how to modify or establish bedtime routines due to insufficient official guidance, they rely too heavily on past experiences, they perceive routines as fixed habits that are difficult to change; and they lack motivation to make adjustments *(Kitsaras et al., 2021).*

Compared with other studies, a study found that a brief behavioral sleep intervention, which delivers individually customized methods to children and their families, was related to minor to moderate long-term sleep gains at a 12-month follow-up. While sustained benefits in child and parent daytime functioning were limited, there were slight improvements in child reciprocal social interaction and parent mental health at the 12-month follow-up. Children randomly assigned to the intervention group showed improved outcomes in terms of bedtime resistance, sleep onset delay, sleep duration, parasomnias, and overall sleep problems *(Pattison et al., 2024).* Collectively, these studies underscore the importance of understanding both parental strategies and the specific challenges faced by children with ADHD to improve sleep outcomes.

The findings reveal that many mothers actively seek solutions for their children's sleep challenges by fostering a conducive sleep environment and implementing relaxation methods. Nevertheless, the frequent occurrence of sleep-related difficulties, such as anxiety and breathing problems, highlights the necessity for enhanced educational materials for parents. Recent studies reinforce these findings, such as *Mindell and Williamson (2018)* demonstrated that parents who established bedtime routines significantly improved their children's sleep quality, emphasizing the effectiveness of a structured environment in alleviating sleep issues.

Additionally, *Hoyniak et al. (2022)* explored the impact of parental education on children's sleep health and concluded that providing parents with comprehensive resources significantly reduced instances of sleep disorders, aligning with the need highlighted in the original findings. Moreover, a systematic review by *Alharbi and Bajaifar (2024)* indicated a strong correlation between parental awareness of sleep hygiene practices and the reduction of anxiety-related sleep disturbances in children. These findings support the call for improved educational tools, suggesting that informed parents can lead to healthier sleep patterns in their children. Collectively, these studies underscore the importance of parental involvement and education in addressing children's sleep issues, reinforcing the assertion about the proactive measures mothers are taking and the need for better resources.

7. Conclusion

ADHD and sleep disturbances are interconnected, as evidenced by the disruptive symptoms of hyperactivity that can interfere with sleep and negatively impact its quality. This study highlights important aspects of child demographics, maternal understanding, and interventions related to sleep and attention deficit hyperactivity disorder (ADHD). The study reveals that the majority of children are aged 6-12 years, with a notable preponderance of boys. While many mothers are aware of ADHD, there is a significant deficiency in their understanding of its clinical signs and treatment options.

The results indicate that a large proportion of mothers take proactive steps to address their children's sleep issues, such as creating a supportive sleep environment and using relaxation techniques. However, the high incidence of sleep-related problems, including anxiety and disordered breathing, underscores the need for improved educational resources for parents.

8. Recommendations

These findings underscore the importance of enhancing maternal knowledge and establishing support systems to effectively address children's developmental and sleep challenges. Future research should focus on developing interventions that address these knowledge gaps and evaluate their effects on child health and well-being.

Moving forward, it would be beneficial for future research to employ a larger sample size and extend the study duration to comprehensively examine the influence of ADHD on sleep problems. Additionally, incorporating interventions by teachers in schools specifically tailored for children with ADHD can provide a more holistic understanding of the subject matter.

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