Nursing Intervention for Mothers regarding Sleeping Problems among their Children with Attention Deficit Hyperactive Disorder

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Abstrsct

Background: Sleeping problems represented highly common phenomena that interfere with daily child and family functioning in children with Attention Deficit Hyperactive Disorder (ADHD). **Aim:** To evaluate the effect of nursing intervention for mothers regarding sleeping problems among their children with ADHD. **Method:** a quasi-experimental design was utilized. A purposive sample of 60 mothers and their children suffering from ADHD were involved in the study. The study was conducted at, the Pediatric Psychiatric outpatient clinic in the Preventive Medicine Hospital which affiliated to Cairo University Hospitals. The following tools were utilized for data collection (pre, post, and follow-up). Tool 1) Interviewing questionnaire that included demographic data, mothers' knowledge regarding ADHD and sleeping problems among their children with ADHD. Tool 2) Mothers' reported practices related to sleeping problems among their children with ADHD. Tool 3) Children's Sleep Habits scale was adopted from **Owens, Spirito and McGuinn (2000)** to assess children's sleeping problems. **Results:** Less than three-quarters of school age children with ADHD were males and more than half of them had no family history of ADHD. A highly statistically significant difference was found between pre, post and follow up after 6 months of nursing intervention regarding the total mean scores of mothers' knowledge, reported practices and their children's sleeping problems. **Conclusion:** The study concluded that, the nursing intervention had highly statistically significant effect on improving mothers' knowledge and reported practices regarding the care of sleeping problems in their children with ADHD and minimizing sleeping problems among their children. **Recommendation:** The study recommended that, continuous guidance and support should be provided to mothers regarding the care of sleeping problems among their children with ADHD.

Keywords: Children- ADHD – Nursing intervention –Sleeping problems- Mothers' knowledge and reported practices.

Introduction

Attention Deficit-Hyperactivity Disorder (ADHD) is one of the most common neurodevelopmental disorders. The children suffering from this disorder show patterns of developmentally inappropriate levels of inattentiveness, hyperactivity or impulsivity **(Satoshi, Shin-Ichi, Ko, Naoko, Hiroyuki & Yoshitsugu, 2020)**. The children with ADHD had several negative effects that reflect their mental abilities such as a decrease in their attention span, lack of concentration and confusion which lead to improper behavior. As well as, prevent the children to engage in their society as influencing and productive citizen later on. **(Magnus, Nazir, Anilkumar & Shaban, 2021)**.

Attention Deficit-Hyperactivity Disorder is a lifelong disorder that affects 8% to 12% of the population worldwide **(Bélanger, Andrews, Gray, Korczak & Canadian Paediatric Society, 2018)**. The ADHD occurs more often in males than females. It is often first recognized in early childhood **(Lapalme, Déry, Dubé & Lemieux, 2018)**. An estimated 6.4 million children and adolescents in the United States, ages 4 to 17 years, have been diagnosed with ADHD (**Centers for Disease Control and Prevention, 2016)**. In Egypt, ADHD affects primary school children (7-12 years old) every 51 out of 1000 children were identified with ADHD, it can affect approximately 3% to 5% of elementary school-aged children **(El-Gendy, El-Bitar, El-Awady, Bayomy & Agwa, 2017)**.

Sleeping is a complex physiological process influenced by intrinsic biologic properties, temperament, cultural norms, and environmental condition**s (Prado et al., 2018)**. Sleeping problem is one of the most common problem that occurs in children with ADHD**.** An estimated 25–50% of children and

adolescents with ADHD experience problems with sleep **(Virring, Lambek, Jennum, Møller & Thomsen, 2017)**. Sleeping problems in children with ADHD are caused by circadian rhythm disorders, breathing problems, caffeine, soda, and chocolate intake as well as ADHD medications, anxiety, electronics with too much time on a smartphone, video games, or watching television in the evening which interfere with the ability to fall a sleep and stay a sleep **(Aizenstros, Chan, Aizenstros & May, 2019)**.

Sleeping problems can impact many aspects of children's everyday life including longer sleep-onset latency and poorer sleep efficiency **(Lumeng & Chervin, 2017).** The ADHD sleep problems may be a side effect of impaired arousal, alertness and regulation circuits in the brain, it can be traced to a delayed circadian rhythm with a later onset of melatonin production. A higher incidence of sleep problems for children with ADHD impaired their daily functioning. It can also cause daytime fatigue, may feel grumpy, irritable, restless, may have trouble paying attention at school. Sometimes, these symptoms may be mistaken for mood disorder, anxiety, and behavioral difficulties (**Grünwald & Schlarb, 2017**).

Sleep management interventions targeted at ensuring adequate sleep (including behavioral, dietary, specific pharmacological agents for treatment-induced insomnia and melatonin) could in turn potentially attenuate symptoms associated with ADHD, such as irritability whether metabolic or neurological pathways common to both sleep and ADHD may be disrupted and whether targeting treatments to these pathways may simultaneously improve both ADHD and sleep symptoms, needs further elucidation **(Wajszilber, Santiseban & Gruber, 2018)**. A comprehensive social history, including an understanding of the child's environment and how ADHD is affecting family members, school, diet, sleep, activity level and elimination pattern should be obtained **(Daniel & Van, 2018)**. ADHD is a complex disorder challenge for nurses in pediatric nursing practice settings to understand the basis of ADHD, analyze symptoms and implement holistic treatment planning. Pediatric nurses play key roles in working with parents and their children with ADHD to provide nursing intervention to improve caregivers knowledge and practice that facilitate optimal function and quality of life **(Shanahan, Isaac & Blackwell, 2021)**.

The health care provider should reassure the parents who had children with ADHD to continue care for sleeping problems among their children with ADHD **(National Institute for Health and Care Excellence, 2018)**. The pediatric nurse must develop a nursing intervention for parents, caregivers and family members regarding the sleeping problems of children with ADHD to understand and have reasonable and realistic expectations. Other management strategies include establishing house rules, routines and sleeping time schedules; being specific about behavioral expectations; scheduling time with the child **(Wolraich et al., 2019)**.

Significance of the study:

Sleep problems can affect any one of the children while there is a greater occurrence of children with ADHD. It is comorbid with insomnia, circadian dysregulation which affects negatively control of both the sleep-wake cycle and metabolism **(Wynchank, Bijlenga & Kooij, 2018)**. One-quarter to one-half of parents of children with ADHD report that their children suffer from a sleep problem, especially difficulties with falling asleep and staying asleep. Based on parent reports, children with ADHD are two to three times more likely to have sleep problems when compared to children without **(Moulding et al., 2020)**.

Delayed sleep onset or variable sleep routines affect the overall health of ADHD children **(Daniel & Van, 2018)**. Inadequate sleep in children can negatively affect the way children think, function, and behave. In addition, children who have sleeping problems may show symptoms, behaviors, or impairments that are remarkably similar to those of ADHD **(Wiggs, Montgomery & Stores, 2019)**. So, it is important to provide nursing intervention for mothers regarding the sleeping problems of their children with ADHD.

Mothers of children with sleeping problems require continuous adjustment and more skills compared to parenting a child without ADHD because children with ADHD have a lot of needs that affect their life. The mothers should be understood their children's needs and should understand how to fulfill and cope with these needs (**Abd- Elkader, Abu al-Wafa, El shatter & Darwish, 2020)**. From empirical observations of the researchers and previous study findings the children with ADHD are suffering from sleeping disorders so, their caregivers particularly mothers should be knowing how to care for their children with such cases. Few studies addressed the effect of nursing intervention on minimizing the sleeping problems among children with ADHD while, the previous studies were done on adolescence and adulthood **(Sciberras et al., 2017)**. So, the current study aimed to evaluate the effect of nursing intervention for mothers regarding sleeping problems among their children with ADHD.

This study aims to:

Evaluate the effect of nursing intervention for mothers regarding sleeping problems among their children with Attention Deficit Hyperactive Disorder.

Specific objectives:

1. Assess the studied mothers' knowledge and reported practices regarding sleeping problems of their children with ADHD pre, post and follow up after 6 months of nursing intervention.
2. Evaluate the sleeping problems of the studied children with ADHD pre, post and after 6 months follow up of nursing intervention.

Research hypotheses:

1. Mothers who received the nursing intervention would having higher total mean scores of knowledge and reported practices regarding sleeping problems among their children with ADHD than before.
2. Sleep problems decreased among children with ADHD and their mothers subjected to the nursing intervention.

Operational definition:

Sleeping problems including assessment of children sleeping habits that included eight sleeping domains (sleeping time, sleeping onset delay, sleeping duration, sleep anxiety, walking during the night, parasomnia, sleeping disordered breathing, and day time sleepiness and it was measured by using The Children's Sleep Habits Scale **(Owens, Spirito & McGuinn, 2000)**.

Subjects and Methods:

Research design:

A quasi-experimental research design (one group pre, post, and follow-up after 6 months of nursing intervention) was utilized to achieve the aim of the study.

Research setting:

The current study was conducted at the Pediatric Psychiatric outpatients clinics at the Preventive Medicine Hospital which affiliated to Cairo University Hospitals.

Sampling:

A purposive sampling technique was used. The sample size was (60) mothers and their children who were suffering from ADHD, having sleeping problems and agreed to participate in the current study were considered as study and control group under the following inclusion criteria; children who diagnosed with ADHD aged from 6-12 years attending to an outpatient psychiatric clinic for follow up, the mothers of children suffering from ADHD regardless their age, educational level, residence and socioeconomic standard. While children suffering from other developmental and psychiatric disorders and children who took medications for sleeping disorders were excluded.

The determination of the size of the sample based upon the following sample calculation:

$$N = \frac{t^2 \times P(1-p)}{m^2} \qquad N = \frac{1.960^2 \times 0.350\ (1-0.350)}{0.050^2} = 58$$

t = confidence level at 95% (standard value of 1.960).
p= estimated prevalence of children who diagnosed with ADHD in the outpatient psychiatric clinic in the preventive medicine hospital (2019) (0.350).
m= margin of error at 5% (standard value of 0.050).

Tools and technique of data collection (pre, post and follow-up after 6 months of nursing intervention). Two tools were used in this study to collect the data, which was developed by the researchers after reviewing the national and international related literatures.

I. ***A structured interviewing questionnaire*** was developed in a simple clear Arabic language by the researchers after reviewing the related literature, it consisted of the following parts:

Part (1): Demographic data of the studied mothers and their children with ADHD. It consisted of 12 multiple choice questions which included the characteristics of the studied mothers (age, educational level, residence, occupation and marital status) and the characteristics of their children with ADHD (age, gender, child's birth rank, educational level, residence, family history and onset of ADHD).

Part (2): Mothers' knowledge regarding ADHD and sleeping problems among their children with ADHD. It consisted of 10 multiple-choice questions. It included the meaning of ADHD, causes, clinical manifestations, treatment, and children's care given.

Scoring system: Each correct answer was scored one and the incorrect answer was zero. The total score of the mothers' knowledge regarding ADHD and sleeping problems in their children was 10 scores which were evaluated as satisfactory (≥ 60% that ranged from 6 to 10 scores) and unsatisfactory level (<60% that ranged from 0 to less than 6 scores).

II. ***Reported practices of the studied mothers regarding the care of sleeping problems among their children with ADHD.*** It was developed by the researchers after an extensive review of literature, it consisted of mothers' care regarding sleeping problems of their children with ADHD and the mother selected the response in form of done or not done. It consisted of the following items (maintaining sleeping hours of the child caring of nightmares, restless during sleep, speaking during sleep, snoring and grinding on child's teeth during sleep).

Scoring system: Each correct response was scored one and referred to done while incorrect response took zero scores and referred to not done. The total score of the mothers' reported practices regarding sleeping problems in their children was 25 scores which evaluated as an adequate level of reported practices (≥60% that ranged from 15 to 25 scores) and inadequate level of reported practices (<60% that ranged from 0 to less than 15 scores).

III. ***Children's Sleep Habits Scale (CSHS):-*** It was adopted from **Owens, Spirito & McGuinn, (2000).** It is a valid and reliable scale used to assess sleeping problems among children with ADHD. The CSHS consisted of 30 statements classified into (8) subscales reflecting sleep domains and included sleeping time (contain 5 items), sleeping onset delay (1 item), sleeping duration (3 items), sleep anxiety (1 item), behavior occurring during sleep and night wakings (3 items), parasomnia (7 items), sleeping disordered breathing (3 items) and day time sleepiness (7 items), that items encompass the major presenting clinical

sleep complaints in the school-age group. Parents asked to recall sleep behaviors occurring over a "typical" recent week. It had internal consistency (=0.78); alpha coefficients for the various subscales of the CSHS ranged from 0.56 (Parasomnias) to 0.93 (Sleep-Disordered Breathing). Test-retest reliability was (range 0.62 to 0.79), a sensitivity of 0.80 and specificity of 0.72.

Scoring system: Each item scored from"zero, 0.5 to 1" for rarely to usually for each item (rarely=0, sometimes=0.5, usually=1) the total score of the scale were 30 scores and total children's sleeping problems were clarified into rarely→ less than 50%, sometimes= 50%- <75% and usually →75% or more. Items are 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 indicative of more disturbed sleep.

Administrative phase:

Official permission was obtained from the director of the Psychiatry out-patient clinic at the preventive medicine hospital. A meeting was scheduled with the directors of the preventive medicine hospital and psychiatric out-patient clinic to present the research study. The researchers were attending the outpatient of the pre-mentioned setting, by using a schedule, 2 days/week, from 9 am to 1 pm. Data collection was carried out over 6 months starting from September, 2020 ended in March 2021, until the sample size was attained.

Pilot study: A pilot study was conducted before starting actual fieldwork representative of 10% of the study including (6 mothers and their children with ADHD) who met the inclusion criteria of the study to assess the applicability and estimate the time required to fulfill the tools. Minor modifications were done in certain sentences such as rephrasing, rearrangement of multiple-choice questions in the interview questionnaire and reported practices tool. The pilot study was excluded from the total sample size.

Validity and reliability: The tools were tested and evaluated for their face and content validity by three experts (2 professors in pediatric nursing and a lecturer in psychiatric medicine) at Cairo and Ain Shams Universities and also to ascertain relevance, clarity and completeness of the tools, experts elicited responses were either agree or disagree for the face and content validity was done. The items on which 85% or more of the experts agreed were included in the proposed tools. Accordingly, the required corrections and modifications were done. Testing reliability of proposed tools was done by using Cronbach alpha test, it was assessed at 98% in tool one and 97% in tool two.

Ethical Considerations: Approval of the studied mothers and their children with ADHD was obtained orally before conducting the study; the researchers explained the objective and aim of the study to each study mother. Confidentiality of obtained personal data, as well as the inspection of participants' privacy, were ensured. Code numbers were created and kept by the researchers to keep participants' anonymity. A summary of the interventions was explained to every mother who voluntarily agreed to participate in the study and they were informed that they could withdraw from the study at any time without giving any reason.

Fieldwork:

The actual fieldwork was carried out for 6 months starting from September, 2020 ended in March, 2021, until the sample size was attained. The researchers visited the study settings 2 days/week from 9 am:1pm. The fieldwork carried out in three phases (preparatory, assessment, implementation and evaluation phases).

Preparatory phase

The researchers reviewed the related literature for developing the used tools and designing nursing intervention based on the actual needs assessment that was translated to the objectives of the study. The studied mothers were assessed by using the study tools for their knowledge and reported practices regarding the sleep problems of their children during the time of follow-up

visits for their children. The study tools were filled by the mothers who can read and write while filled by the researchers for mothers who can't read and write. The study tools took about 20:30 minutes, the aim of the study was explained and the oral approval to participate in the study was taken before starting the data collection.

Data were collected throughout three phases of assessment, the first phase was carried out before conducting the designed nursing intervention using three tools to have baseline data about mothers' knowledge and reported practices regarding sleeping problems for their children with ADHD. The tools used firstly as a pre-intervention (control group), it was carried out individually for each mother to assess their level of knowledge and reported practices regarding sleep problems for children with ADHD and CSH scale for their children, the time took for pre-intervention was half an hour to fill out the questionnaires.

A booklet containing the nursing intervention based on literature review and needs assessment of studied mothers. It was prepared in Arabic language and was supplemented by pictures and illustrations. The nursing intervention was designed to improve mothers' knowledge and practices regarding the sleeping problems of their children with ADHD through the application of simplified sessions presented in the Arabic language. Nursing intervention included theoretical and practical content developed by the researchers and selected to meet the mothers' needs and to fulfill the study aim. Theoretical part: was covered through two sessions and the practical part composed of three sessions.

2- Implementation phase:

The nursing intervention was carried out for study subjects in the special waiting room in the outpatient psychiatric clinics. The researchers shared the health team, which consisted of physicians and nurses, The mothers were encouraged to participate actively in group discussion through listening to each other and providing feedback. the nursing intervention's objectives were stated clearly by the researchers for participants which included the following objectives.

- Identify the meaning, causes, clinical manifestations, types and sleeping problems management of children with ADHD.
- Improve mothers' knowledge and reported practices regarding sleeping problems among their children with ADHD.
- Apply specific strategies for managing sleeping problems among children with ADHD.

The researchers selected teaching methods which were lectures, small group discussion and role play. Teaching aids such as booklets, handouts that covered all theoretical and practical parts as pen and paper were used. The nursing intervention was implemented in 5 sessions. Every session took approximately (45-60 minutes) for every group for four weeks for every group, (18) hours for total sessions. Each group consisted of (5-10 mothers). The sessions consisted of the following:

Session (1) included explaining the aim of the study, introduction about ADHD and sleep problems, definitions, causes/risk factors and management. ***Session (2)*** consisted of causes, manifestations, consequences, management, and mothers' role regarding the care of their children with sleeping problems. During the session, mothers were encouraged to ask questions and provided feedback. Proper channel of communication was kept open between the researchers and the subjects, ***Session (3)*** focused on the nursing skills and intervention required for helping the mothers in providing care of sleeping problems for their children with ADHD. It included: minor exercise (play), nutrition, bathing, and environmental modification, ***Session (4)*** focused on clarifying specific sleeping strategies, relaxation techniques and urged the children to apply them before bedtime. ***Session (5)*** focused on revision of all sessions and nursing intervention termination at the final 10 minutes at each session was for a summary. This summary focused on knowledge and practices learned during the sessions. Evaluation for each session was done through, immediate feedback from participants. The agreement on the mechanism of post-nursing intervention evaluation when terminating the

application of the designed nursing intervention.

3- **Evaluation phase:** This phase considered the second phase of assessment that, the same group (study group) assessed twice post-intervention (one month post the nursing intervention implementation and follow up after 6 months) to evaluate the effect of the nursing intervention, each mother was reassessed by using the same tools of pre-intervention and comparison was done to determine the effect of the nursing intervention.

Statistical analysis:

Data analysis was performed using IBM SPSS (Statistical Package for Social Sciences) statistical software version 25. Descriptive statistics with mean and standard deviation (SD) for continuous variables and frequency for categorical variables were analyzed. Qualitative variables were compared using the Chi-square test ($\chi 2$). Baseline differences between the group at pre-and post-were assessed using Paired T-Test (t) for continuous variables. Differences between the group during the three visits were assessed by repeated measures ANCOVA for quantitative data and Friedman test for qualitative data and Correlation coefficient (r) was used to test the correlation between the study variables.

Degrees of significance of results were considered as follows:

- P-value > 0.05 Not significant (NS)
- P-value ≤ 0.05 Significant (S)
- P-value ≤ 0.01 Highly Significant (HS).

Results:

As shown in table (1) the mean age of studied mothers were 31.1±5.3 years old, most of them (83.3%) were housewives, more than half (55%) of them were married while less than one third (31.7%) were divorced and less than half (45%) had secondary level of school education.

As seen in the table (2) the mean age of studied children was 7.5±1.3 years old, less than three-quarters of children (73%) were males, more than one quarter (30%) of them ranked as the second child and (60%) were from urban areas. More than half (56.7%) of them had no family history of ADHD.

Figure (1) illustrates that less than two-thirds of the studied children (60%) their an onset of ADHD was 1-<3 years.

Table (3) reveals that, a highly statistically significant difference was found between mothers' knowledge pre and post-intervention concerning meaning, causes, manifestations, treatment, and care given of ADHD and sleep problems at P (<0.01), in addition, there was a highly statistically significant difference in mothers' knowledge pre, post, and follow-up after 6 months of the nursing intervention where P-value (<0.01).

Figure (2) shows that, mothers had satisfactory knowledge pre, post, and after 6 months of nursing intervention (10%, 76.7% & 70% respectively).

Table (4) reveals that highly statistically significant differences were observed between mothers' reported practices pre and post and follow–up after 6 months of nursing interventions where P-value (<0.01).

Figure (3) illustrates that mothers have adequate reported practices pre, post, and after 6 months of nursing intervention (13.3%, 80% & 73.3%) respectively.

Table (5) reveals that a significant difference was observed between mean scores regarding children's sleeping habits scale domains which reflecting sleeping problems for bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, waking during the night, parasomnias, sleep disorders breathing, and day time sleepiness pre and post and followup after 6 months of nursing intervention where P value was(<0.01).

As illustrates in table (6) highly significant differences were observed between total levels of children's sleeping habits domains on a rating scale pre, post, and follow up after 6 months of nursing intervention. Where more than half (53.3%) of children were having sleep problems usually pre-intervention while (45% and 61.7%)) of them were having rarely sleeping problems post and follow up after 6 months of nursing intervention where p-value (<0.01).

As shown in table (7), there were highly significant a negative correlation between total mothers' reported practices with total children's sleeping problems and between total mothers' knowledge with total children's sleeping problems pre, post-intervention and

follow up after 6 months, also a high significance difference with positive correlation was found between the total knowledge and total mothers' reported practices in pre**,** post-intervention and after 6 months follow up at **P value<0.01.**

Table (1): Frequency and Percentage Distribution of the Studied Mothers according to their Demographic Data of (n=60).

Mothers' demographic data	**No. (60)**	**%**
Age/ years		
<25	6	10
25-< 35	**35**	**58.3**
35-<45	17	28.3
≥ 45	2	3.3
Mean ± SD 31.1±5.3		
Job		
Housewife	**50**	**83.3**
Working	10	16.7
Social status		
Married	**33**	**55**
Divorced	19	31.7
Widowed	8	13.3
Level of education		
Not read and write	10	16.7
Read and write	5	8.3
Primary school	8	13.3
Secondary school education	**27**	**45**
University education	10	16.7

Table (2): Frequency and Percentage Distribution of the Studied children according to their Characteristics (n=60).

Children characteristics	**No. (60)**	**%**
Age/ years		
6 - < 8	**45**	**75**
8 - < 10	9	15
10 - ≤ 12	6	10
Mean±SD 7.5±1.3		
Gender		
Male	44	73.3
Female	16	26.7
Child's rank		
First	16	26.7
Second	**18**	**30**
Third	11	18.3
Fourth	15	25
Level of education		
Nursery	6	10
Primary school	**52**	**86.7**
Preparatory school	2	3.3
Residence		
Rural	24	40
Urban	**36**	**60**
Family history of ADHD		
Yes	26	43.3
No	**34**	**56.7**

Figure (1): Percentage Distribution of the Studied Children according to the Onset of DHD (n=60).

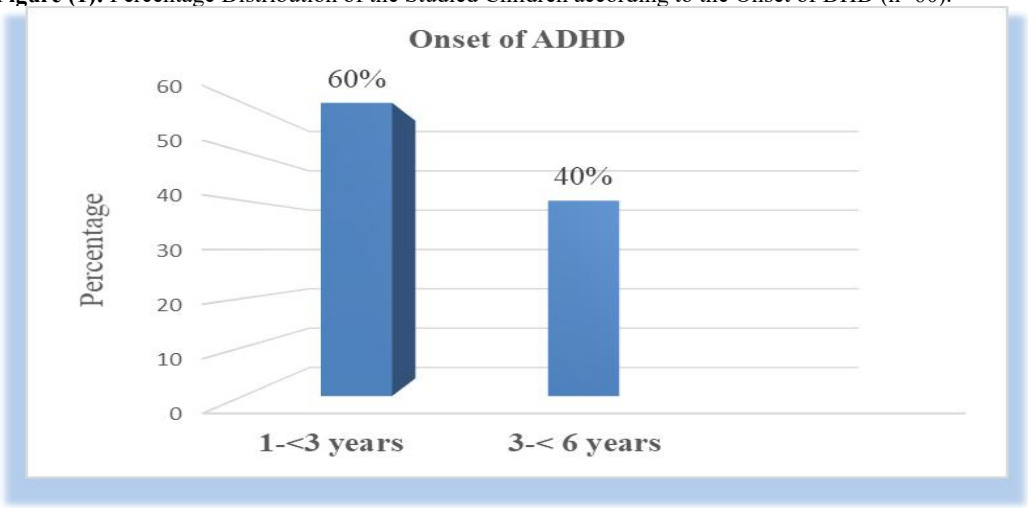

Table (3): Differences between Mothers' Knowledge (Correct answers) regarding Attention Deficit Hyperactive Disorder and Sleeping Problems Pre, Post and Followup after 6 months of Nursing Intervention (n=60).

Mothers' knowledge	Pre-intervention		Post-intervention		After 6 months		(P1)		(P2)		(P3)	
	Correct		Correct		Correct							
	No	%	No.	%	No.	%	$\chi 2$	p	$\chi 2$	p	f	P
ADHD												
Meaning	30	50	51	85	48	80	**14.2**	**.005****	**1.010**	**.124**	**18.50**	**.005****
Causes / Risk factors	6	10	47	78.3	44	73.3	**18.4**	**.000****	**1.516**	**.099**	**47.15**	**.000****
Clinical manifestations	31	51.7	50	83.3	47	78.3	**12.87**	**.007****	**1.110**	**.101**	**15.55**	**.007****
Treatment	7	11.7	46	76.7	42	70	**15.2**	**.000****	**1.345**	**.115**	**11.53**	**.000****
Child care given	3	5	40	66.7	38	63.3	**27.1**	**.000****	**1.011**	**.124**	**27.44**	**.000****
Sleep problems												
Meaning	9	15	50	83.3	47	78.3	**35.1**	**.000****	**1.004**	**.111**	**29.33**	**.000****
Causes and types	27	45	48	80	45	75	**8.85**	**.000****	**1.106**	**.143**	**18.17**	**.007****
Manifestations and concequences	0	0	49	81.7	45	75	**12.1**	**.000****	**1.340**	**.101**	**47.44**	**.000****
Treatment	0	0	51	85	47	78.3	**9.73**	**.000****	**1.211**	**.137**	**35.67**	**.000****
Child care given	20	33.3	40	66.7	38	63.3	**13.3**	**.000****	**1.014**	**.151**	**25.31**	**.005****

X^2: Chi-square **f= Friedman test** **p= p-value** **: Highly statistically significant at $p < 0.01$. *: Statistically significant at $p < 0.05$

P_1: p value for comparing between **pre and post** intervention.

P_2: p-value for comparing between **post and after 6 months of follow-up** intervention.

P_3: p-value for comparing between the **three times of assessment (pre, post, and after 6 months)**.

Figure (2): Mothers' Total level of Knowledge regarding Sleeping Problems of their Children with ADHD Pre, Post, and Follow up after 6 months of Nursing Intervention (n=60).

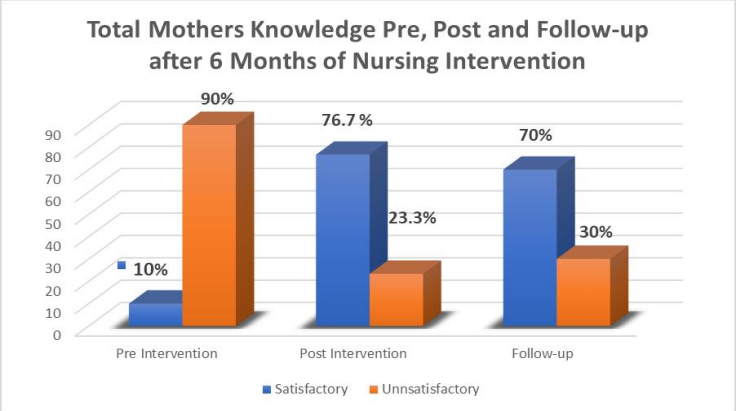

Table (4): Differences between Mothers' Reported Practices (done responses) regarding Sleep Problems of their children with ADHD Pre, Post, and after 6 months of Nursing Intervention (n=60).

Mothers' reported practices	Pre-intervention Done		Post-intervention Done		After 6 months Done		(P1)		(P2)		(P3)	
	No.	%	No.	%	No.	%	$\chi 2$	P	$\chi 2$	p	F	p
Maintain the child's sleeping hours												
Practice mild exercise	15	25	50	83.3	47	78.3	**16.50**	**.000****	**1.011**	**.224**	**24.07**	**.000****
Keep dim light and calm environment	23	38.3	55	91.7	51	85	**14.37**	**.001****	**1.324**	**.215**	**16.55**	**.000****
Read stories for children and avoid caffeine	7	11.7	46	76.7	42	70	**18.49**	**.000****	**1.405**	**.301**	**36.40**	**.000****
Nightmares during sleep												
Talking with child	16	26.7	45	75	43	71.7	**19.74**	**.000****	**1.449**	**.414**	**28.50**	**.000****
Give interesting picture	15	25	46	76.7	44	73.3	**18.17**	**.000****	**1.416**	**.219**	**24.81**	**.000****
The difficulty of breathing during sleep												
Put the child in the semi-sitting position	20	33.3	48	80	45	75	**18.47**	**.001****	**1.444**	**.142**	**21.41**	**.000****
Notify the doctor	9	15	42	70	40	66.3	**19.35**	**.000****	**1.024**	**.321**	**28.29**	**.000****
Restless during sleep and Afraid to sleep alone												
Encourage the child to sleep alone	19	31.7	48	80	45	75	**17.91**	**.000****	**1.115**	**.199**	**20.70**	**.000****
Sit beside the child and give reassurance	16	26.7	45	75	40	66.3	**18.11**	**.000****	**1.331**	**.214**	**17.51**	**.000****
Provide relaxation as deep breathing and warm shower	19	31.7	51	85	40	66.3	**20.19**	**.000****	**1.001**	**.249**	**16.40**	**.000****
Speaks during sleep												
Wakeup the child and talk with him/ her	12	20	50	83.3	47	78.3	**26.32**	**.000****	**0.997**	**.574**	**25.21**	**.000****
Snoring of the child during sleep												
Modify the child's head position	15	25	46	76.7	44	73.3	**19.55**	**.000****	**1.100**	**.251**	**28.55**	**.000****
Clean the child's nose	17	28.3	48	80	45	75	**18.66**	**.000****	**1.114**	**.201**	**26.14**	**.000****
Try to wake up the child	26	43.3	50	83.3	47	78.3	**15.47**	**.005****	**0.721**	**.187**	**16.36**	**.000****
Change the child's position	37	61.7	50	83.3	47	78.3	**14.41**	**.009****	**0.955**	**0.775**	**15.94**	**.000****
Performed grinding on his teeth during sleep												
Move the child's head	9	15	56	93.3	51	85	**29.41**	**.000****	**1.014**	**.214**	**29.11**	**.000****
Place tong depressors	7	11.7	55	91.7	51	85	**26.32**	**.000****	**1.006**	**.222**	**27.58**	**.000****

X^2: Chi-square **f= Friedman test** **p= p-value** **: Highly statistically significant at $p < 0.01$.
*: Statistically significant at $p < 0.05$
P_1: p-value for comparing between **pre and post**-intervention **P_2:** p-value for comparing between the in **post and follow-up** intervention
P_3: p-value for comparing between the **three times** of assessment **pre, post, and follow-up** intervention.

Figure (3): Mothers' Total level of Reported Practices regarding Sleeping Problems Pre, Post and after 6 months of Nursing Intervention (n=60).

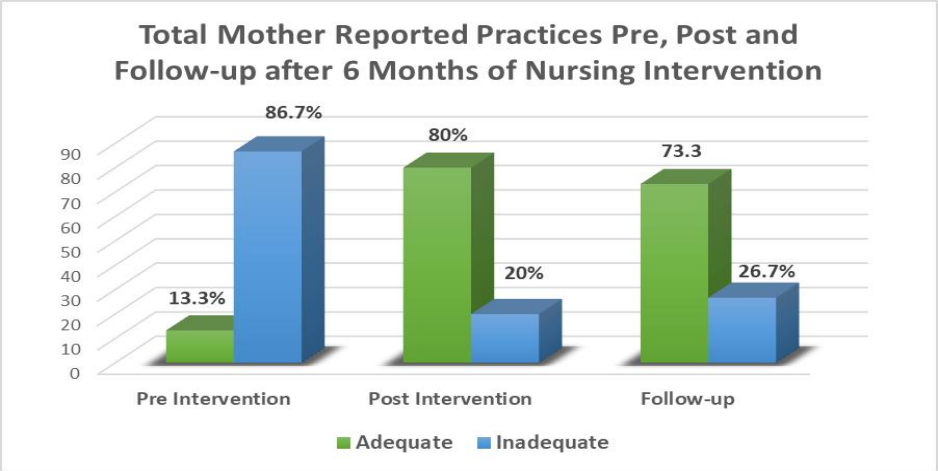

Table (5): Mean Scores of Children' Sleeping Habits Domains as Reported by Mothers Pre, Post and follow-up after 6 Months of Nursing Intervention (n=60).

Children's Sleeping Habits Domains (sleeping problems)	Pre-intervention	Post-intervention	Follow up After 6 months	(P1)		(P2)		(P3)	
	Mean±SD	Mean±SD	Mean±SD	T-test	P-value	T-test	P-value	f test	P-value
Bedtime resistance	8.14±2.71	4.75±1.52	2.57±0.91	**9.241**	**.000****	**6.255**	**.001****	**11.51**	**.000****
Sleep onset delay	0.72±0.24	1.01±0.42	1.78±0.62	**7.854**	**.001****	**5.907**	**.007****	**9.071**	**.000****
Sleep duration	3.90±1.13	1.82±0.99	1.21±0.52	**7.965**	**.001***	**4.814**	**.009****	**8.67**	**.000****
Sleep anxiety	1.42±0.72	0.96±0.13	0.52±.091	**8.410**	**.000****	**5.951**	**.001****	**10.97**	**.000****
Waking during the night	4.26±1.75	1.80±0.84	1.01±0.38	**9.070**	**.000****	**7.957**	**.001****	**11.63**	**.000****
Parasomnias	9.24±4.57	4.91±2.08	2.07±0.51	**10.41**	**.000****	**9.958**	**.000****	**12.71**	**.000****
Sleep disordered breathing	4.21±1.75	1.88±0.92	0.98±0.74	**11.04**	**.000****	**9.611**	**.000****	**14.28**	**.000****
Day time sleepiness	11.51±5.07	4.73±1.73	2.49±0.95	**12.81**	**.000****	**10.99**	**.000****	**13.01**	**.000****

**: Highly statistically significant at $p < 0.01$. *: Statistically significant at $p < 0.01$

P_1: p-value for comparing between **pre and post**-intervention

P_2: p-value for comparing between the **post and follow-up** after 6 months.

P_3: p-value for comparing between the **three times of assess**ment.

Table (6): Total Levels of Children' Sleeping Habits Domains Pre, Post, and Follow-up after 6 Months of Nursing Intervention (n=60).

Total levels of children's sleeping habits domains	Pre-intervention		Post intervention		Follow up after 6 months		(P1)		(P2)		(P3)	
	No.	%	No.	%	No.	%	$\chi 2$	P	$\chi 2$	P	f	P
Rarely	12	20	**27**	**45**	**37**	**61.7**	19.25	.000**	14.31	.000**	27.99	.000**
Sometimes	16	26.7	21	35	12	20						
Usually	**32**	**53.3**	12	20	8	13.3						

X^2: Chi-square **f= Friedman test** **p= p-value** **: Highly statistically significant at $p < 0.01$. *: Statistically significant at $p < 0.05$

P_1: p-value for comparing between **pre and post**-intervention

P_2: p-value for comparing between the intervention **post and follow-up** after 6 months

P_3: p-value for comparing between the **three times of assessment**.

Table (7): Correlation between Mothers' Total Knowledge, Total Reported Practices and Children' Total Sleeping Problems Pre, Post and after 6 months of nursing intervention (n=60).

Item	Total children's sleeping problems						Total mothers' reported practices					
	Pre-intervention		Post-intervention		Follow up After 6 months		Pre-intervention		Post-intervention		Follow up After 6 months	
	r	P	r	P	R	P	r	P	r	P	r	P
Total mothers' reported practices	-.415	.000**	-.690	.000**	-.624	.000**						
Total mothers' knowledge	-.394	.000**	-.532	.000**	-.505	.000**	.525	.000**	.625	.000**	.601	.000**

r= correlation coefficient test. **P=** p-value ******: Highly statistically significant at $p < 0.01$.

Discussion

Attention-deficit/hyperactivity disorder and sleep problems can have similar symptoms and influence daily functioning, social attendance, and quality of life and these two problems can affect each other. The ADHD-associated disrupted behaviors may influence nighttime sleep with symptoms of insomnia, bedtime struggles, poor sleep quality, or insufficient sleep duration. Conversely, primary sleep disorders, such as obstructive sleep apnea, restless legs syndrome, and periodic limb movement disorder, cause daytime neurobehavioral problems which resemble those of ADHD, especially in children **(Mulraney, Giallo, Lycett, Mensah & Sciberras, 2016).** This in turn can have an impact on whoever looks after them. A parent might miss work or suffer from stress because of their children's sleeping problems **(Um, Hong & Jeong, 2017)**. So assessment of the sleep conditions in ADHD children before initiation of pharmacotherapy is the currently recommended guideline and good sleep hygiene can be considered as the first-line treatment option (**Tsai, Hsu & Huang, 2016).** The current study aimed to evaluate the effect of nursing intervention for mothers regarding sleeping problems among their children with Attention Deficit Hyperactive Disorder.

The mothers' knowledge of ADHD is critical on how to raise the awareness and care provided to their affected children, including how the disorder is being diagnosed, how ADHD treatment affects the daily life of affected children, and increasing the treatment compliance (**Dodangi, Vameghi & Habibi, 2017).** Concerning mothers' knowledge about ADHD and sleeping problems, the result of the present study found a highly significant difference between mothers' knowledge pre and post (after one month) and follow up after 6 months of nursing intervention where most of the studied mothers had unsatisfactory knowledge about ADHD and sleeping problems pre-intervention while most of the studied mothers had satisfactory knowledge in post nursing intervention and follow up after 6 months. The researchers believe that increasing mothers' knowledge regarding ADHD, sleeping problems and its management can relief the sleeping problems among their children with ADHD. This is explained by **Wajszilber, Santiseban & Gruber, (2018**) who stated that lack of information represents a significant gap in knowledge as well as a significant barrier to effective clinical management of ADHD children with sleep disorders.

The study findings revealed that highly statistically significant differences were found between selected mothers' reported practices pre, post, and follow up after 6 months of nursing intervention concerning mother role when the child had (nightmares, the difficulty of breathing during sleep, restlessness during sleep, and afraid to sleep alone, performed grinding on his teeth during sleep) and statistically significant differences were found when the child spoke and snored at sleep while there was no statistically significant difference in maintaining the hours of the child's sleep, where mothers had adequate reported practices post nursing intervention. These results were supported by

Grünwald & Schlarb (2017) in their study ***"Relationship between subtypes and symptoms of ADHD, insomnia, and nightmares in connection with quality of life in children"*** who found that there was a significant correlation between ADHD, insomnia, and signs of nightmares, also supported with **Mehri et al., (2020)** in their study entitled with ***"The effect of behavioral parent training on sleep problems of school-age children with ADHD: A parallel randomized controlled trial"*** who stated that Children in the intervention group experienced a significant improvement in total sleep scores two months after the intervention compared to the control group (p = 0.03). Also, the findings showed a significant decline in total sleep problems in the intervention group compared to the control group over time (p = 0.01). In addition, **Papadopoulos, Sciberras, Hiscock, Mulraney, McGillivray & Rinehart, (2019)** in their study titled ***"The Efficacy of a Brief Behavioral Sleep Intervention in School-Aged Children With ADHD and Comorbid Autism Spectrum Disorder"*** found that children with ADHD-ASD who received the intervention had large improvements in sleep problems and moderate improvements in child behavioral functioning 3 and 6 months post-randomization. The researchers believe that the mothers reported practices improved post nursing intervention and application of learned practices to minimize their children sleeping problems this was explained by **Tsai et al., (2016)** who stated that, the non-pharmacologic management of children with sleeping disorders can be used alone or combined with pharmacologic options. However, in mild cases such as good sleep hygiene, a regular sleep schedule, mentally alerting activities, physical exercise, and avoiding caffeine, alcohol, or certain medications are beneficial.

Concerning the total mothers' reported practices regarding sleeping problems, the finding of the current study revealed that, the majority of mothers had inadequately reported practices pre-intervention while the majority of studied mothers had adequate reported practices about sleeping problems post-test and after 6 months follow up for the nursing intervention. This finding was supported by **Shokravi, Shooshtari & Shahhatami, (2016)** who study ***"The impact of a sleep hygiene intervention on sleep habits in children with attention-deficit/hyperactivity disorder"*** and found that, sleep hygiene intervention improved sleep problems in a sample of children with ADHD as reported by their parents' post implement educational programs on good sleep-hygiene practices for children and adolescents. While this finding contradicted **Abdel Aleam, Ismail & Hassan, (2019)**, who carried out the study of " ***Assessment of Mothers' knowledge and Practices regarding Sleeping Disorders among their Children Suffering from Attention Deficit"*** and reported that more than half of studied mothers were having adequate practices to care for their children especially nightmares and urination during sleep. The researchers believe that, sleeping problems decreased in children whose mothers had adequate practices regarding the care of their children with ADHD.

Regarding mean scores of children's sleeping habits domains which reflected their sleep problems, the current study revealed that, highly statistically significant differences were found between mean scores for sleep problems domains in bedtime resistance, sleep anxiety, parasomnias, waking during the night and day time sleepiness pre, post and after 6 months of nursing intervention. this was supported by **Yürümez & Kılıç (2016)** who studied "***Relationship Between Sleep Problems and Quality of Life in Children With ADHD"*** and found the frequency of sleep problems in ADHD children was 84.8%, higher than the control group (p = .002), the quality of life is worse in physical, psychosocial health and total life quality (p < .05), frequency of parasomnias increased, ADHD group had more night wakings than the control group, it is thought that night waking that cause a partitioned sleep may be important signs seen in ADHD.

The study findings revealed that, there was a highly significant difference between the total mean scores of mothers' knowledge,

reported practices and children's sleeping habits domains pre, post nursing intervention and after 6 months follow up, where sleeping problems improved post nursing intervention in children of mothers having a higher mean score for total knowledge and total reported practices. These results supported with **Shokravi et al., (2016)** who found that increasing maternal knowledge about sleep process, sleep importance, consequences of pediatric sleep problems, and acquiring skills for implementing good sleep habits practices as a part of behavioral strategies for managing sleep problems and reported improvement in their children's sleep problems according to the Children Sleep Habits scale, two months after the intervention, compared with control children, intervention children had a significant reduction in the mean scores of five subscales of CSH scale including bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, daytime sleepiness and total score of CSHS, after controlling pretest. The researchers believe that improving the mothers' knowledge and practices play an active role in the care of sleeping problems in their children with ADHD.

Conclusion:

The study findings concluded that the nursing intervention had highly statistically significant effect on improving mothers' knowledge and reported practices regarding the care of sleeping problems in their children with ADHD and minimizing sleeping problems among their children.

Recommendations:

Based upon the findings of the current study the following recommendations were suggested:

- Develop behavioral intervention for ADHD children based on their actual needs assessment to improve sleeping problems.
- Evaluate the mothers' practice regarding care of sleeping problems among their children with ADHD.
- Continuous guidance and support should be provided to mothers regarding the care of sleeping problems among their children with ADHD.
- Empower mothers' knowledge and practices towards care of sleeping problems among their children with ADHD.
- Further studies are needed to link knowledge and practices about sleeping problems' outcomes in children with ADHD.

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