Original Article

The Prevalence and Patterns of Sleep Problem in Children with ADHD

Tikumporn Hosiri MD[1], Sirinadda Punyapas MD[1], Warintip Sawangsri MD[1]

[1] Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Objective: To determine the prevalence and patterns of sleep problems in children with Attention deficit/hyperactivity disorder [ADHD] as well as to identify several factors associated sleep problems.

Materials and Methods: This present study was a cross-sectional, descriptive study. Ninety- six parents whose children were diagnosed with ADHD in their first visit responded to a questionnaire. The items in the questionnaire included questions about demographic data and questions related to sleep problems chosen from a Child Behavior Checklist (Thai version) and the literature review. The prevalence and patterns of sleep problem are presented as descriptive statistics. Factors associated with sleep problems were analyzed by Chi-square test and logistic regression.

Results: The prevalence of sleep problems was found to be 72.9%. Their patterns were the following: needing the parents to stay with them at bedtime (38.5%); fear of sleeping in the dark (30.2%); and hard to fall asleep (24%). The factors associated with the sleep problems were the age of the children, adjusted OR = 7.47 (1.97 to 28.34), and the perception of the parents on their child's sleep problems, adjusted OR = 7.80 (1.92 to 31.68). Namely, children under 11 years old were more likely to have a sleep problem than children over 11 years old. Children whose parents had been aware of some signs of their sleep problems were more likely to have a real sleep problem than those whose parents had not been aware.

Conclusion: The prevalence of sleep problems in ADHD children before coming for treatment was high. Most sleep problems occurred at the time they were going to bed. For these reasons, it is essential to identified children's sleep problems before an ADHD treatment is prescribed.

Keywords: Prevalence, Sleep problems, ADHD

J Med Assoc Thai 2018; 101 [Suppl. 1]: S34-S40
Full text. e-Journal: http://www.jmatonline.com

Attention deficit/hyperactivity disorder [ADHD] is a common psychiatric disorder in children and adolescent. The prevalence of ADHD was 5 to 12%[1,2], while as of 1998, it was 8.1% in Thailand[3]. Children with ADHD usually have more behavioral, social, and learning problems than other children. However, their sleep problems were not commonly evaluated in their first meeting with a child and adolescent psychiatrist. Sleep problems are usually evaluated only after the children have been prescribed of some stimulants. From the literature review, it was found that children with ADHD reported more sleep problems than normal children. The studies reported that even before ADHD children were treated with medications, they had already had more sleep problems than normal children. For example, they had difficulties getting to sleep, restless sleep, talking while sleeping or sleepwalking, having nightmares, and napping during the day[4,5]. Children with ADHD who had sleep problems were usually accompanied by learning problems, and subsequently have a negative impact on the mood of their parents. The parents of ADHD children who had moderate to severe sleep problems were 2.7 times more depressed, anxious, and stressed out than those whose ADHD children did not have sleep problems[6,7]. From the author's review of Thai literature, there was very little information regarding sleep problems in ADHD children. Therefore, the

Correspondence to:
Punyapas S, Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University, 2 Wanglang Road, Bangkoknoi, Bangkok 10700, Thailand.
Phone: +66-2-4194293-8, Fax: +66-2-4194298
E-mail: sirinadda.pun@mahidol.ac.th

How to cite this article: Hosiri T,Punyapas S,Sawangsri W. The prevalence and patterns of sleep problem in children with ADHD. J Med Assoc Thai 2018;101;Suppl. 1: S34-S40.

authors intended to investigate the prevalence of and factors that affected the sleep problems of children with ADHD who had never been treated with medication. It was expected that the results would benefit the treatment and care of children with ADHD and improve the quality of life of both the children and their parents.

Objective

To investigate the prevalence of and factors that affected the sleep problems of children with ADHD who had never been treated with medication and had come for treatment at the child and adolescent psychiatric clinic in Siriraj hospital, Thailand.

Material and Method

Subjects

The target population was children who were diagnosed with ADHD on their first visit at the child and adolescent psychiatric clinic, Siriraj hospital, between 2013 to 2015. Based on the prevalence estimate of previous research[7], the sample size was 96.

Inclusion criteria

Children 7 to 12 years of age who have been diagnosed with ADHD on their first visit were included under the conditions that their main caregivers had taken care of them for at least 6 months. Prior to their participation in the study, both parents or caregivers and the children provided written consent.

Exclusion criteria

The children who were already being treated with medication for their ADHD and/or sleep problems were excluded.

Procedure and measurement

For all new cases, as the children had seen a child and adolescent psychiatrist in their first visit, a research assistant would approach the parents and children then told them about the study. After the participants provided consent, they were asked to respond to questionnaires.

The research instrument was a set of 3 questionnaires. The first questionnaire had questions about the participant's demographic information; the second had questions about the child's sleep hygiene, while the last set had 11 questions about sleep problems. Six of these questions were obtained from the "Child Behavior Checklist (Thai version)[8], five were from a review of recent research works[9,10]. The sleep problems must not be earlier than 6 months before the date that they gave responses to the questionnaire. Choices of the questions were limited to 0, 1, or 2 where 0 meant the queried event or not happen; 1 meant sometimes or a little; and 2 meant it happened as described very frequently. If the response was 2, it was taken as an incident of a sleep problem.

Analysis

The statistics were calculated with SPSS software v20.0 (IBM Corp., Amonk, NY, US). The prevalence and patterns of sleep problems were presented as frequency and percentage. Correlations between factors were determined by odds ratio with 95% confidence interval and logistic regression analysis.

Ethical consideration

This study was approved by Siriraj Institutional Review Board [SIRB], Faculty of Medicine Siriraj Hospital, Mahidol University; Si. 370/2013.

Results

Demographic data

There were 96 participants. Seventeen were females (17.7%) and 79 were males (82.3%). Most were between 7 to 9 years of age (67 participants or 69.8%). Fourteen participants (14.6%) had personal illness such as allergy, asthma, and thalassemia. Forty-nine participants (51%) were diagnosed with one or more psychiatric disorders. The most frequent comorbidity was specific learning disorder which was found in 31 participants (32%). Other statistics can be found in Table 1. Regarding their sleeping behaviors, most participants (68 of them) went to sleep after 20:00 (70.8%). Sixty-four of them (66.7%) slept for 9 hours or more during the night. Thirty-six caregivers (37.5%) thought that their child was having a sleep problem while only 18 children (18.8%) thought that they were having a sleep problem. Other sleeping behavior data are shown in Table 2.

Prevalence of sleep problems and some detailed descriptions of them

It was found that 70 participants (72.9%) had at least one sleep problem. Twenty-seven participants (28%) had only one sleep problem while 14 (14.6%) had 2 sleep problems. Twenty-three (23.9%) had 3 sleep problems, and six (6.30%) had 4 or more problems. The most common problem found was that the children absolutely needed their parents to stay with them while

Table 1. Demographic data (n = 96)

Data	Number	Percentage (%)
Gender		
Male	79	82.3
Female	17	17.7
Age		
7 to 9 years	67	69.8
10 to 12 years	29	30.2
Comorbidity		
Specific learning disorder	31	32.0
Conduct disorder	7	7.3
Depressive disorder	2	2.1
Enuresis	2	2.1
Autistic spectrum disorder	2	2.1
Oppositional defiant disorder	1	1.0
Tic disorders	1	1.0
Language disorders	1	1.0
Without	49	51.1
Total family income (baht per month)		
Less than 10.000	13	13.5
10,000 to 50,000	65	67.7
More than 50,000	18	18.8
Type of family		
Core	75	78.1
Extended	21	21.9

Table 2. Sleeping behaviors (n = 96)

Data	Number	Percentage (%)
Time to get to sleep		
Before or at 20:00 pm	27	28.1
After 20:00 pm	68	70.8
Sleeping period		
Less than 9 hours	32	33.3
9 hours or over	64	66.7
Things that disrupted their sleeping		
Existing	16	16.7
Not existing	80	83.3
Parental perception of their child's sleep problem		
Yes	36	37.5
No	59	61.5
The children thought that they were having a sleep problem		
Yes	18	18.8
No	77	80.2

they were getting to sleep. Thirty-seven participants (38.5%) had this problem. The second most frequent problem was that they were afraid to sleep in the dark alone. Twenty-nine of them (30.2%) had this problem. Other problems were the following: hard to get to sleep for 23 participants (24%); snoring for 19 participants (19.8%); getting less sleep than normal children for 15 participants (15.6%); bad dream and urinated while sleeping for 9 participants (9.4%);talking while sleeping or sleepwalking for 7 participants (7.3%); complaining

of body pain for 3 participants (3.1%); sleeping for more hours than normal children for 2 participants (2.1%); and other sleep problems such as grinding their teeth while sleeping or changing sleeping posture too frequently for 20 participants (21.3%). All of these results are summarized in Table 3.

Correlations between sleep problems and factors affecting them

The author found that there were 2 factors that strongly correlated with sleep problems: age and the parental perception of their child's sleep problem. In addition, ADHD children whose age was less than 11 years had more sleep problems than those whose age were 11 years or higher. Moreover, the ADHD children whose parents thought that they were having a sleep problem had more sleep problems than those whose parents were not concerned about it. The statistics regarding the data are shown in Table 4, 5.

Discussion

Prevalence and types of sleep problems

The author found that the prevalence of sleep problems in children who had not been treated with medications before they were diagnosed with ADHD was 72.9%. This number is close to that found by Sung et al at 73.3%[7]. In their study, they grouped the subjects according to 2 levels of severity (of the sleep problems): low and moderate to high severity. Twenty-eight point five percent of their subjects were having low-severity problems while 44.8% were having moderate to high-severity problems. This present study did not classify the participants according to the same criterion. Instead, it reported the percentages of participants who were having different numbers of problems. In addition, 44.8% of the subjects had more than one sleeping problem, and among this group, 6.3% had more than 3 sleeping problems.

The most common problem found was that the subjects absolutely needed their parents to stay with them while they were getting to sleep, at 38.5%. This result was in accordance with findings from a study by O'Brien et al who also reported that the prevalence of this problem was 79%, the highest among all of the sleep problems[11]. Rodopman-Arman et al also reported that 22% of their combined-type subjects were having this problem[5]. The degree of prevalence found in this study was different which may be attributed to the different sizes of the population of the participants. Judith A. Owens have explained that bedtime fears and the need to have their parents to stay with them while the children were getting to sleep were significantly correlated with anxiety disorder or depressive disorder that were disorders which are commonly found with ADHD[12], while Dickason-Mayes et al reported that children with ADHD who also had anxiety or depressive disorder were more likely to have sleep problems than those who did not have these disorders[13]. The results contradicted results from the current study that there was only one participant with depressive disorder who needed to have his parents staying with him as he was getting to sleep and that no participant was found to have an anxiety disorder. It is possible that our subjects were not diagnosed with these disorders because it was their first visit to the clinic. Their anxiety or depressive symptoms might have not been shown clearly or completely enough to have satisfied the diagnosis criteria.

The second most frequent sleep problem was that the children were afraid to sleep in the dark (at

Table 3. Prevalence of sleep problems (n = 96)

Data	Number	Percentage (%)
Absolutely needed their parents to stay with them while they were sleeping	37	38.5
Afraid to sleep in the dark alone	29	30.2
Hard to get to sleep	23	24.0
Other sleeping problems	20	21.3
Snoring	19	19.8
Sleeping less than normal children	15	15.6
Nightmares	9	9.4
Urinated while sleeping	9	9.4
Sleep talking or sleepwalking	7	7.3
Complaining of body pain while sleeping	3	3.1
Sleeping more than normal children during the day and/or night	2	2.1

Table 4. Correlations between sleep problems and the associated factors

Factor	Sleep problem		*p*-value	Odds ratio (95% confidence interval)
	Yes, n (%)	No, n (%)		
Gender				
Male	57 (81.4)	22 (84.6)	1.00	1.25 (0.36 to 4.26)
Female	13 (18.6)	4 (15.4)		1.0
Age				
Under 11 years	64 (91.4)	17 (65.4)	0.004*	5.64 (1.76 to 18.07)
11 years and over	6 (8.6)	9 (34.6)		1.0
Total family income (bath per month)				
More than 10,000	60 (85.7)	23 (88.5)	1.00	0.78 (0.19 to 3.10)
10,000 or less	10 (14.3)	3 (11.5)		1.0
Type of family				
Core	16 (22.8)	5 (19.2)	0.70	1.24 (0.40 to 3.82)
Extended	54 (77.1)	21(80.8)		1.0
Things that disrupted sleep				
Yes	9 (12.8)	7 (26.9)	0.12	0.40 (0.13 to 1.22)
No	61(87.2)	19 (73.1)		1.0
Parental perception of their child was having a sleep problem				
Yes	33 (47.1)	3 (12.0)	0.002*	6.54 (1.79 to 23.86)
No	37 (52.9)	22 (88.0)		1.0
Complaining about a sleep problem				
Yes	15 (21.7)	3 (11.5)	0.38	2.13 (0.56 to 8.07)
No	54 (78.3)	23 (88.5)		1.0

* *p*-value <0.05

Table 5. Results of logistic regression analysis

Factor	Crude OR	Adjusted OR
Less than 11 years of age	5.64 (1.76 to 18.07)	7.47 (1.97 to 28.34)*
Parental perception of their child was having a sleep problem	6.54 (1.79 to 23.86)	7.80 (1.92to 31.68) **

OR = odds ratio
* Adjusted OR of the parents thought that their child was having a sleep problem, ** Adjusted OR of age

30.2%) which is common in children at primary school age. The third most frequent problem was the problem of hard to get sleep at 24%. This result supported those from many other studies that reported that children with ADHD usually had this problem[5,7,14]. Judith A. Owens stated that this problem is related to one of the following: lack of good sleep hygiene training, inappropriate caretaking, a problem with the relationship between the child and their parents, hyperactivity, and the child's own bad behavior such as being stubborn, defiance, and bad conduct[12]. The result that 70.8% of participants usually went to bed after 20:00 may be attributed to environmental factor or the way they were raised; the parents might have not told the child clearly about their bedtime, or the child might be doing multiple activities before going to sleep such as doing homework or watching TV or the child may experienced symptoms of hyperactivity that prevented them from getting to sleep. It was assumed that the main problems were either an environmental problem or a caretaking problem or a manifestation of an ADHD symptom. The fourth most frequent problem found was other kinds of problem at 21.3%. Some parents reported the problem clearly. For example, 9.6%

of the participants were reported to grind their teeth while they were sleeping and 7.4% were reported to change their sleeping posture frequently while they were sleeping. However, Cortese et al had concluded that children with ADHD usually moved more frequently during sleep than normal children did[15], so this problem may not be a distinct problem for the study's participants. The fifth most frequent problem found was snoring at 19.8% which is comparable to the results from studies by O'Brien et al[11] and Sedky et al[16] which reported that 40% of their ADHD children had a stop-breathing problem during sleep and 25 to 57% of them were having a snoring problem related to sleep-related breathing disorder. Sung et al reported that 8.8% of their participants had a mild snoring problem[7]. It was out of the scope of this study to use polysomnography to evaluate the participants' snoring problem, so no conclusion were drawn in regards to the possible causes of their snoring problem.

Other sleep problems such as getting less sleep than normal children, nightmare, enuresis, sleep talking or walking were with prevalence of 15.6%, 9.4%, 9.4%, 7.3%, and 2.1%, respectively. These results are close to the results from a study by Choon et al[4] but different from the results of O'Brien's study; it presented that children with ADHD who went to the sleeping clinic in their study were having nightmare at 62%, sleep walking at 31%, and enuresis at 51%[11].

Correlations between sleep problems and factors affecting them

This present study found 2 factors that were significantly correlated with sleep problems: the children's age and the parental perception of sleep problem in their child. Regarding the age factor, it was found that the children with ADHD whose age was less than 11 years had 7.47 more times of sleep problems than those 11 years of age or older. This may be that children of the older age group were becoming adolescents and their hyperactivity symptom became lessened. Their age played an important factor as older children were more likely to sleep in a separate room from the parents and so the parents' observation of the sleep problem might not have been keen enough. In this regard, Shur-Fen Gau has reported that age correlated strongly with sleep problems and ADHD symptom[17].

Regarding the factor that the parents have already thought that their child was having a sleep problem, the children with ADHD participants whose parents thought so were having 7.80 times more sleep problems than the children whose parents did not think so, suggesting that parents' reports were an important piece of information and were likely to be true.

The present study recruited only new subjects who were diagnosed with ADHD at Siriraj hospital. They cannot be assumed to be true representatives of the whole population of children with ADHD in Thailand. Moreover, it was a descriptive study that did not take into account the data from a control group. Indeed, the survey was also from parental report questionnaires which were subjected to bias. Although there were limitations, future study should aim to sample a higher number of participants from a full variety of sources and should include a control group. Moreover, sleeping problems should be verified with more accurate methods that can completely satisfied the diagnosis criteria.

Conclusion

The prevalence of sleep problems in ADHD children before coming for treatment was high. The most frequent problem was children wanted their parents to be with them as they were getting to sleep. The major factors that were statistically significantly correlated with sleep problems were age and the parental perception of their child's sleep problem. Therefore, the child and adolescent psychiatrist should pay good attention to their ADHD children's sleep problems before an ADHD treatment is prescribed.

What is already known on this topic?

The prevalence of sleep problem in ADHD children was higher than that in normal children. The types and possible causes of sleep problem varied.

What this study adds?

The prevalence of sleep problems in ADHD children who came to the child and adolescent psychiatric clinic, Siriraj Hospital was 72.9%. They had already sleep problems before they received medicine. Most problems occurred at the time ADHD children were getting to sleep. The major factors that were statistically significant correlated with sleep problems were age and parental perception of their child's sleep problem.

Acknowledgements

The present study was supported by a research grant from the Siriraj Reseach Affair, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand. The authors wish to thank the following

people: Suthipol Udompunturak, who provided us consultancy on statistical analysis, Kittichai Theankam and the nursing staff at the child and adolescent psychiatric clinic who assisted in data collection.

Potential conflicts of interest

None.

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