

## Sleep Problem of Children with Autistic Spectrum Disorder Assessed by Children Sleep Habits Questionnaire-Abbreviated in Indonesia and Japan

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**BACKGROUND:** Sleep problems are associated with problems of cognitive functioning, learning, attention and school performance. It has been found that sleep problems are highly prevalent in children with Autistic spectrum disorders (ASD), with rates ranging from 40% to 80%. We aimed to identify the prevalence of sleep problems on children with ASD in Indonesia and Japan. **METHODS:** A cross-sectional study was conducted in Surabaya, Indonesia and Kobe, Japan. Children aged 4 – 10 years old were enrolled using stratified cluster sampling. Children's Sleep Habits Questionnaire-Abbreviated (CSHQ-A) was used in this research to assess the sleep problems, consisted of 22 questions (NICHD SECCYD—Wisconsin). Data were analyzed with Mann-Whitney U test to compare the CSHQ-A scores between Indonesian and Japanese children, while the proportion of sleep problems was evaluated by chi-square test with 95% confidence interval. **RESULTS:** Fifty children with ASD were included in this study, 25 children from Kobe, Japan and 25 children from Surabaya, Indonesia. The prevalence of sleep problems on children with ASD was 60% (15 children) in Indonesia and 16% (4 children) in Japan respectively. There were significant differences in total waking during the night and in morning wake for the CSHQ-A between children from Indonesia and Japan ( $p < 0.005$ ). **CONCLUSIONS:** The prevalence of sleep problems on children with ASD was higher in children from Indonesia than from Japan.

### INTRODUCTION

Autism Spectrum Disorder (ASD) is a developmental disorder characterized by deficits in social interaction and communication, restricted, repetitive interests and behaviors beginning in infancy and toddler years (1). The prevalence of autism has been estimated at 13/10,000 and is believed to be increasing (3,7). The etiology of autism is still unknown. There is insufficient evidence to implicate any prenatal factor in autism etiology although, there is some evidence to suggest that exposure to pregnancy complications may increase the risk (8). Several researchers have reported on the increasing numbers of sleep problems in children with ASD (4,10,12,15,16,24,34). Sleep problems commonly reported across a range of conditions such as difficulty in settling to sleep, night waking, irregular sleep patterns, short-duration sleep and daytime sleepiness (15,23,34).

Many of the sleep problems are associated with problems of cognitive functioning, learning, attention and school performance (11,17,25,26,31,35). Fewer hours of sleep per night is a predictor of symptoms of ASD and social skills deficits (4,27). Children with ASD who sleep problems were found to have had more internalizing and externalizing behavior problems and poorer adaptive skill development than children with ASD who did not sleep problems (18,19,28,29). However, exploration of the types of sleep difficulties and associated etiological factors in the ASD is still in its infancy (24).

A variety of measurement tools are utilized in sleep assessment, including Electroencephalography (EEG), Polysomnography, Actigraphy and Children's Sleep Habits Questionnaire (CSHQ). The CSHQ is used to screen sleep problems. Although CSHQ alone is not sufficient for diagnosis or treatment planning. It can provide supplemental information beyond the clinical interview. In addition, questionnaires may be a useful way to monitor treatment progress. To date there has been a limited number of studies on this topic published in Indonesia and Japan. For this study we used the CSHQ-A, to identify sleep problems of children with ASD in

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Indonesia and Japan. A high total CSHQ score of children with ASD has recently been reported in a study of the sleep disturbances in children with ASD (20). This study investigated the prevalence of sleep problem in children with ASD. Our previous research, showed 3% of Indonesian typically developing (TD) sustained sleep problems. The hypothesis in this study is the prevalence of sleep problems on children with ASD is high. This data could be used to support the management on children with ASD in Indonesia and Japan.

### MATERIALS AND METHODS

#### Methods

A cross sectional study was conducted in Surabaya, Indonesia and Kobe, Japan, from June 1 to December 30, 2014. The sample of this study consisted of 50 children diagnosed with ASD, 25 from Surabaya, Indonesia and 25 from Kobe, Japan. Sample size was calculated based on the total sampling. Children enrolled in the study met the following criteria: age between 4 and 10 years old, stable medical conditions, and no change in medication related to sleep or health status in the past 3 months. ASD diagnosis was made by a pediatrician and confirmed by The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (1). The researcher interviewed the parents/caregivers and filled in a CHSQ-A after the parents were being informed of the study and gave their written consents.

Data were analyzed with Mann-Whitney U test to compare the CSHQ-A scores between Indonesia and Japan, while the proportion of sleep problems was evaluated by chi-square test with 95% confidence interval. Analysis were performed using SPSS 16.0.

This study was approved by the Ethics Committee Faculty of Medicine, Airlangga University, Surabaya, Indonesia and Graduate School of Health Sciences, Kobe University, Japan.

#### Materials

The CSHQ-A (NICHD SECCYD-Wisconsin) was used in this research to assess the sleep problems, was modified The CSHQ by Owen and only a subset of items was administered, and the response scale was expanded to 5 points (1 = always, 5 = never). The CSHQ-A consisted of 22 questions. These questionnaires were attained primarily by retrospective method with the parents/caregivers recalling on sleep patterns, disturbances, or behaviors (e.g., bed time, sleep behavior, waking during the night, morning wake up). Items of the CSHQ-A are rated on a five point scale ranging from "always" if the sleep behavior occurred 7 times in the past week, "usually" if the behavior occurred 5-6 times in the past week, "sometimes" for 2 to 4 times that week, "rarely" for 1 time that week, and "never" for 0 times that week. A total score of more than 41 on CSHQ was taken as abnormal and indicative of sleep problems (21,22).

### RESULT

Fifty children with ASD included in this research, 25 children from Kobe, Japan and 25 children from Surabaya, Indonesia. Eighty two percent (41) children were male and only 18% (9) children were female (Table I)

#### I. Distribution

Table I. Characteristics of children with ASD (N = 50)

Participants	Indonesian Children with ASD (n=25)	Japanese Children with ASD (n=25)	<i>P</i>
Age (Mean ±SD)	4.8±1.5	7.7±1.7	*
Gender			
Male (%)	21 (84)	20 (80)	NS
Female (%)	4 (16)	5 (20)	

\*  $P < 0.05$  (Mann-Whitney U test, Chi-square test)

#### II. Total score of Children's Sleep Habits Questionnaire-Abbreviated (CSHQ-A)

The children with ASD in Indonesia had more sleep problems on 2 out of 4 domains of CSHQ-A than Japanese children with ASD (Table II).

Table II. Total score of CSHQ-A

	Indonesia	Japan	<i>P</i>
Total bed time	18.88 ±3.07	17.88 ±2.24	NS
Total sleep behavior	12.36 ±2.29	11.04 ±1.24	NS
Total waking during the night	2.76 ±1.01	2.36 ±0.95	*
Total morning wake up	7.12 ±1.71	6.00 ±1.19	*
Total Score	41.12 ±5.49	37.28 ±2.81	*

\*  $P < 0.05$  (Mann-Whitney U test)

Based on CSHQ-A, the prevalence of sleep problems for children with ASD was 60% in Indonesia and 16% in Japan respectively (Table III)

Table III. Children with ASD who had Sleep Problems

Sleep Problems	Indonesia (N=25) (%)	Japan (N=25) (%)	<i>P</i>
Yes	15 (60)	4 (16)	0.001*
No	10 (40)	21 (84)	

\*Significant (Chi-Square test)

## DISCUSSION

The present study showed that the prevalence of sleep problems on children with ASD was 60% in Indonesia and 16% in Japan respectively. The most commonly reported behaviors were child falls asleep in parent's or sibling's bed, child goes to bed at the same time at night, child sleeps about the same amount each day and child wakes up by him/herself. An individual sleep problem also was defined as a sleep problem occurring at least two nights per week (37). Children who don't have enough sleep time or have a poor quality sleep have been shown to have more behavior difficulty, especially in children with ASD (27,28).

Sleep problems in ASD might occur as a result of complex interactions between biological, psychological, social/environmental, and family factors, including child rearing practices that are not conducive to good sleep (5,31). This could be due to sleep being a dynamic and regulated set of behavioral and physiological states and stages (36).

The high prevalence of Indonesian children with ASD in our study (60%) was similar to other studies that found sleep problems are highly prevalent in children with ASD, with rates ranging from 40% to 80% (5,19,23,26,27,32,33). The higher prevalence of sleep disturbance in Indonesian children with ASD due to different characteristics with Japan population that Indonesian children showed higher severity of ASD. Meanwhile, the low prevalence of sleep problems in Japan of children with ASD may not due to the difference in the mean age of children with ASD between two countries ( $4.8 \pm 1.5$  vs  $7.7 \pm 1.7$ ). A study by Hodge (13) found that the sleep problems of children with ASD were not associated with age, but to the reduced sleep duration in children with ASD since the age of 30 months and persisted to adolescence (14). Sleep problems in children with ASD were related to poor quality of life (6) with sleep onset delay being particularly related to melatonin pathway genes (9,32).

Children with ASD who had sleep problems had more internalizing and externalizing behavior problems and poorer adaptive skill development than children with ASD who had no sleep problems (28). Children with ASD had poorer daytime performance and behavior than the TD children (28,29). Comparing our subjects to the TD children in Indonesia, we found 3% of TD children have sleep problems.

In CSHQ-A four specific sleep parameters were assessed, namely bedtime; sleep behavior; waking during the night; and morning wake up. There were significant differences in total waking during the night and morning wake up which showed children with ASD in Indonesia had more sleep problems on 2 out of 4 domains of CSHQ-A when compared to Japanese children with ASD. Thirty one children with ASD (62%) in our study had a good sleep. However Sikora (2012) found the CSHQ have a negative relationship with daytime behavior (30).

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Insomnia (in particular sleep onset, settling, and night-waking problems) issues are a hallmark of sleep problems in ASD (24). The good sleepers with ASD did not differ from the TD children on CSHQ-A domains (18).

In this study, 41 children (82%) were male and only 9 children (18%) were female. The gender difference in this study was similar to data in the United States that showed ASD affected 1 in 80 boys and the ratio of male and female was 4:1 (3). The gender and age differences in sleep problems may be the reflection of developmental characteristics of children. Gender difference exists in growth pace and physical trait, and equality in personality and temperament, which may result in different behavioral tendency and disease sensitivity (30,37). The mean age in our study was  $4.8 \pm 1.5$  years in Indonesia and  $7.7 \pm 1.7$  years in Japan. To date it is unclear if sleep problems in children with ASD will improve with age. There has been mixed evidence in the literature that show sleep problems in children with ASD might improve with age (23) however, Mayes and Calhoun found no relationship between sleep problems and age (19). Parent-report sleep problems were associated with more daytime sleepiness and more behavior problems (2).

In summary, the prevalence of sleep problems in our study is 60% in Indonesia and 16% in Japan.

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