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ORIGINAL RESEARCH

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EFFECT OF HEALTH EDUCATION OF SLEEP HYGIENE ON SLEEP PROBLEMS IN PRESCHOOLERS

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Abstract

Background: Children need adequate sleep for good health status. Without a balanced sleep, it will encourage the emergence of serious health or developmental problems. Previous studies showed more than 40% of preschoolers experienced sleep problems.

Objective: To examine the effect of HESH (Health Education of Sleep Hygiene) on sleep problems in preschoolers.

Methods: Pretest posttest design non-equivalent control group was used in this study. Sixty participants recruited by consecutive sampling. Parents in the experimental group received health education using power point and booklet HESH for 100 minutes, parents in the control group received health education using power point for 100 minutes without booklet HESH. Telephone follow up was done for evaluation program. Sleep problem was measured with Children's Sleep Habits Questionnaire (CSHQ) completed by children's parents. Data analysis used unpaired t-test with 95% confidence interval.

Results: The result showed that there was effect of HESH toward sleep problems in preschooler (experimental group: -3.367 ± 5.269 ; control group: 0.033 ± 5.061 , $p = 0.015$).

Conclusion: HESH in parents could decrease sleep problems in preschoolers in Indonesia. It is expected that HESH can be used as an alternative nursing intervention involved parents to decreases sleep problem in preschooler.

Keywords: CSHQ; health education; sleep problem; sleep hygiene; preschool

INTRODUCTION

Children need adequate sleep for good health status. Without a balanced sleep, it will encourage sleep problems then raises serious health disorders and developmental problems. Adequate sleep in children is necessary to optimize function of normal growth and development, maternal and family welfare ([Bathory & Tomopoulos, 2017](#)). The need for sleep in quantity in preschoolers is 10-13 hour per day ([Foundation, 2017](#)).

Sleep behavioral problems in children consist of bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, sleep disordered

breathing, night waking, parasomnias and daytime sleepiness ([Owens, Spirito, & McGuinn, 2000](#)). In this study, sleep problem is sleep behavioral problem which consists of bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, sleep disordered breathing, night waking, parasomnias and daytime sleepiness and measured by Children's Sleep Habit Questionnaire (CSHQ).

Research in China found 49.4% of children experienced sleeping problems ([Z. Liu et al., 2013](#)) while in Indonesia, especially in

Semarang, found that out of 183 preschool children (3-6 years old) and 146 (79.78%) of children had trouble sleeping with score of CSHQ more than 41 ([Zahara, Hartanto, & Adyaksa, 2013](#)). The preliminary study at Salaman Mloyo village that randomly selected from all district of West Semarang, showed 93% of children experienced sleep problems with a score of sleep problems more than 41.

Parental mismanagement of sleep routines is a family factor due to sleep problems in children ([Jones, Pollard, Summerbell, & Ball, 2014](#)). Parenting attitude also a factor that positively correlates to child sleep problems ([Jones et al., 2014](#); [X. Liu, Liu, Owens, & Kaplan, 2005](#)). Some non-pharmacological recommendations for parents include music therapy, counseling, sleep education programs, early care and education program, behavioral therapy and sleep hygiene ([Gonzales, 2013](#); [Gruber, Cassoff, & Knäuper, 2011](#); [Halal & Nunes, 2014](#); [Hockenberry & Wilson, 2014](#); [Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006](#); [Staton et al., 2016](#); [Wilson, Miller, Bonuck, Lumeng, & Chervin, 2014](#)). Recommendations for parents to address sleep problems in children can be provided by health workers including nurses ([Gruber et al., 2011](#)).

Sleep hygiene is a term to describe practices on behavior and environment by parents and children to promote healthy sleep quality and intended to treat mild to moderate insomnia ([Hauri, 1977](#)). Systematic review of Halal and Nunes (2014) found that sleep hygiene was a non-pharmacological intervention and easy implemented and adhered ([Halal & Nunes, 2014](#)). Poor sleep hygiene was associated with sleep problems such as late bedtime (after 9 pm), longer sleep latency, parental presence in the bedroom and shorter sleep ([Owens, Jones, & Nash, 2011](#)).

Theory of Knowledge-Attitude-Practice (KAP) adopted by learning theorists suggests individuals who acquire knowledge related to practice, with that knowledge, they develop a positive attitude toward the practice, and this raises behavioral change ([Bettinghaus, 1986](#);

[Chien-Yun, Wan-Fei, Yu-Hsi, & Chia-Hung, 2012](#)). Based on the model of the firm, the first step to changing behavior is to equip someone with the appropriate knowledge and adequate. There is no research in Indonesia that examines the Health Education of Sleep Hygiene (HESH) to sleep problems in children. The purpose of this study was to examine the effect of health education of sleep hygiene on sleep problems in preschool children.

METHODS

Study design

This study was quasi-experimental study with pretest posttest design non-equivalent control group.

Participants

The study was conducted in sub-district of West Semarang, Indonesia, based on the highest number of kindergarten students in Semarang, Indonesia. West Semarang consists of sixteen sub-districts and Salaman Mloyo was randomly chosen. Based on preliminary studies in Salaman Mloyo, there were two kindergartens had same characteristic in social economic and academic schedule. Research conducted in both Kindergarten Talenta Semarang and Kindergarten Kanisius Kurmosari Semarang.

The inclusion criteria of the both experimental and control group were children aged 4-6 years, lived with both parents, did not experience deviations or emotional mental problems, ADHD, and had no history of seizures. The characteristics of parents included mother or father of Kindergarten students, could read and speak using Indonesian language, lived in one house with kindergarten students, aged between 18-44 years and willing to become participants. The exclusion criteria of children were: asthma, obesity, and taking anti-seizure medication. While for parents were parents who were educated under high school, earn below regional minimum wage or inpatient at the Hospital. Some of participant did not participate because of their limited time and

one of them just had a baby. Sixty participants recruited by consecutive sampling. Bias because the parent's interaction is anticipated by determining one kindergarten to be an experimental group and the other kindergarten into control group (random determination).

Instruments

Children's Sleep Habits Questionnaire (CSHQ) Indonesian version, module and booklet HESH (Health Educational about Sleep Hygiene) and follow-up telephone checklist used as instrument in this study. There are many methods to measure sleep problems in preschooler including using CSHQ in Indonesian version. The CSHQ developed by Judith Owens, consists of 33 item questionnaire, parent-rated questionnaire for assessing the behavior associated with common pediatric sleep difficulties ([Owens et al., 2000](#)). The CSHQ contains 8 domains of sleep problems (sleep time resistance, sleep-onset delay, sleep duration, sleep anxiety, night waking, parasomnias, sleep disordered breathing and daytime sleepiness). Internal consistency of all item of the CSHQ in Indonesian version was 0.80 ([Hartini, Herini, & Takada, 2017](#)). A cut-off total CSHQ score of 41 could be utilized to identify children with sleep disturbances, and highlight sleep domains which warrant further clinical evaluation ([Owens et al., 2000](#)). Score CSHQ more than 41 indicated that children have sleep problems. Permitted and approval to use CSHQ was provided by Judith A. Owens (the owner of the instrument) and by Sri Hartini who developed the CSHQ instrument in Indonesian ([Hartini et al., 2017](#); [Irwanto, Rehata, Hartini, & Takada, 2016](#)). Booklet has been tested expert validity and tested legibility on the parents of kindergarten Miftaul Khoir.

Data collection

The research data was collected from March 2017 to May 2017 at two private kindergartens located in Salaman Mloyo, West Semarang, Indonesia. At the beginning of the study researchers explained research

procedures and asked the participants to participate in the study by asking participants signed an informed consent. Then participants filled out the CSHQ questionnaire as the pretest data of sleep problems. Posttest data were collected at the fifth week after intervention.

Intervention

Experimental group received health education using power point and booklet of HESH for 100 minutes and followed up by telephone every week of a month. In the control group health education using power point for 100 minutes without booklet. Intervention was provided by a research assistant who had been briefed. The research assistant involved has requirements such as a nurse with a minimum education level of Bachelor of Nursing, having more than one year of working experience as a nurse in a clinic or educator or trainer. An assistant researcher on sleep hygiene education to both groups (in order to avoid bias), three other assistants who did telephone follow-up. The selection process and the research flow could be seen in Figure 1.

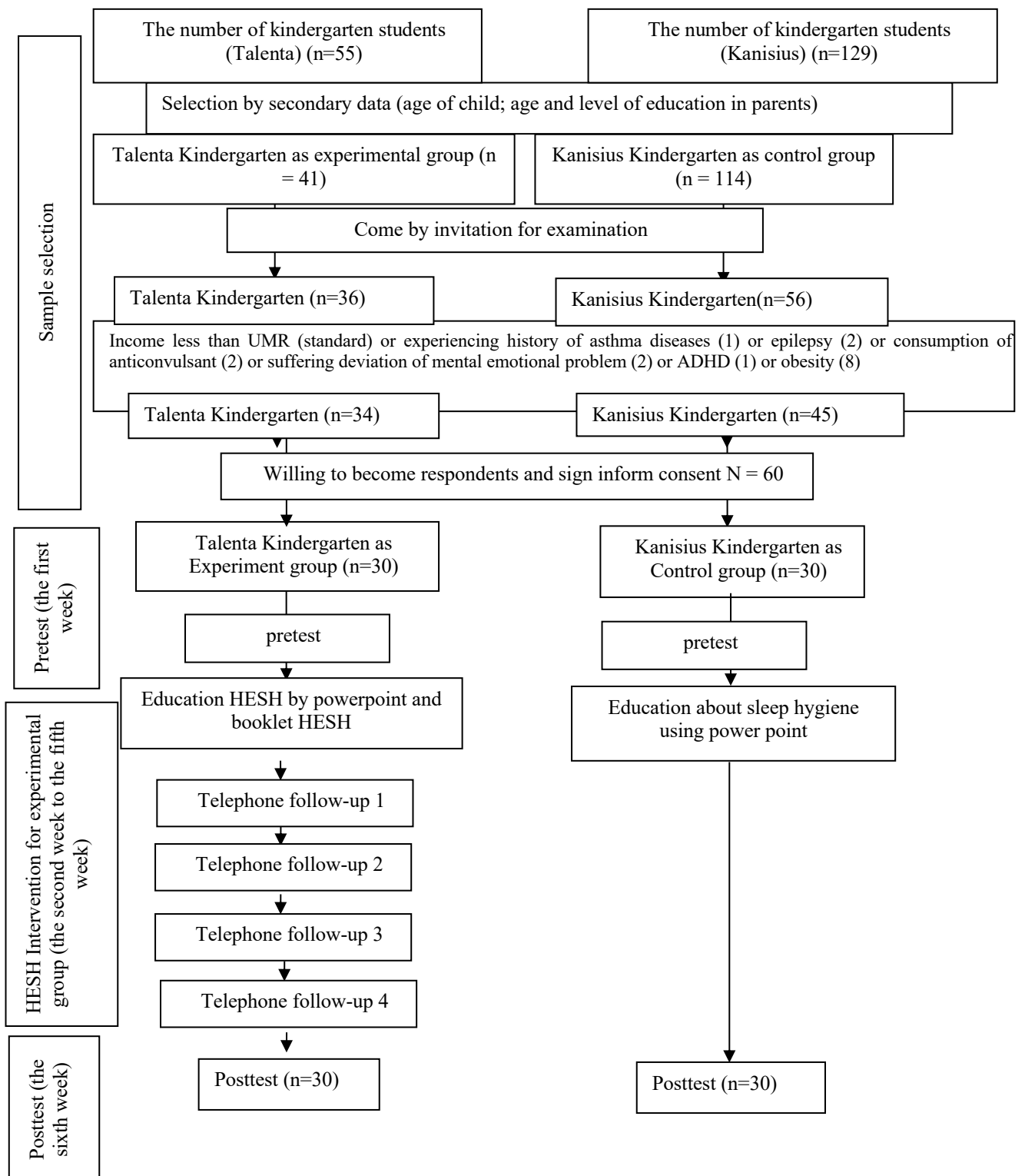
Data analysis

Distribution of data on the control group ($p=0.154$) and the experimental group ($p=0.073$) were normal, so unpaired t-test was used to analyze the effect HESH on sleep problem in preschooler. Effect size of HESH on sleep problems in preschooler analysis used Cohen's test.

Ethical consideration

Research conducted after obtaining a letter of ethics of research ethics from the Research Ethics Committee of Faculty of Medicine Universitas Gadjah Mada Yogyakarta and research permission from the National Unity and Political Entity (Kesbangpol) Semarang City Government of Central Java Province. Ethical eligibility letter number is KE/FK/0183/EC/2017.

Figure 1 Flow Research



RESULTS

Participant's characteristic

Participants have the characteristics of parents (age, education and role) and child (age and sex) written in detail in table 1. Sixty

participants met the criteria and followed the study, thirty participants in the control group and thirty participants in the experimental group.

Table 1 Different test results of study participants' characteristics

Sample	Characteristics	Classification	Control (N=30)		Experiment (N=30)		P-value
			n	%	n	%	
Parents	Age (year)	19-35	14	(46.7)	18	(60.0)	0.301 ^a
		36-44	16	(53.3)	12	(40.0)	
	Level of education	High School	12	(40.0)	6	(20.0)	0.091 ^a
		College	18	(60.0)	24	(80.0)	
	Role	Father	5	(16.7)	2	(6.7)	0.424 ^b
		Mother	25	(83.3)	28	(93.3)	
Child	Age	48-60 month	17	(56.7)	15	(50.0)	0.605 ^a
		61-72 month	13	(43.3)	15	(50.0)	
	Sex	Male	17	(56.7)	20	(66.7)	0.426 ^a
		Female	13	(43.3)	10	(33.3)	

* $p < 0.05$ | ^aChi-Square test | ^bFisher Exact test

Chi square test on parent age characteristics, parent education level, child age and gender of children in control group and experimental group showed $p > 0.05$. Fisher test was used to examine the difference in parent roles between control group and experimental

group because there were 2 cells with value count less than 5. Fisher test showed $p > 0.05$ on characteristic of parent role, which can be concluded that the research participants in the control group and experimental group have the same characteristics.

Table 2 Sleep problems in the experimental and control group

Score of sleep problem (CSHQ)	Pretest		Posttest		P-value
	Mean	SD	Mean	SD	
Control group	45.43	6.13	44.50	6.58	0.971 ^a
Experimental group	47.07	5.38	43.70	5.31	0.002 ^{a**}

95% CI (95% Confidence Interval of the difference) | ^aPaired t-test | ^{**} $p < 0.01$

Table 2 shows that the mean of sleep problem before intervention in control group was 45.43 and after period time was 44.50 with p -value 0.971 (> 0.05), which indicated that there was no significant difference in the mean value of sleep problem between before and after in control group. Meanwhile, decreases sleep problem in experimental group was significant with p -value=0.002 (< 0.05) indicated there was a statistically significant difference on sleep problem.

The Effect of HESH on sleep problems in preschool children

Unpaired t-test and Cohen's d were used to examine the effect of sleep hygiene health

education on sleep problems. Unpaired t-test showed $p = 0.015$ (< 0.05), which indicated that there was a significant difference in the mean score of sleep problems in the experimental group with the mean score of sleep problems in the control group. The decreased score of sleep problems in the experimental group was significantly different than the decreased score of sleep problems in control group, which mean that HESH for parents influenced sleep problems in preschooler. Effect size of HESH was moderate because of d -Cohen value was 0.645. The effect of HESH in experimental group also showed the difference between before and after intervention.

Table 3 Effect of health education of sleep hygiene on sleep problems

Posttest-pretest difference	Mean (SD)	Mean Difference (95% CI)	t	p	d
Difference of control group (n=30)	-0.0333 (5.06157)	3.333 (0.663-6.003)	2.499	0.015 ^{a*}	0.645 ^b
Difference experiment group (n=30)	-3.3667 (5.26854)				

95% CI (95% Confidence Interval of the difference) | ^aUnpaired t-test | ^bCohen's d test | *p<0.05

DISCUSSION

Study of sleep hygiene education for parent towards sleep problems of preschool children was the first study in Indonesia. Previous research on sleep hygiene education was conducted in North Carolina, USA, New Zealand, Australia, and Michigan. Little is known about research on sleep hygiene developed in developing countries.

This study found that there was a significant influence of HESH on sleep problem in preschoolers. There were significant differences in deviation between sleep problems in the control and experimental group (-0.033±5.061 vs -3.367 ± 5.269) with mean difference of 3.333 (95% CI: 0.663-6.003) and p=0.015. The mean decrease was significantly different statistically but not clinically. But the effect size of HESH in this study was moderate (d=0.645).

The first reason of this result study was because the experimental group followed 100 minutes of sleep hygiene education from beginning until the end of session. The second reason was because participants received booklet of HESH. They read and applied the recommendation from this booklet. And the third reason was there was a telephone follow-up weekly in a month.

This study supports a systematic review conducted by (Halal & Nunes, 2014). Several studies in the systematic review stated that sleep hygiene methods improve the quality of child's sleep and decreases sleep problems of children. Another study declared health education about sleep in the form of a novel sleep education program for preschoolers and

their families lowered the problem of child's sleeping behavior (Wilson et al., 2014).

Education using power point and booklet gives a chance for parents to learn and create behavior. During education, parents listened and paid attention in material of sleep hygiene. They also had a chance for asking and discussing their problem. Based on social learning theory by Bandura (1977), parents experienced four mediation processes (Bandura & Walters, 1977). Bandura conveys there are four mediation processes in social learning theory that occurs in a person such as attention (behavior must be attention to be practiced), retention (how much behavior can be remembered), reproduction (humans try to do what has been seen and processed) and motivation (behavior requires motivation to be practiced). In the process of sleep hygiene education, participants do the process of listening, understanding, remembering, getting motivated and then imitating or practicing what is taught so that there is a change of parental behavior toward preschoolers. The retention process is supported by the use of booklets and telephone follow-up once a week. Knowledge-Attitude-Practice (KAP) theory also underlies the behavioral changes (Bettinghaus, 1986; Chien-Yun et al., 2012).

The application of sleep hygiene by parents shows an increase in the learning level. Kirkpatrick's four levels of training evaluation mentions four levels of evaluation in training or learning such as reaction, learning, behavior and result (Kirkpatrick, 2009). The fourth stage of the theory, the result evaluation, is an evaluation of the influence on the environment caused by behavior

change or performance improvement from the trainee. In this study, changes in the behavior of parents in the application of sleep hygiene to preschool children have an effect on the decrease in sleep problems of preschool children.

Sleep hygiene is a term that describes behavioral and environmental practices by parents and children to promote healthy sleep quality and is intended to treat mild to moderate insomnia (Hauri, 1977). Sleep hygiene is easy to apply and to adhere (Halal & Nunes, 2014). As well as through sleep hygiene parents can also regulate healthy sleep patterns and prevent sleep problems in children (Bathory & Tomopoulos, 2017).

The balance between the two sleep regulatory processes (the circulatory system and homeostatic sleep regulator) is important for the quality and quantity of sleep as well as the optimization of the level of awareness (Owens et al., 2011). This is the basis for the development of sleep hygiene. Sleep hygiene works through individual activities or a combination of a trained circadian rhythm, conditioning behavior, lowering anxiety, decreasing environmental stimulation and enhancing relaxation (Galland & Mitchell, 2010).

The results of this study show that HESH received by the parents decreases sleep problems of preschool children. The decrease in pre-school child sleep problems is the effect of providing sleep hygiene education and is not influenced by other factors such as the characteristics of children and parents. This is supported by data that the participatory characteristics of parents (roles, levels of education and age of parents) and children (sex and age) in this study did not differ significantly in both groups.

Limitation of the study

Researchers found some limitations and weaknesses during the study. Parents had limited time because of their occupation so could not participate in this study. Evaluation of knowledge and attitude changes were not

measured, which only based on the information from research assistant only.

CONCLUSION

Results of this study indicated that HESH for parents have a significant impact on sleep problems in preschoolers with moderate effect size. Health promotion about healthy sleep should be priority in community because of the impact of sleep problems can harm preschool children. Sleep hygiene booklets can be used as a media to provide health education to families and communities. Healthy sleep for preschoolers is a basic need of a child. Further research with bigger sample size is needed, with different design, setting and distinguished media in health education.

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Conflict of interest

The authors declare no conflict of interest with respect to the research, authorship, and/or publication of this article.

Author contribution

Authors contributed equally in this study.

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