



The Influence of Lighting on The Bedroom Towards The Sleep Quality of Children Aged 0-5 Years

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Abstract

Lighting in the bedroom is important in maintaining the quality of children's sleep. At the age of 0-5 years, a child has a sleep duration of around 11-18 hours, so it is necessary to pay attention to the lighting in the bedroom so that children have quality sleep time. This study aims to determine the effect of lighting in the bedroom on the sleep quality of children aged 0-5 years. Samples were taken randomly with the age range of children 0-5 years with the criteria of children accustomed to sleeping with the lights off as many as 6 samples. The number of samples was adjusted to the availability of samples around the research site in Tinjomoyo village. Data collection techniques were observation and questionnaires. The parents of the sample filled out the observation sheets and questionnaires. The duration of data collection depends on how many times each sample wakes up during sleep at night, starting when the child falls asleep until 03.00 AM. The results showed that there was an effect of bedroom lighting on the sleep quality of children aged 0-5 years as indicated by a change in the child's total awakening, which is an average of 2 fewer awakenings during sleep from the lights on to the lights off.

INTRODUCTION

Light is an important role in everyday life, for example, lamp light, light illumination. Lighting depends on the distance of the object to the light source. A light source will emit energy that is converted into visible light (Sukardi *et al.*, 2017). Good lighting is very necessary to support all human activities. Lighting is divided into two, namely natural and artificial lighting. Natural lighting comes from sunlight (Mustaqim & Haddin, 2017), while artificial lighting is any form of light sourced from man-made tools (Widiyantoro *et al.*, 2017).

Lamps are an example of a lighting source that is widely used to illuminate every room in the house. As users, consumers should be wise in using lamps. Excessive use of lights can cause energy waste and increase electricity costs. Choosing the proper and appropriate lamps can save energy expended. To save energy, it is better to use fluorescent lamps rather than incandescent lamps (Saputro *et al.*, 2013). The installation and use of lights in each room in the house must be arranged as best as possible by paying attention to the function of that room, for example, in the bedroom, since bedroom is used to rest from all activities.

Bedroom is generally used for sleeping or resting. To sleep, usually the lights are turned off. The state of the lights that are turned off is very much in accordance with health recommendations. The minimum recommended level of illumination for a sleeping space is 120-250 lux (Jean-Louis *et al.*, 2000). The quality of lighting in the bedroom at night is very important, especially to support learning activities and rest. Uneven distribution of light can affect or interfere with a person's visual comfort.

Sleep is defined as a subconscious state in which the person can be awakened by sensory excitatory administration or by other excitatory (Guyton & Hall, 2007). Sleep quality is a state of sleep that produces freshness and fitness when awakened in the morning. Sleep quality that includes quantitative aspects of sleep such as sleep duration, sleep latency, as well as subjective aspects such as deep sleep and rest (Khasanah, 2012).

One of the factors that affect a person's sleep quality is light levels. Light has two influences on the hormone melatonin, namely the day-night light cycle which will change the rhythm of hormone secretion. The duration and intensity of sufficient and short light will suddenly suppress the production of the hormone melatonin. The hormone melatonin is a hormone secreted from the pineal gland, especially at night, this hormone is involved in the cycle and regulation of a person's sleep, as well as helping the physical activity of other cycles and human circadian rhythms (Grivas & Savvidou, 2007).

Inhibition of the formation of the hormone melatonin can give the human body an order to ignore sleep and carry out activities longer at night, so it has a big impact for the quality of sleep itself (Hengkengbala & Halim, 2022). The amount of the hormone melatonin produced by a person depends on the intensity of light received by the eyes. If a person sleeps in the dark, the production of the hormone melatonin can be said to be maximum.

Problems with sleep quality do not only occur in adults. Studies conducted on teenagers aged 15 to 18 years showed that 30% of them experienced at least one sleep-related problem (Ardiani, N. K. N., *et al.* 2021). Among them, 20% experienced sleepiness during the day, 12.4% had difficulty sleeping at night, 13.8% experienced sleeps that did not provide recovery, and 9.25% experienced difficulty staying asleep (Ardiani, N. K. N., *et al.* 2021). In relation to the use of lights, research conducted by Hidayat, M. T., *et al.* (2024) shows that 38.6% of respondents aged 18 to 25 years experience sleep disturbances when the lights are on, which results in decreased sleep quality. On the other hand, an increase in sleep quality occurred in 81.4% of respondents slept with the lights turned off. Hengkengbala & Halim (2022) showed that there is a relationship between sleep quality and the use of nightlights among students at SMA Negeri 2 Bitung, North Sulawesi with a p value < 0.005 . However, study about the relationship between sleep quality and the use of light of children has not been conducted. Therefore, in this study, the effect of light to the sleep quality of children was investigated. The samples were children aged 0-5 years old residing in Tinjomoyo sub-district, Banyumanik sub-district, Semarang city.

METHODS

The research method used in this research was a qualitative approach. The instruments used in this study were questionnaire instruments and observation instruments. The use of instruments aims to obtain information about the effect of lighting on the sleep quality of children aged 0-5 years. Data collection was carried out by distributing questionnaire instruments and observations to observers (parents of children).

The samples in this study consisted of 6 children aged 0-5 years. This was adjusted to the availability of samples around the research site in Tinjomoyo village, Banyumanik District.

RESULTS AND DISCUSSION

The number of awakenings of children while sleeping in conditions where the lights are on, lights are dim and the lights are off can be seen in Figure 1.

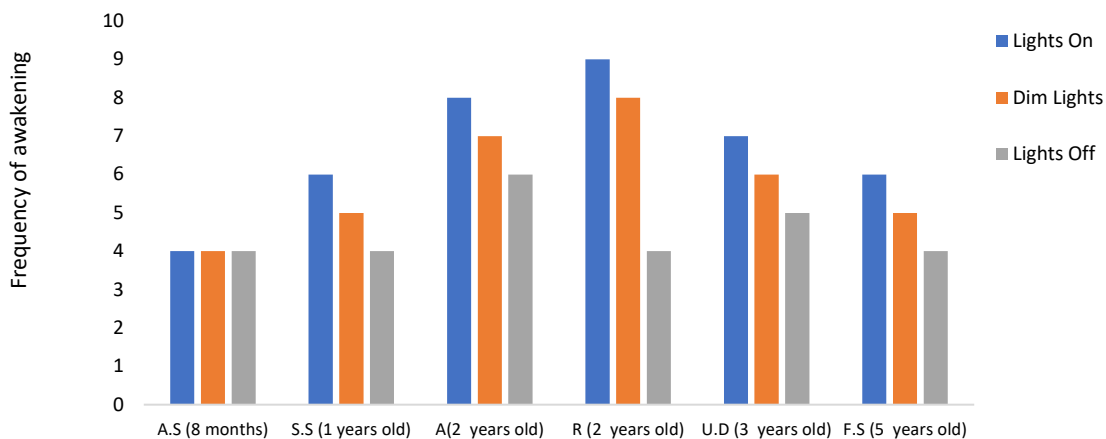


Figure 1. The frequency of awakenings of children aged 0-5 years during sleep in some conditions.

As shown in Figure 1, there were 5 out of a total of 6 children who experienced a complete change in waking up when given treatment. This suggests that children who sleep with the lights on will wake up more than if the lights were dimmed or the lights were turned off. The results showed that for children aged 0-5 years who are used to sleep with the lights on have a poor quality of sleep as indicated by the number of children waking up during sleep, which is 9 times.

The quantity and quality of children's sleep is important since during sleep the child's brain growth will continue to increase. Children need longer sleep time than adults, but not only enough sleep time, children also have to sleep soundly. It means that it is necessary to ensure that children get sufficient and quality sleep every day (Maharani *et al.*, 2022). The findings from this study also show that preschoolers (3-5 years old) do not get the 10-13 hours of sleep per day recommended by the National Sleep Foundation (Hirshkowitz *et al.*, 2015).

According to researchers from Harvard, our society is exposed to too much light. The cause is not only the overexposed bedroom but also the lights that are turned on hours before we go to bed. Melatonin levels in the body are affected by light. When the lights are turned on too brightly, the quality of sleep and the body's ability to regulate body temperature, blood pressure, and glucose levels are affected (Rusmiati, 2015).

The Harvard team also said that dimming the lights at night, and sleeping in the dark can reduce insomnia, maintain normal blood pressure, and

lower the chances of diabetes. In various studies, melatonin has been known to have a role in overcoming poor sleep quality, hypertension, and even cancer (Harmandini, 2011 in Rusmiati, 2015). The wakefulness cycle followed by sleep is associated with a photosensitive system involving the eyes and pineal gland in the brain. Without bright light, the pineal gland secretes melatonin (a hormone that causes drowsiness and sleep). Light can also trigger suppression of melatonin secretion (Rosenthal *et al.*, 1984 in Timby, B.K, 2009).

From the results of research conducted with the initial condition, children who are accustomed to sleeping with the lights on will wake up 4-9 times, in dim lights conditions children will wake up 4-8 times, and in lights off conditions children wake up 4-6 times. The lights that turn off during sleep make the performance of the hormone melatonin to the maximum so that the child's body and brain are fully rested so that they get a good quality sleep. These results are in accordance with research conducted (Rochmani, S., & Winarni, L. M. 2022) that there is a significant relationship between the use of light during sleep and sleep quality. Lighting in this bedroom can affect the quality of children's sleep. Dim light is more significant in suppressing the hormone melatonin in the body compared to bright light. As is known that this hormone melatonin can affect a person's sleep patterns, especially children (Urquhart & Broadley, 2014).

The results of the questionnaire on the effect of lighting can be seen in Table 1.

Table 1. The effect of lighting on the quality of sleep of the child.

Statement	Criteria
Many children wake up during sleep when the lights are on.	Strongly agree
In conditions of a light off, the child's sleep quality will be good.	Strongly agree
Lighting settings during sleep, reducing electricity consumption	Strongly agree
There is an effect of lighting in the child's bedroom on the quality of the child's sleep.	Strongly agree

In Table 1, it can be seen that parents strongly agree that the condition of the lights influences the better quality of children's sleep, and lighting settings in the bedroom also reduce electricity consumption. Therefore, parents should pay attention to the use of lights in an effort to maximize the quality of children's sleep so that there are no sleep disturbances in children that will affect children's growth and development.

CONCLUSION

In this study, it is concluded that there was an influence of lighting on the sleep quality of children aged 0-5 years. The lower the lighting in the child's bedroom, the better the quality of the child's sleep. It's shown that the average of the frequency of waking up being reduced by 2 times from the lights on to the lights off. Therefore, it can be said that the quality of the child's sleep is getting better. Through the results of this research, it is hoped that parents will be able to consider the lighting conditions in their children's bedrooms.

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