



The Effect of Lighting on Sleep Quality in The Elderly in Sidodadi Village

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Abstract: Sleep disorders in the elderly are a problem that can affect overall health. The lighting factor during sleep is thought to influence sleep quality through inhibiting melatonin production and disrupting circadian rhythms. This research used a cross-sectional design with a total sampling of 44 elderly respondents in Sidodadi Village, Banyuwangi. The independent variable is lighting (bright, dim, dark), while the dependent variable is sleep quality. Data analysis was carried out using the chi-square test. Most respondents slept in darkness (52.4%), and the majority had good sleep quality (83.3%). However, the results of the chi-square test showed that there was no significant relationship between lighting and sleep quality ($p\text{-value} = 0.066$). This research concludes that lighting does not have a statistically significant relationship with the sleep quality of the elderly in Sidodadi Village. Further research is needed to consider other variables that may influence sleep quality in older adults.

Keywords: Lighting, Sleep Quality, Elderly.

1. INTRODUCTION

Some problems often faced by the elderly include sleep disorders. This problem can have an impact on the health of the elderly. In particular, poor sleep has a major impact on the health of the elderly by increasing the risk of hypertension (Suputra, 2020). Elderly is the final stage of a phase of life aged 60 years and over. Sleep quality includes subjective factors such as rest and sleep at night and sleep duration (Utami et al., 2021). Light emissions during sleep affect melatonin synthesis and sensitivity to irregular circadian rhythms which cause sleep quality disturbances (Oktaviana & Sukmalara, 2020)

The data scale for the elderly according to the Indonesian Ministry of Health in 2020, the number of elderly people was 893.9 million, which was around 9.7% of the total world population at that time. Projections then indicate that in 2025, the number of elderly people in Indonesia will reach 428.2 million, which will be around 7.9% of the total world population. Based on Population Projections for 2022, it can be concluded that the elderly population in East Java in that year reached 13.97%. indicates that the population structure in the area is classified as an old population. Based on Population Projections for 2022, it is estimated that the number of elderly people in Banyuwangi will reach 10%. (Hasibuan & Hasna, 2021)

Sleep quality can be influenced by several factors, for example, the environment such as lighting can affect a person's sleep quality. The hormone melatonin plays an important role in sleep regulation. Its production is strongly influenced by light (Rahayu, 2022). Melatonin production can be inhibited by light during sleep, which can impact the biological clock system.

The initial sign of disruption of the sleep process is due to low melatonin production due to continuous light causing instability in the circadian rhythm which makes it difficult for the body to obey natural sleep signals and continue to be active until late at night (Utami et al., 2021).

As progress progresses, we are now more exposed to artificial lights, especially at night. Electronic devices such as cellphones, tablets and computers are often used at night, and screens emit strong blue light, which can disrupt sleep (Rusmiyati, 2015). The LED lights used in many homes and offices also contain high levels of the blue light spectrum. High exposure to blue light has been linked to decreased sleep quality in the elderly. This can disrupt the body's circadian rhythm. Sleep quality has a significant relationship with mortality that occurs in the elderly age range. Having good quality sleep can at least reduce the risk of mortality (Hidayat et al., 2023).

2. RESEARCH METHODS

A research framework that examines the correlation between disease and exposure in individuals from one population group over a certain period of time (Hikmawati, 2021). This research uses a cross-sectional design approach.

In this investigation, total sampling was used. The population is 42 respondents, with a total sample of 42 respondents. This research will be carried out in Sidodadi Village, Glenmore District, Banyuwangi Regency. The independent variable in this research is lighting. The dependent variable in this study is sleep quality. Univariate analysis uses Frequency Distribution, bivariate analysis uses the chi-square test to find a significant influence or not between lighting and the quality of sleep in the elderly.

3. RESULTS

a. Lighting

Table 1 Light Frequency Distribution of Lamps

Lighting	Frekuensi	Presentase %
Bright	12	28,6%
Dim	8	19%
Dark	22	52,4%
Total	42	100%

Hasil tabel 1 menunjukkan sebagian besar penggunaan penerangan lampu ketika tidur pada lansia kategori terang 12 responden (28,6%), kategori redup 8 responden (19%), dan kategori gelap 22 responden (52,4%).

b. Kualitas tidur lansia

Tabel 2 Distribusi Frekuensi Kualitas Tidur Lansia

Sleep Quality	Frekuensi	Presentase %
Good	35	83,3%
Bad	7	16,7%
Total	42	100%

The results of table 2 show that the quality of sleep in the elderly is in the good category, 35 respondents (83.3%), in the poor category, 7 respondents (16.7%).

c. Cross tabulation results of the effect of light on the sleep quality of the elderly

Table 3 Cross Tabulation Results

No	Lighting	Sleep Quality		Total
		Good	Bad	
1	Bright	9	3	12
2	Dim	5	3	8
3	Dark	21	1	22
	Total	35 (83%)	7 (17%)	42(100%)

Based on Table 3 of Cross Tabulation Results which show the relationship between lamp light and sleep quality, it can be explained that of the 42 respondents studied, the majority of respondents (83%) had good sleep quality, while 17% had poor sleep quality.

d. Chi Square Test Results

Table 4 Chi Square Test Results

	Value	Df	Asympototic significance (2-sided)
Person Chisquare	5,427	2	0,066
Likelihood Rasio	5,630	2	0,060
Linear Assocation	2,989	1	0,084
N of Valid Cases	42		

The Chi-Square test results in the table show that the Person Chi-Square value is 5.427 with degrees of freedom (Df) of 2 and an asymptotic significance value (2-sided) of 0.066. Apart from that, the Likelihood Ratio value is 5.630 with 2 degrees of freedom and a significance of 0.060. For Linear Association, the Chi-Square value is 2.989 with a degree of freedom of 1 and a significance of 0.084. The number of valid cases in this analysis is 42.

Based on these results, because the asymptotic significance value is greater than 0.05 in the Person Chi-Square, Likelihood Ratio, and Linear Association tests, it can be concluded that there is no statistically significant relationship between the lighting variable and the respondent's sleep quality.

4. DISCUSSION

a. Lighting

Based on data, 52.4% of elderly people in Sidodadi village choose to sleep in the dark, while 28.6% sleep with bright lighting, and 19% sleep with dim lighting. However, descriptively, elderly people who sleep in dark conditions tend to have better sleep quality compared to those who sleep in bright or dim conditions.

Exposure to nighttime light, especially blue or bright light, can significantly suppresses melatonin and disrupts circadian rhythms, ultimately affecting sleep quality, especially in sensitive populations such as the elderly (Tähhämö et al., 2019). The importance of timing of light exposure and individual variations in response to light. The elderly, who may have changes in sensitivity to light, may experience greater sleep disturbances due to exposure to light at inappropriate times (Chellappa, 2021).

Sleeping in the dark should be encouraged as a habit among the elderly to improve their sleep quality. A large proportion of elderly people at Posyandu Sidodadi sleep in dark conditions and reports of better sleep quality in these conditions suggest that dark lighting can provide a more supportive sleep environment. Thus, it is important for health workers to provide education to the elderly about the importance of reducing light exposure at night to improve their sleep quality.

b. Sleep Quality of the Elderly

Based on existing data, where 35 respondents (83.3%) reported good sleep quality, while 7 respondents (16.7%) experienced poor sleep quality, it appears that the majority of elderly people experience adequate sleep. However, there is still a group of seniors who face sleep problems. These figures show that although the majority of seniors can enjoy quality sleep, special attention is still needed to address sleep problems experienced by a small portion of the population.

Advanced age is often accompanied by physiological changes that can disrupt sleep, such as decreased production of growth hormone and changes in REM sleep patterns. Seniors tend to experience more sleep disorders such as insomnia and sleep apnea. Chronic health conditions such as hypertension, diabetes and heart disease can also interfere with sleep quality (Bingga, 2021). According to (Wang et al., 2023) stress and depression have a strong correlation with sleep disorders in the elderly.

As we age, physiological changes such as decreased production of melatonin, a hormone that regulates sleep cycles, can affect sleep patterns. Seniors may have difficulty maintaining restful sleep and wake up frequently during the night.

Additionally, medical conditions common in old age, such as chronic pain or respiratory disorders, can interfere with sleep. Psychology can also affect sleep patterns, making it more difficult for seniors to get quality sleep. Understanding and treating sleep problems in the elderly is important to improve their quality of life.

c. Relationship between lighting and sleep quality in the elderly

The Chi-Square test results in the table show that the Person Chi-Square value is 5.427 with degrees of freedom (Df) of 2 and an asymptotic significance value (2-sided) of 0.066. Apart from that, the Likelihood Ratio value is 5.630 with 2 degrees of freedom and a significance of 0.060. For Linear Association, the Chi-Square value is 2.989 with a degree of freedom of 1 and a significance of 0.084. The number of valid cases in this analysis is 42. Based on these results, because the asymptotic significance value is greater than 0.05 in the Person Chi-Square, Likelihood Ratio, and Linear Association tests, it can be concluded that there is no statistically significant relationship between the variables lighting and respondents' sleep quality.

This research is in line with (Utami et al., 2021) This research shows that although artificial lighting can affect sleep, the effect may not always be significant or consistent across all age groups or conditions. Results may vary based on lighting intensity, type of lighting, and other individual factors. The results of this study are not in line with the findings (Harisa et al., 2022). This research underlines the importance of managing lighting to improve sleep quality in the elderly, supporting the idea that exposure to artificial lighting can affect the sleep of the elderly.

Some factors may influence such as the type of lighting. Further research could consider different types of lighting (for example, blue lighting versus warm light) and how each affects sleep quality. Lighting exposure at different times evaluation of light exposure at different times of the day can provide additional insight. Further research with larger samples and considering these variables may be needed to gain a deeper understanding of the relationship between lighting and sleep quality in the elderly.

5. CONCLUSION

The chi square results obtained a significant level of p-value of 0.05 because the p-value of 0.066 means that there is no statistically significant relationship between the lighting variable and the respondent's sleep quality.

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