

Effectiveness of Using Eye Masks and Earplugs on Sleep Quality of Patients in Intensive Care Unit

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Abstract

Background: Sleep quality is a vital component of recovery in intensive care unit patients. However, environmental factors such as continuous noise from medical equipment and excessive lighting often disrupt sleep, potentially delaying healing. Non-pharmacological interventions, including the use of eye masks and earplugs, offer a simple approach to improve sleep without medication.

Objective: This study aimed to assess the effectiveness of eye masks and earplugs in improving sleep quality among intensive care patients.

Material and Method: A quasi-experimental study with a non-equivalent control group design was conducted in the Surgical High Care Unit (HCU). A total of 68 patients were divided into intervention and control groups based on different data collection periods. The intervention group used eye masks and earplugs for two consecutive nights from 10:00 PM to 6:00 AM. Sleep quality was measured using the Richards-Campbell Sleep Questionnaire (RCSQ) before and after the intervention.

Results: The intervention group showed a significant increase in sleep quality scores (from 59.4 to 72.6), while the control group showed no meaningful change (from 61.27 to 61.04), with a p-value of 0.000.

Conclusion: The use of eye masks and earplugs effectively improves sleep quality in ICU patients. This low-cost, non-invasive intervention is recommended as part of standard ICU care to support patient recovery.

Keywords: Eye mask and earplugs, Sleep Quality, Intensive Care Unit

Introduction

Sleep plays a crucial role in the recovery process of ICU patients from their critical illnesses. Sleep

quality plays an important role in the clinical field as more and more people complain about decreased sleep quality and its impact on daily activities. In addition, poor sleep quality can be a major symptom

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of various sleep disorders and other health problems¹. The intensive care unit is a room that functions as a place to treat patients with unstable conditions with sophisticated equipment in it. Medical technology such as heart monitors, mechanical ventilators, and infusion pumps in the Intensive Care Unit (ICU) often produce varying noise². The sounds produced by these machines are generally high frequency and can disturb the patient's sleep. In addition, the intensive care unit has high exposure to night light and uncertain health staff activities until late at night³.

ICU patients are known to suffer from fragmented sleep as well as reduced slow-wave and rapid eye movement sleep. More than 60% of ICU survivors report poor or insufficient sleep. Because poor sleep and delirium often co-occur in critically ill patients, it has been suggested that there is a relationship between the two disorders, and growing evidence suggests that sleep disturbances are associated with delirium⁴. Sleep deprivation can lead to various cardio-metabolic risks, such as weight gain, glucose intolerance, and high blood pressure. Blood pressure is physiologically regulated by cardiac contractility, cardiac output, and peripheral vascular resistance. It is controlled by the autonomic nervous system and is connected to blood pressure through baroreceptor feedback mechanisms. The results of the study showed a significant increase in systolic, diastolic and Mean Arterial Pressure (MAP) in individuals with limited sleep time, when compared to individuals with normal sleep^{3,5}.

From the initial observation results, in the intensive care unit, the sound of monitor alarms and various other devices can be heard, as well as diagnostic and administrative activities that contribute to noise in the intensive care unit. Initial interviews conducted with patients in the intensive care unit found that most patients said they had difficulty sleeping and starting to sleep due to noise from medical personnel and from the equipment in the intensive care unit. In addition, bright lighting also affects the quality of patient sleep. Likewise, the results of the researcher's observations showed that patients who had sleep problems tended to have disturbed hemodynamics⁶.

Sleep-promoting interventions include pharmacological and non-pharmacological

treatments. Sleep-inducing medications provide sedation and analgesia and are often used in intensive care units. However, the use of these medications can have negative effects⁵. Drug-induced sleep is also not recommended for some patients, such as non-ventilated patients with pulmonary hypercapnia. Therefore, there is now a greater emphasis and recommendation on non-pharmacological interventions. Some non-pharmacological interventions include the use of physical devices such as eye masks and/or earplugs, relaxation techniques such as massage and foot baths, music therapy, quiet time, acupuncture, and aromatherapy which are used to improve sleep quality in the intensive care unit^{7,8}.

Providing earplugs and eye masks is a relevant action in closing the patient's sense of hearing and vision in the ICU to prevent sleep disturbances due to external stimuli⁹. This action is part of the nursing intervention that aims to maintain a normal circadian rhythm, so that it can reduce sleep disturbances in patients in the room¹⁰ mental well-being, and recovery. Nonpharmacologic interventions are recommended as first-choice treatment. However, studies evaluating the interventions are often of poor quality and show equivocal results. Objective: To assess whether the implementation of nonpharmacologic interventions is associated with improved inpatient night sleep. Design, Setting, and Participants: In a nonrandomized controlled trial, patients were recruited on the acute medical unit and medical and surgical wards of a Dutch academic hospital. All adults who spent exactly 1 full night in the hospital were recruited between September 1, 2019, and May 31, 2020 (control group¹¹). The use of eye masks and earplugs improves sleep quality in ICU patients. In line with research showing that the use of eye masks and earplugs effectively improves sleep quality in ICU patients who receive frequent examinations. These findings also provide additional support for the use of additional non-pharmacological interventions that can improve sleep quality in the ICU environment^{3,12}. Despite its promising benefits, the routine use of eyemasks and earplugs in nursing practice or patient care is still not standard practice in many healthcare settings. It is therefore important to explore the effectiveness of eyemasks and earplugs in improving patient sleep quality and to provide scientific evidence to support its implementation as part of the standard of clinical care.

Materials and Methods

Research design and setting:

The research design selected for the study was quasi-experimental, pre-test and post-test with non-equivalent control-group design, at the General Hospital of Aceh. This study was conducted after completing the ethical review process, which was approved by the Health Research Ethics Committee at dr. Zainoel Abidin General Hospital, Banda Aceh, under approval number 246/ETIK-RSUDZA/2024. All respondents provided written informed consent to participate in this study.

Population and sample:

The sample size in this study was determined using Cohen's table¹³ with a confidence level of 95% and a significance level (α) of 0.05. Based on an estimated population of approximately 80 patients, the minimum required sample size was 68 respondents, divided equally into 34 participants in the intervention group and 34 in the control group. In this study, the intervention group and the control group consisted of patients in the Surgical High Care Unit (HCU) during different time periods. The control group consisted of patients who received standard care, while the intervention group was patients who, in addition to receiving standard care, were also given treatment in the form of using eye masks and earplugs for two consecutive nights. The intervention group and the control group were compared although their selection was not random. The sample in this study was selected based on certain inclusion and exclusion criteria to ensure data homogeneity and validity. Inclusion criteria included patients who had not received intravenous sedation or anesthesia in the last 12 hours, such as Fentanyl, Morphine, or Midazolam; not in an intubated condition; did not experience communication or hearing disorders; were adults (≥ 21 years or married); and had a Glasgow Coma Scale (GCS) score of 15. Exclusion criteria included patients with hearing or vision impairment; undergoing treatment for severe sleep disorders, such as sleep-related breathing disorders, severe insomnia, or sleep movement disorders; undergoing treatment for a diagnosis of depression or anxiety disorders; and those with other mental disorders. Although the sampling was not randomized, group allocation was

based on different time periods but within a similar patient population, thereby minimizing potential baseline differences.

Procedure of study:

Before implementing the intervention, all enumerators received comprehensive training on the implementation procedures, including the steps for completing the questionnaire and the ethical principles that must be upheld during interactions with respondents. Three professional nurses, graduates of the Ners program, were hired as enumerators. Prior to the intervention, the researcher conducted an initial assessment of patients' sleep quality using the Insomnia Severity Index (ISI)¹⁴. The screening results indicated that all respondents had ISI scores ranging from 14 to 20, which reflects a moderate level of sleep disturbance. The researcher and enumerators visited each potential respondent to provide a direct explanation of the study's purpose, the procedures to be followed, and their rights and responsibilities throughout the process. After the explanation was given, respondents were asked to sign an informed consent form as written confirmation of their voluntary participation in the study.

Both groups were given a pre-test before the intervention and a post-test after the intervention concluded. The pretest was conducted by assessing the respondents' sleep quality by filling out the Richards-Campbell Sleep Questionnaire (RCSQ). On the third day, all respondents' sleep quality was reassessed using the RCSQ questionnaire as a posttest value. In the control group, patients received standard care on the first and second nights, whereas in the intervention group, patients were provided with eye masks and earplugs on both nights started at 10:00 PM and ended at 6:00 AM, with a total usage time of approximately 8 hours. This intervention was carried out for two consecutive nights. Prior to use, the sleep aids were explained to the patients, including how to use them properly.

Results

The study was conducted from December 3, 2024 to January 23, 2025. The purpose of this study was to determine the effectiveness of the use of eye masks

and earplugs on the quality of sleep of patients in the intensive care unit of the Dr. Zainoel Abidin Aceh Regional General Hospital.

The results of the study are presented in the following tables and graphs. Based on table 1, it is found that the average age of respondents in the intervention group was 50.41 years. While in the control group the average age of respondents was 44.26 years. It was found that female gender was the most respondents, namely in the intervention group totaling 19 people (55.9%) and in the control group totaling 18 people (52.9%). The most common marital status was married status, namely 30 people (88.2%) in the intervention group and 19 people (55.2%) in the control group. The most common level of education was secondary education, namely 18 people (52.9%)

in the intervention group and 16 people (47.1%) in the control group. Furthermore, the most common occupation was housewives with 15 people (44.1%) in the intervention group and 15 people (44.1%) in the control group.

For the most treatment days, namely 1-2 days of treatment, as many as 20 people (58.9%) in the intervention group and 26 people (76.5%) in the control group. The most common medical diagnosis is Post Laparotomy, as many as 11 people (32.4%) in the intervention group and 10 people (29.4%) in the control group. For the history of comorbidity in the intervention group, there were 17 people (50%) and in the control group there were more respondents who did not have a history of comorbidity, as many as 22 people (64.7%).

Table 1: Frequency Distribution of Respondent Characteristics (n=68)

| Respondent Characteristics | Intervention | | Control | |
|----------------------------|--------------|------|----------|------|
| | (n = 34) | | (n = 34) | |
| | f | % | f | % |
| Age | | | | |
| Mean | 50.41 | | 44.26 | |
| Min-Max | 20-76 | | 20-75 | |
| Gender | | | | |
| Man | 15 | 44.1 | 16 | 47.1 |
| Woman | 19 | 55.9 | 18 | 52.9 |
| Married Status | | | | |
| Not married yet | 2 | 5.9 | 10 | 29.4 |
| Married | 30 | 88.2 | 19 | 55.9 |
| Widower/Widow | 2 | 5.9 | 5 | 14.7 |
| Level of education | | | | |
| Basic education | 13 | 38.3 | 15 | 44.1 |
| Secondary Education | 18 | 52.9 | 16 | 47.1 |
| Higher education | 3 | 8.8 | 3 | 8.8 |
| Work | | | | |
| Doesn't work | 3 | 8.8 | 4 | 11.8 |
| Housewife | 15 | 44.1 | 15 | 44.1 |
| Civil Servants/TNI/POLRI | 2 | 5.9 | 4 | 11.8 |
| Farmers/Fishermen/Laborers | 8 | 23.5 | 2 | 5.9 |
| Self-employed | 6 | 17.6 | 8 | 23.5 |
| Retired | - | - | 1 | 2.9 |
| Treatment Day | | | | |
| 1-2 days | 20 | 58.9 | 26 | 76.5 |
| 3-4 days | 6 | 17.6 | 8 | 23.5 |
| >4 days | 8 | 23.5 | - | - |

Continue.....

| | | | | |
|--|----|------|----|------|
| Medical Diagnosis | | | | |
| Post Laparotomy | 11 | 32.4 | 10 | 29.4 |
| Post Posterior Stabilization/ Laminectomy | 4 | 11.8 | 6 | 17.6 |
| Post Craniotomy | 1 | 2.9 | 1 | 2.9 |
| Sepsis | 2 | 5.9 | 3 | 8.8 |
| Post ORIF | 5 | 14.7 | 6 | 17.6 |
| Others (rectal prolapse, liver abscess, post nephrectomy, etc.) | 11 | 32.4 | 8 | 23.5 |
| Comorbid | | | | |
| No | 17 | 50 | 22 | 64.7 |
| Yes | 17 | 50 | 12 | 35.3 |
| Diabetes mellitus | 8 | 23.5 | 5 | 14.7 |
| Hypertension | 8 | 23.5 | 6 | 17.6 |
| Impaired kidney function | 1 | 3 | 1 | 3 |
| Insurance | | | | |
| BPJS | 34 | 100 | 34 | 100 |

Table 2: Frequency of Sleep Quality Value (n=68) Intervention Group and Control Group

| Variables | Intervention Group (n=34) | | Control Group (n=34) | |
|----------------|---------------------------|-----------|----------------------|-----------|
| | Mean ± SD | Min - max | Mean ± SD | Min - Max |
| Pre-test | 59.4 ± 8.6 | 43.8-78 | 61.27 ± 7.85 | 48.5-80.3 |
| Post test | 72.6 ± 8.3 | 53.7-85.3 | 61.04 ± 7.93 | 47.3-80.3 |
| <i>p-value</i> | 0,000 | | 0.240 | |

Table 2 shows the analysis of the average difference of two different independent groups. In the sleep quality test in the intervention group, the average value was 72.6 in the control group, the average value was 61.04. The difference in sleep quality in the intervention group obtained a p value <0.05, which is 0.000, which means that statistically there is a significant difference in sleep quality between before and after the intervention of using eye masks and earplugs. Furthermore, to determine the different values in the group, the analysis used is the Independent t-test which is a parametric test that tests the differences between two different groups if the data distribution is normal.

In the test of the average difference in sleep quality between the two groups, the p value was obtained = 0.000 or <0.05, so it can be concluded that H_0 is rejected. This means that statistically there is a difference in sleep quality in the intervention group after using eyemasks and earplugs with the control

group with standard hospital intervention.

This study demonstrated that the use of eye masks and earplugs significantly improved sleep quality among ICU patients, as evidenced by a notable increase in Richard-Campbell Sleep Questionnaire (RCSQ) scores following the intervention. These findings affirm the effectiveness of a simple and low-cost intervention within the critical care context. An unexpected finding was the absence of any complaints or reported side effects

Discussion

The results of this study indicate that the use of eye masks and ear plugs has an effect on the quality of patient sleep, where the results of the average difference test of sleep quality between the two groups using the Independent T-test with $p = 0.000$ or <0.05 indicate that there is a significant difference in sleep quality between the two groups that underwent intervention and with standard hospital intervention.

This is in line with research results which state that the use of eye masks and earplugs serves to reduce disturbances from the surrounding environment, such as noise and light, which are often the cause of poor sleep quality in the intensive care unit (ICU)¹⁵. Eye masks help block light that can disrupt circadian rhythms and melatonin production, which are essential for restful sleep. Meanwhile, earplugs reduce ambient noise levels, which are often high (>80 dB) in the ICU, allowing patients to sleep better and deeper^{16,17}.

In addition, there are quite a few patients who experience sleep disorders not because of their medical condition, but because of environmental discomfort¹⁸. By providing simple interventions such as eye masks and earplugs, patients can obtain better sleep quality without having to rely on pharmacological therapy that carries the risk of side effects, especially in patients with certain comorbidities¹⁹. These results are also consistent with previous studies that have shown that eye masks and earplugs can prolong sleep duration, increase sleep efficiency, and improve sleep phases²⁰.

The use of eye masks and earplugs among ICU patients generally offers several benefits, including improved sleep quality, reduced stress levels, and enhanced comfort due to a darker and quieter environment. These factors contribute to better rest quality, which ultimately supports the overall recovery process^{7,21}. Nevertheless, despite their significant benefits, several potential risks should be considered. Some patients may experience discomfort. In certain individuals, earplugs may cause skin or ear canal irritation, especially if the devices are unclean or used for prolonged periods without replacement. There is also a risk of infection if earplugs are not regularly cleaned or replaced. Similarly, eye masks may cause discomfort if too tight or not well-fitted to the patient's facial contour. Therefore, although eye masks and earplugs are generally regarded as safe and effective, healthcare providers must ensure proper, hygienic use tailored to each patient's condition to prevent unwanted side effects³. Notably, in this study, no adverse effects were reported by patients during the intervention period.

The use of eye masks and earplugs in intensive care units has been shown to be very beneficial in improving the quality of sleep for patients³¹⁸. By blocking out distracting light with an eye mask, patients can more easily achieve restful sleep, while earplugs help to block out the noise of medical equipment and conversations that can break their concentration while trying to sleep. Many patients report feeling more refreshed and alert after using these devices, as the quieter, darker environment makes them feel more comfortable. Additionally, by reducing distractions from light and sound, these devices not only improve the quality of sleep, but can also help to reduce the levels of stress and anxiety that are often experienced in intense intensive care settings⁷²². In line with research results showing that the use of eye masks and earplugs together can overcome disturbances from light and sound, which are common problems in hospital environments²³. This is in line with research findings that revealed that the use of eye masks and earplugs significantly improved the quality of sleep for patients in the ICU. This intervention has been shown to be effective in reducing sleep disturbances that are common in intensive care settings¹¹⁸.

Conclusion

The use of eye masks and earplugs has been shown to be effective in improving the quality of sleep for patients in the intensive care unit (ICU). Where there was a significant difference in sleep quality between the intervention group and the control group after the intervention with a p value = 0.000. This simple intervention helps reduce light and noise disturbances, allowing patients to sleep better without the need for pharmacological intervention. These findings support the results of previous studies and show significant benefits in nursing practice.

Limitation: This study has several limitations. The first is sleep quality was assessed subjectively using the RCSQ without the support of objective tools such as polysomnography or actigraphy. Additionally, the intervention was conducted for only two consecutive nights, so its long-term effects remain unknown.

Future Research Recommendations: For future research, we recommend the use of a randomized

controlled trial (RCT) design with a larger sample size, objective sleep monitoring, a longer intervention duration, and the inclusion of additional clinical outcomes such as the incidence of delirium and length of ICU stay.

Ethical Clearance: The research approval was given by the Health Research Ethics Committee at dr. Zainoel Abidin General Hospital, Banda Aceh, under approval number 246/ETIK-RSUDZA/2024.

Conflict of Interest: None

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