

A QUASI -EXPERIMENTAL STUDY TO ASSESS THE EFFECTIVENESS OF 'DREAM BUNDLE' ON SLEEP AMONG PATIENTS ADMITTED IN ICU AT A TERTIARY HOSPITAL

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Abstract

Background: For any individual, sleep and rest are important for physical and psychological well-being. However, poor-quality sleep and sleep complications have been reported frequently in ICU patients as a cause of irritability, restlessness, and declined cognitive activity amongst other adverse effects. Diverse interventions such as aromatherapy, relaxation therapy, and music have been applied to improve sleep in ICU patients. However, they have not been able to provide consistent positive outcomes. In this study, we evaluated the effect of slow soothing music along with the overnight wearing of an eye mask and earplugs on sleep in ICU patients. The study aimed to assess and compare sleep quality among the experimental group and control group before and after dream bundle intervention.

Methods: An experimental research approach with a quasi-experimental design with a purposive sampling technique was used. Data for Sociodemographic proforma, vital parameters, and Richard Campbell sleep questionnaire was collected for 50 patients. Dream bundle implementation was given to the experimental group for five nights, and the control group received routine care. The post-test assessment was taken for 5 days from both the groups.

Results: The control group showed no significant difference in pre/post scores ($t=2.01 < \text{table } t=2.02$), while the experimental group demonstrated a significant difference ($t=9.32 > \text{table } t=2.02$) after Dream bundle assessment.

Conclusion: Dream Bundle is effective in enhancing quality sleep in ICU Patients.

Keyword: Nursing, ICU patients, Dream Bundle, Sleep, Quasi-experimental study.

Highlights:

The "Dream Bundle" intervention, comprising soothing music, overnight eye mask usage, and earplugs, significantly improved sleep quality among ICU patients.

Post-intervention, the experimental group demonstrated a substantial improvement in sleep quality, notably with a majority experiencing excellent sleep. Additionally, stronger associations were found between physiological parameters in the experimental group.

INTRODUCTION

Sleep is a crucial aspect of human well-being, constituting a third of our lifespan. In the intensive care unit (ICU), however, sleep quality often suffers due to environmental stressors like noise and light. Patients experience disrupted sleep patterns, mainly characterized by reduced deep sleep and frequent awakenings, impacting their recovery.

Studies show that ICU noise levels far exceed recommended limits, reaching over 80 dB, while ideal levels should not exceed 30 dB during the day and 40 dB at night. Similarly, excessive light exposure, especially beyond 30-50 lux, disrupts the circadian rhythm and suppresses melatonin, further impeding sleep. To address these issues, various interventions like aromatherapy and relaxation techniques have been employed, with music proving to be a cost-effective and impactful solution.

Music therapy has gained traction in medical circles as a non-pharmacological method to improve sleep quality. Research indicates its ability to reduce stress hormones like cortisol, promoting relaxation. A study among cardiac surgical ICU patients in China demonstrated the efficacy of earplugs, eye masks, and relaxing music in enhancing sleep quality. Such non-pharmacological interventions have shown promise in improving overall sleep quality in ICU patients, though individual differences and other factors can influence their effectiveness.

The use of music as a sleep aid has garnered public support and research backing, with meta-analyses affirming its positive impact on sleep quality. This non-invasive approach offers a viable path to alleviate sleep disturbances without known side effects.

Sleep is a naturally recurring state of mind and body characterized by altered consciousness and relatively inhibited sensory activity, reduced muscle activity and inhibition of nearly all voluntary muscle during rapid eye movement sleep, and reduced interaction with surroundings.^[1] Human beings spend one-third of our lifespan on sleep.^[2]

Sleep is equally significant for healing in critical illness.^[3] However, sleep in the intensive care unit (ICU) has been reported to be of suboptimal quality and a major stressor associated with their admission^[4].

A full cycle through the different stages of sleep normally requires 90–110 minutes. ICU patients suffer from both quantitative and qualitative sleep problems^[5]. Previously, reports have shown that ICU patients predominantly experienced light stage N1 sleep and decreased or absent stages N2 and N3 sleep, plus a high frequency of arousals and awakenings and extreme reduction in REM sleep. An earlier study also found that total sleep time in ICU patients could be as small as 1.7 hours per day^[5].

Higher incidences of sleep and circadian disturbances amongst ICU patients are often regarded as a result of the intrusive clinical care and clinical environment, with noise and light as etiological causes. As a result, patients exhibit symptoms consistent with dyssomnia, such as difficulty with sleep initiation and fragmentation, and early morning awakenings^[6]. **Music** is generally defined as the art of arranging sound to create some combination of form, harmony, melody, rhythm or otherwise expressive content. **“Without music, life will be a mistake”** the statement of Friedrich Nietzsche, a German philosopher, simplified the importance of music in one's life so easily. It consists of lesser words with deeper meanings is one of the most-used self-help strategies to promote sleep^{[7][8]}.

Sleep disturbances increase neurosis, anxiety, confusion, attention deficiency, emotional discomfort and mortality, but also decrease physical self-defence and sensitivity. There are many factors affecting sleep, and they are generally categorised as physical (illness, discomfort and pain), emotional (anxiety, depression, psychiatric disease, stress and cognitive disorders) and environmental (temperature, humidity, lightness, noises, smell and sound) factors.^[9]

A non-experimental study was conducted by in Australia to assess the impact of sleep disturbances on Intensive Care patients. They have discussed the normal sleep architecture and the effect of environmental factors such as noise, light and clinical care intervention on patient's sleep and its psychophysiological consequences. It has been concluded there are numerous environmental factors which contribute to sleep disturbances and the urge of modifications to their environment and care planning in order to promote sleep and aid recovery in ICU patients.^[10]

The World Health Organization (WHO) has recommended that the average noise levels in hospital wards should not exceed 30 dB during day or night, and peak levels should not exceed 40 dB during the night^[11]. Studies have shown that noise levels in the ICU are much higher than the standard norms, sometimes exceeding 80 dB^[12]. The equivalent sound pressure level exceeding 30 dB indoors for continuous noise and peak noise levels at 45 dB or less may negatively affect sleep and result in sleep disturbance. More than 70 dB of noise may result in vasoconstriction, increased heart rate, hypertension and even arrhythmias. Additionally, prolonged light exposure is another noxious and disruptive environmental factor affecting sleep in the ICU as it is pivotal in circadian rhythm synchronization.

Chang et al. found that light levels of the range of approximately 30 to 50 lux in the angle of gaze delayed the circadian clock, acutely suppressed melatonin and disrupted sleep^[13].

Studies by Chellappa et al. have shown that light is able to directly alter sleep structure at low light levels (40 lux). The light readings obtained in the various ICUs have shown that the mean maximum nocturnal level ranges are high enough to suppress melatonin, and hence may influence sleep and biological rhythm^[14].

To improve sleeping in ICU patients, diverse interventions such as aromatherapy, relaxation therapy, massage and music have been applied. Generally, the result is increased quantity and quality of sleep. Among the interventions, music intervention is cost-effective because it is relatively easy to supply.^[15]

In the medical world music therapy emerged as a non-pharmacological alternative Therapy. Music is the language of inner reality, the universal tongue, personal emotions and expressions that are not expressed. Music therapy has been utilized in America for therapeutic purposes and has shown promising results.^[16]

A quasi-experimental study was conducted by Hu RF et al, among cardiac surgical ICU patients in China (2015) to assess the effect of ear plugs and eye masks combined with relaxing music on sleep. 45 patients selected by randomized envelope method, from which 20 samples in intervention group and 25 in control group. Researchers assessed the effect of intervention by nocturnal urine on the day before surgery, first and second day after surgery. Significant differences were found between groups in overall sleep quality. The study concluded that nonpharmacological interventions are useful for promoting sleep in ICU adult patients; however, any influence on nocturnal melatonin levels and cortisol levels may have been marked several factors such as timing of surgery, medication and individual difference.^[17]

Music is a sleep solution with no know side effect. Moreover, using music to promote sleep has found support in surveys of the public. Meta-analysis of music and sleep related studies, including a Cochrane review showed a positive effect of music as an intervention on sleep quality.^[18]

MATERIALS AND METHODS

Study patients:

For this quasi-experimental study, Institutional Ethics Committee (IEC) approval was done (IEC Protocol No. KJSH/CON/3950/2022). 50 participants were selected 25 in Control group and 25 in experimental group. Adult patients (< 18 years of age) admitted to ICU who are conscious, non-ventilated and non-sedated, speak and understand English / Hindi / Marathi and willing to listen music were included in the study. Patients aged under 18, those on mechanical ventilation, unconscious/semi-conscious or sedated individuals, and those with specific conditions like insomnia, ear issues, mental illness, requiring willingness to comply with music, eye mask, and earplug use, as well as active participation and availability during data collection were excluded.

Data Collection:

Data was collected from 01/09/2022 To 14/10/2022. Patients were selected according as mentioned above. Two hospitals were; permission taken and control and experimental groups were assigned in each hospital respectively. The samples were explained about the study and consent was taken. Patients were made to feel comfortable and relaxed.

Intervention:

On the first day, the tool was utilized to get data regarding the baseline quality of sleep prior to the administration of the dream bundle. Music was provided for 30 minutes, eye mask and earplugs overnight to the experimental group for 5 nights. Earplugs were made with cotton balls. Eye mask made up of black cotton cloth was provided to every sample. Control group received routine care, with no intervention from the researcher. The researcher assessed the physiological parameters 4 times during night through the cardiac monitor whereas the patient records were used to document the physiological parameters of the control group. The questionnaire regarding the sleep quality was provided every morning for 5 days to both the groups. The intervention was implemented continuously for 5 days and used to follow up the patients in the wards; in case of transfer from the ICU. Those study participants that did not comply with all the three interventions (Music/ Eye Mask/ Ear plug) for 5 days were excluded from the study.

Statistical analysis

Demographic data and clinical proforma were analyzed using frequency and percentage. Vital sign data underwent analysis using Mean, Median, SD, and One-way ANOVA. Pre-test and post-test scores of the Richard Campbell sleep questionnaire between study and control groups were analysed using Mean, Median, SD, and Paired T test. Association of pre-test scores with selected demographic variables was assessed using the chi-square test. All of the statistical analysis were preformed using Microsoft Excel.

RESULTS

Section A: Distribution of Demographic Variable

Figure 1.1 illustrate age distribution, with 60% in the control and experimental groups aged 41-60 years. Figure 1.2, the majority in the control group are male (60%), while the experimental group has 76% females. Figure 1.3 reveal weight distribution, with 44% overweight and 32% obese in the control group, while the experimental group has 52% normal weight. Figure 1.4 show afternoon nap prevalence, with 52% in the control and 56% in the experimental group having afternoon naps. Figure 1.5, 72% in the control group have pain complaints, whereas 52% in the experimental group do not.

Section B: Comparison of Pre-Test assessment vs Post-Test assessment for quality of sleep in control and experimental group

In Table 1.1's control group pre-test, 60% had poor sleep, 16% average, 12% excellent, 8% good, and 4% very good sleep. In the post-test, 44% had average sleep, 16% poor, 32% good, and 8% very good sleep. In the experimental group pre-test, 48% had

poor sleep, 28% average, 8% good, 8% very good, and 8% excellent sleep. Post-test results showed 72% had excellent sleep and 28% very good sleep in the experimental group.

Section C: Comparison of pre-test and post- test assessment of quality of sleep within the group.

In Table 1.2, the control group exhibited a non-significant difference between pre-test (mean: 121.20, SD: 164.76) and post-test (mean: 191.68, SD: 79.87) scores, with a calculated t value of 2.01 (vs. table t value 2.02). Conversely, Table 1.3 indicates a significant difference in the experimental group between pre-test (mean: 136.00, SD: 163.43) and post-test (mean: 426.64, SD: 51.25) scores, with a calculated t value of 9.32 (vs. table t value 2.02). This suggests that the Dream bundle had a notable effect in the experimental group but not in the control group.

Section D: Association of s Pre-test assessment of quality of sleep with selected demographic variables

Table 1.4 demonstrates no significant association ($p > 0.05$) between demographic variables (age, gender, weight, afternoon nap, pain complaints, and medications) and pre-test scores in the Richard Campbell sleep questionnaire. Conclusively, selected demographic factors do not significantly correlate with the questionnaire's pre-test scores.

Section E: Association of the post-test assessment of quality of sleep selected physiological parameters (pulse rate, Respiration Rate, Blood Pressure, Spo2)

Table no. 1.5 shows that In the control group, pulse rate, respiration rate, systolic BP, diastolic BP, and SpO2 showed no significant association with sleep quality ($p > 0.05$). In contrast, the experimental group exhibited significant associations between pulse rate, respiration rate, systolic BP, diastolic BP, and SpO2 with sleep quality ($p < 0.05$). The pulse rate, respiration rate, systolic BP, diastolic BP, and SpO2 in the experimental group had lower p-values than the control group, indicating a stronger link between these physiological parameters and sleep quality. These findings suggest that these parameters may play a more critical role in influencing sleep quality in the experimental group compared to the control group. In the control group, no significant associations were found ($p > 0.05$) for pulse rate, respiration rate, systolic BP, diastolic BP, and SpO2 with sleep quality. Conversely, the experimental group showed significant associations ($p < 0.05$) for all these parameters, suggesting a stronger link between physiological measures and sleep quality in the experimental group. The lower p-values in the experimental group indicate a more pronounced influence of these parameters on sleep quality compared to the control group.

Table 1.1: Comparison of Pre-Test assessment vs Post-Test assessment for quality of sleep in control and experimental group

Quality of sleep	Percentage	Control Group				Experimental Group			
		Pre-Test assessment		Post Test assessment		Pre-Test Assessment		Post-Test Assessment	
		f	%	f	%	f	%	f	%
Poor	0-6	15	60.00	04	16.00	12	48.00	00	0.00
Average	7-12.	04	16.00	11	44.00	07	28.00	00	0.00
Good	13-18.	02	08.00	08	32.00	02	08.00	00	0.00
Very Good	19-24	01	04.00	02	08.00	02	08.00	07	28.00
Excellent	25-30	03	12.00	00	0.00	02	08.00	18	72.00

Table 1.2: Comparison of pre-test and post- test assessment of quality of sleep within the group

Control Group	N	Minimum	Maximum	Mean	Median	SD	Table value (n-1)	Paired t test
Pre-Test	25	0	500	121.20	40	164.76	2.02	2.01
Post-Test	25	40	328	191.68	184	79.87		

Table 1.3: Indicates a significant difference in the experimental group between pre-test

Experimental Group	N	Minimum	Maximum	Mean	Median	SD	Table value (n-1)	Paired t test
Pre-Test	25	0	500	136.00	110	163.43	2.02	9.32

Table 1.4: Association of s Pre-test assessment of quality of sleep with selected demographic variables

Variables	Groups	N	Df	Chi square	P - Value	Significance
Age	18-25 Years	00	20	23.825	0.250	Not Significant
	26-40 Years	04				
	41-60 Years	12				
	60+ Years	10				
Gender	Male	06	10	9.697	0.467	Not Significant
	Female	19				
Weight	Underweight	00	10	15.97	0.464	Not Significant
	Normal	13				
	Overweight	07				
	Obese	05				
Afternoon nap	Yes	11	10	8.665	0.564	Not Significant
	No	14				
Complaints of pain	Yes	12	10	11.184	0.343	Not Significant
	No	13				
Any medication	Yes	15	10	9.413	0.493	Not Significant
	No	10				

Table 1.5: Association of the post-test assessment of quality of sleep selected physiological parameters (pulse rate, Respiration Rate, Blood Pressure, SpO2)

VARIABLE	GROUPS	MEAN	MEADIAN	SD	P - VALUE(one -way ANNOVA repeated measure)	Significance
Pulse rate	Control group	88.32	88.2	11.60	0.779	Non-significant
	Experimental group	84.74	84.8	12.63	0.000	Significant
Respiration rate	Control group	21.48	21.2	4.71	0.079	Non-significant
	Experimental group	21.60	21.6	3.40	0.010	Significant
Systolic BP	Control group	128.80	130	20.36	0.521	Non - significant
	Experimental group	135.6	131.2	15.07	0.048	Significant
Diastolic BP	Control group	108	94	9.51	2.202	Non - significant
	Experimental group	98	92	8.11	0.005	Significant
SpO2	Control group	95.72	95.2	2.69	0.060	Non - significant
	Experimental group	96.6	96.2	1.67	0.045	Significant

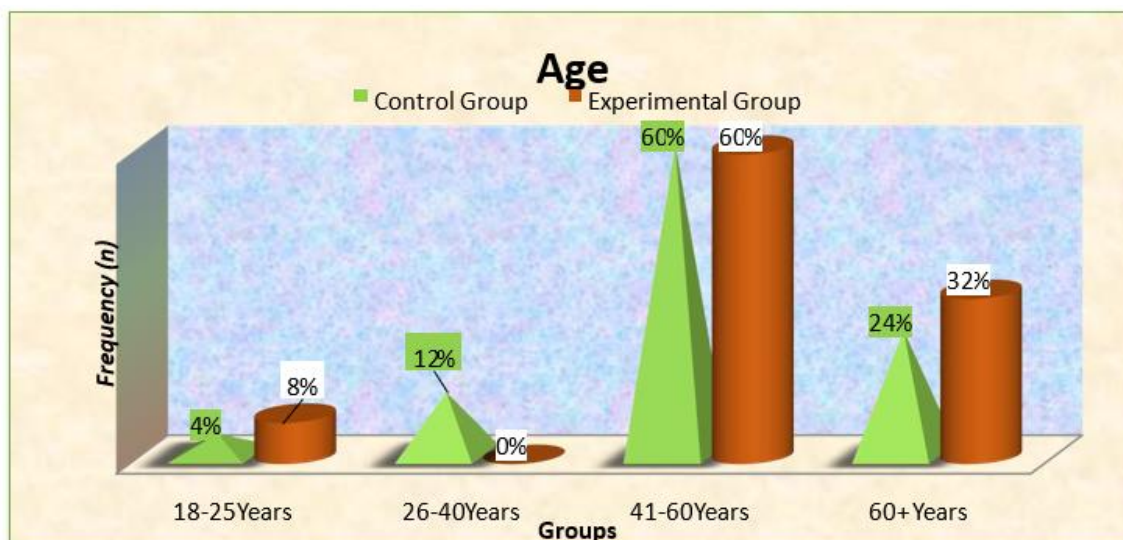


Figure 1.1 illustrate age distribution

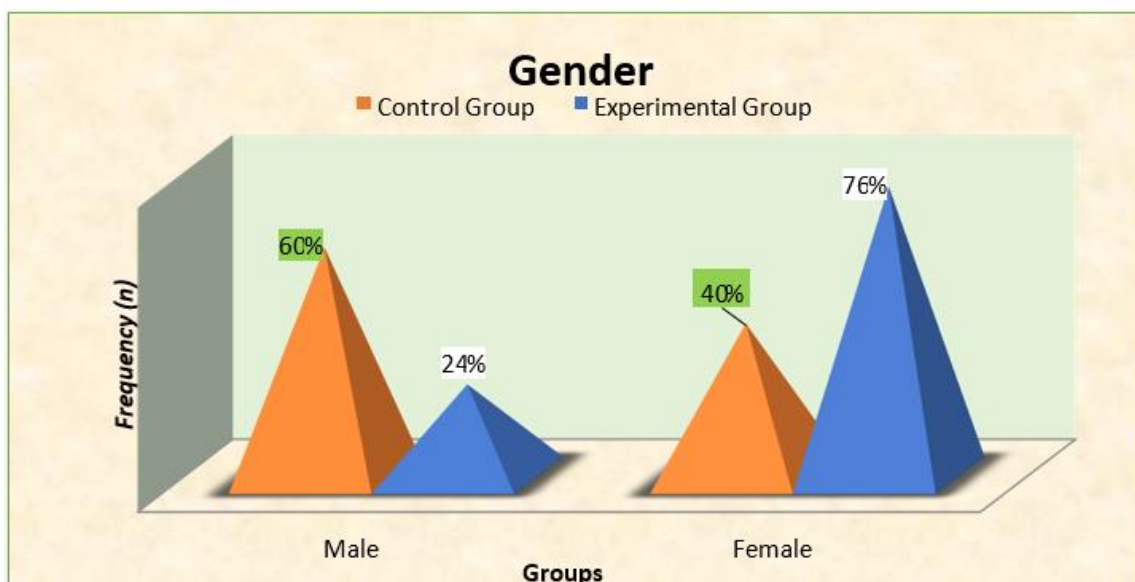


Figure 1.2: The majority in the control group are male (60%), while the experimental group has 76% females.



Figure 1.3: Reveal weight distribution, with 44% overweight and 32% obese in the control group, while the experimental group has 52% normal weight.

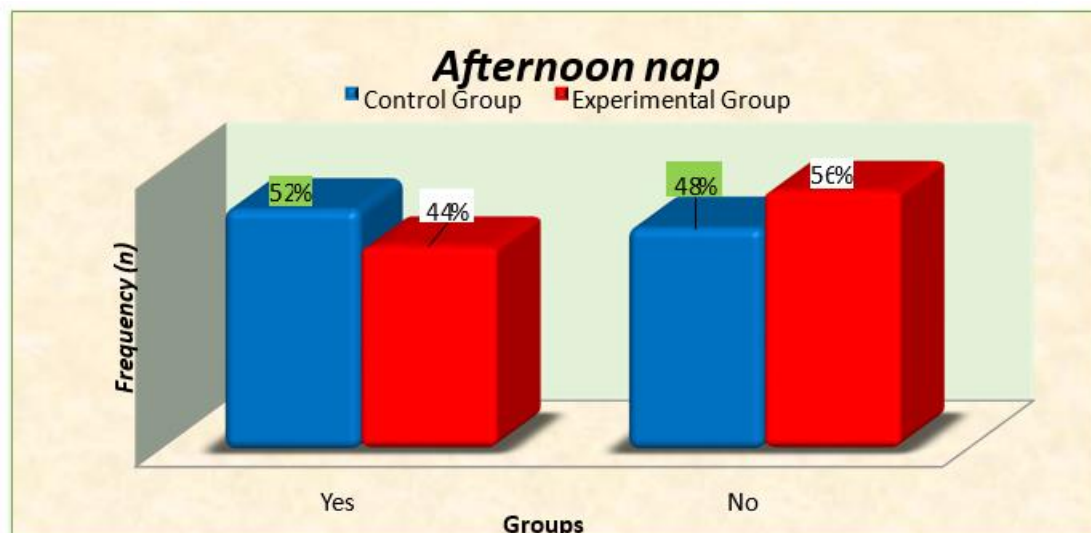


Figure 1.4 show afternoon nap prevalence, with 52% in the control and 56% in the experimental group having afternoon naps.

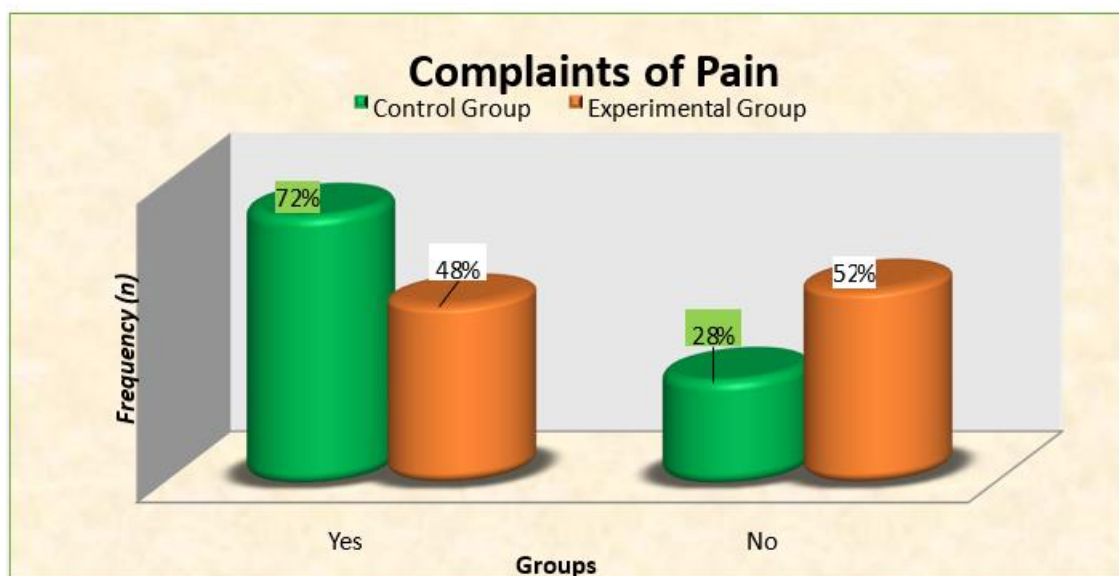


Figure 1.5: 72% in the control group have pain complaints, whereas 52% in the experimental group do not.

LIMITATIONS

The study has a small sample size (50), restricting result generalization. Resource and time constraints impacted the study. Some subjects faced discomfort with overnight eye mask use, headphone, and music preferences, affecting overall cooperation and varied intervention durations (2-3 nights).

CONCLUSION

Post-test scores revealed control group had mainly average sleep, whereas the experimental group showed significant improvement with excellent sleep. No associations were found between demographic variables and pre-test scores; the Dream bundle intervention effectively enhanced sleep quality in ICU patients.

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