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Effect of Benson relaxation therapy on sleep quality among children in pediatric intensive care unit

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Abstract--Background: Children in intensive care units must get enough sleep to maintain their physical and mental health. Benson's Muscle Relaxation Technique is an effective complementary and non-pharmacological technique used to improve sleep patterns. Aim: To evaluate the effect of Benson relaxation therapy on sleep quality among children in the pediatric intensive care unit. Subjects and Methods: Design: A quasi-experimental design was used to achieve this study. Setting: The study was conducted in Pediatric Intensive Care Unit affiliated to Sohag University Hospital. Subject: Non-probability purposive sampling technique was used to select a sample of 60 children who were randomly assigned into two groups, 30 for each (the study and control groups). Two tools were used: (I) a structured interview questionnaire and (II) the Pittsburgh Sleep Quality Index scale. Results: The present study findings demonstrated that There were significant differences and improvements regarding sleep quality mean scores between the two groups post-implementation of Benson relaxation therapy at ($P < 0.05$). Conclusion: Benson's relaxation therapy implementation was an effective and safe intervention used to improve sleep quality among children in the

pediatric intensive care unit. Recommendations: Benson relaxation therapy is recommended alongside treatment for children in the pediatric intensive care unit to improve their sleep quality.

Keywords--Benson relaxation therapy, children, pediatric intensive care unit, sleep quality.

Introduction

Numerous physical, environmental, and pharmaceutical elements that are present in the Pediatric Intensive Care Unit (PICU) for children increase their susceptibility to sleep disruption. In the CCU, sleep quality is evaluated by nurse observation and polysomnography, respectively. Polysomnography is invasive and technically complex, and interpretation is complicated due to traditional grading (Menear et al., 2017).

Critically ill children, especially young children, frequently express difficulty sleeping during the fast eye movement stage, complaining of fragmented and shallow sleep (Devlin et al., 2018; Khalil et al., 2019). Numerous elements, such as non-circadian light, noise from the medical staff, monitoring devices, and discomfort, have been linked to sleep problems in young children as a result of invasive examination methods (Aitken et al., 2017; Telias and Wilcox, 2019; Honarmand et al, 2020; Miranda-Ackerman et al, 2020). Additionally, several signs that disrupt the start and upkeep of high-quality sleep have been connected to conditions of the cardiovascular, pulmonary, endocrine, renal, and neurological systems (Rittayamai et al., 2016; Kimia et al, 2020).

Numerous sleep issues and other psychological diseases result from poor sleep quality (Boergers et al., 2017). Numerous cognitive, psychological, and physical issues are brought on by poor sleep quality. Hospitalized children's requirements should be managed by nurses, however, there is no defined protocol for nurses to use while caring for their patients' sleeping conditions (Bevan et al., 2016). A lack of sleep can result in a wide range of physiological and psychological issues, including post-traumatic stress disorder, anxiety, immune, cardiovascular, respiratory, and respiratory disorders, as well as lower quality of life and lower quality of life can all contribute to an increase in mortality. The multiple systems that are affected by sleep disruption demonstrate that the effects of sleep disturbance affect not only the central nervous system but also every bodily system (Finan et al., 2015; Medrzycka-Dabrowska et al, 2018; Chaudhary et al, 2020).

Sleep disturbance has a negative effect on cardiovascular functioning due to the sympathetic nervous system being activated and the release of adrenaline and noradrenaline. When noradrenaline and adrenaline are released, the blood pressure, pulse, myocardial oxygen demand, and cardiac dysrhythmia all increase. These elements raise the risk of recurrent heart attacks and exacerbate myocardial ischemia. Sleep deprivation increases the release of inflammatory cytokines associated with atherosclerosis, hypertension, and acute coronary syndrome throughout many nights (Honarmand et al, 2020). Sleep disorders have

an impact on the respiratory system. Sleep disruption affects the respiratory system's ability to function, leading to increased oxygen use and carbon dioxide production, hypoventilation, and a decrease in forced vital capacity and maximal inspiratory pressure (Medic et al, 2017).

To assess sleep quality, the subjective nurse sleep evaluation method is thought to be a good alternative. Structured interviews, questionnaires, or rating scales can be used to investigate the amount or quality of sleep that patients report for those who are capable of self-reporting (Storti et al., 2015; Ritmala- Castren et al., 2016). When promoting sleep for critically ill patients, critical care nurses need to take into account a variety of important elements, including knowledge of sleep cycles, different causes of sleep disturbance, and objective or subjective approaches to sleep evaluation (Aitken et al., 2017; Herscher et al, 2021).

For patients, Benson's Relaxation Technique (BRT) is among the most effective methods for relaxing their muscles. This method was developed by Herbert Benson (1975), who asserted that it can produce a relaxation response by reducing autonomic nervous system activity. This nurse intervention strategy is the most efficient and straightforward. Due to the influence of total muscular relaxation, it involves mindfulness techniques that have a broad range of positive effects on patients' physical and psychological issues. Nurses work toward several objectives, including improving patients' comfort and sleep quality. Complementary and non-pharmacological therapies can assist nurses to achieve these objectives (Drouot and Quentin, 2016).

Significance of the study

All physiological systems have been found to suffer from sleep deprivation, including inappropriate emotional processing, compromised immune function, postponed wound healing, and an increased risk of hypertension, heart attack, hypoxia, hypercapnia, and stroke (Wu and Sun, 2017&Astin et al, 2020). Critical care nurses in CCUs prioritize cardiac monitoring and ensure proper oxygenation over sleep quantity and quality. Sleep quality is usually underreported by members of the medical team while being an important factor in maintaining wellness and good health.

Sleep deprivation has been proven to negatively affect all physiological systems, including inappropriate emotional processing, reduced immune function, postponed wound healing, and an increased risk of hypertension, heart attack, hypoxia, hypercapnia, and stroke (Wu and Sun, 2017&Astin et al, 2020). Critical care nurses at CCUs place more emphasis on maintaining appropriate oxygenation and cardiac monitoring than on the quantity and quality of sleep. Sleep quality is usually underreported by members of the medical team while being a crucial factor in maintaining wellness and good health. Therefore, this study aimed to evaluate the effect of Benson relaxation therapy on sleep quality among children in the pediatric intensive care unit.

Aim of the study

This study aimed to evaluate the effect of Benson relaxation therapy on sleep quality among children in pediatric intensive care units through:

- Assessing sleep quality among children in the pediatric intensive care unit.
- Determine the effect of Benson relaxation therapy on sleep quality among children in the pediatric intensive care unit.

Research hypothesis

Children in the pediatric intensive care unit who receive Benson relaxation therapy expected that their sleep quality will be improved than children who do not.

Subjects and Methods**Research design**

A quasi-experimental research design was used to achieve the aim of the current study

Setting

The study was conducted in Pediatric Intensive Care Unit affiliated to Sohag University Hospital. This setting may be found on the third floor of the pediatric department of Sohag University Hospital. It had two bedrooms, the first with five beds and the second with six beds. The former location was chosen because it is one of Egypt's largest public teaching hospitals, with a high incidence of children from different socioeconomic and educational backgrounds traveling from all across areas to receive medical care.

Subjects

Non-probability purposive sampling technique was used to select a sample of 60 children who were randomly assigned into two groups, 30 for each (the study and control groups) with and without Benson relaxation therapy. Study group: Consist of 30 children who have received Benson relaxation therapy in addition to routine care. Control group: Consisted of 30 children who received routine care only.

Randomization of the sample

We used the coin in selecting the sample where the face of writing is selected for the control group and the face of the king is selected for the study group within six months, from the beginning of July 2021 till to the end of December 2021.

Inclusion criteria included for children

- Children in the pediatric intensive care unit at the time of the study

- Children aged from 8 and less than 18 years.
- From both gender
- Conscious children
- Agree to participate in the study

Sample size calculation

The sample size was computed using the level of significance of power analysis of 0.95(=1-0.95=0.5) at alpha. The significance was set at 05 (one-sided) with a big effect size (0.5), and the high significance was set at 0.001.

Tools of data collection

Two tools were used to collect data:

Tool (I): A structured interview questionnaire: Was developed by the researchers after reviewing related literature. It was composed of two parts:

Part (1): It includes demographic characteristics which consisted of four items related to age, gender, educational level, and residence.

Part (2): It includes the medical history of the children; it consisted of 3 items about the previous admission to PICU, history of other diseases, and history of analgesic consumption.

Tool (II): The Pittsburgh sleeps quality index scale (PSQI) (Buysse, Reynolds, & Monk, 1989).

Before and following the intervention, the PSQI was utilized to assess the quality of sleep (Carpenter & Rykowski, 1998). Buysse and his coworkers created the scale to assess sleep quality and make a distinction between those who get poor sleep and those who get good sleep. The measure includes the following domains: subjective sleep quality, sleep latency, sleep length, habitual sleep efficiency, sleep disruptions, usage of sleep medicine, and daytime dysfunction. The scale is divided into two parts: five questions that are rated by a bed partner and 19 questions that are self-reported and used to rate the scale. A doctor or research assistant can also give the scale. The majority of the items are brief, simple questions with multiple choices that are easy to comprehend and respond to. The PSQI questions are rated from 0 = no difficulty to 3 = severe difficulty, generating scores that correspond to the domains of the scale. The scores range from 0 to 21 and the authors suggest that a score >5 be considered a significant sleep disturbance. Time to complete PSQI scale: 5–10 min. The reliability of the scale is considered good with Cronbach's alpha of 0.83 for the total score. Test-retest reliability is also considered good. The validity of PSQI has been described by the authors as good with a sensitivity of 89.6% and a specificity of 86.5% of patients versus control subjects.

Content validity

Five panels of experts in pediatric nursing and critical care medicine were given the study tools to evaluate the face and content validity. Professors from Sohag University's Faculty of Nursing, including two from the critical care medicine department, one from pediatric nursing, and two from other nursing departments, examined the two assessment methods for applicability, thoroughness, clarity,

and relevance. Based on their findings, some changes were made to the methods. A content validity index of 0.86.5% was found for tool II.

Tool reliability

The internal consistency and stability of the evaluation tools were assessed using Cronbach's alpha coefficients to determine their reliability. Cronbach's alpha coefficient was 0.83 for tool II.

Ethical considerations

The purpose of the study was clarified to children and their parents. Following an explanation of the study's aim, oral consent was taken from parents of the studied children before participating in the study, with confidentiality and anonymity guaranteed. Participants were promised that might withdraw from the study at any moment for any reason.

Fieldwork

Preparatory phase

Official approval was through an issued letter from the Dean of the Faculty of Nursing, Sohag University Hospital to conduct this study and the directors of the previously selected setting.

A pilot study

A pilot study was done on 10% of the sample (6 children) of the overall sample to examine the clarity and feasibility of the research study. There were no changes made to the tools in its final version. Children who participated in the pilot were included in the study.

Implementation phase

This study aimed to evaluate the effect of Benson relaxation therapy on sleep quality among children in pediatric intensive care units through:

- Before conducting the study, an exploratory visit was done to the selected setting to evaluate the rate of admission and suitable time for collecting data.
- Data were collected within six months from the beginning of July 2021 till to the end of December 2021.
- Researchers attended the previously mentioned setting for collected data oneday per week (Monday), from 9 am to 12 am.

Assessment

The researchers interviewed each child individually for about 30 minutes; the researchers explained the aim of this study as well as oral consent was obtained

from their parents and then demographic and sleep quality index scale were collected from the child for two groups

Intervention

In the study group:

- The researchers interviewed each child individually for about 1 hour; the researchers explained the purpose of the study as well as oral consent was obtained from them then demographic and sleep quality index scale were collected from the child with the application of the Benson relaxation technique.
- The children were randomly assigned into two equal groups, study and control groups (thirty subjects in the study group who received the Benson relaxation technique and routine care and thirty subjects in the control group who received the routine care only).
- Teaching methods included discussion, demonstration and re-demonstration, models, and pictures (Benson relaxation technique).

Intervention

The instruction of Benson's relaxation technique included the following steps:

- Sit in a comfortable position.
- Close the eyes.
- Relax all muscles beginning from the soles for the feet to the top of the head moving forward up, and relax all parts of the body.
- Take a breath from the nose. Exhale from the mouth whenever exhaling, repeat one word or number (as Allah or one) inhale, and exhale with comfort and confidence.
- Do this for 20 minutes. Try to keep the body and muscles relaxed and repeat the desired word in your mind. Then open the eyes slowly and do not move or stand up for a few minutes.
- In the current study, the questionnaire was distributed two times; pre and postthe intervention
- In the study group implementation of each child on Benson relaxation technique started after the sleep quality index scale pre-test was completed.
- The researchers gave information to the subjects in the study group individually about the Benson relaxation technique.
- After the relaxation implementation, the researchers demonstrated each step of the Benson relaxation technique and then asked the children to re-demonstrate it. The researchers then asked the children to re-demonstrate all the steps and repeat the technique three to four times until the children master it.
- The researchers were distributing the designed manual booklet to each participant to clarify how to apply the Benson relaxation technique.

The control group

- Participants received routine care only as an evaluation of their physical health, administration of prophylactic medications, and adequate and safe sleep for the children without the application of the technique.

Title: Effect of Benson relaxation technique on sleep quality among children.

General objective: To determine the effect of the Benson relaxation technique implementation on sleep quality among children in PICU.

Specific objectives

- To assess sleep quality among children in PICU pre-intervention.
- To implement Benson's relaxation technique (intervention)
- To assess sleep quality among children in PICU post-intervention.

Outlines of the booklet

Knowledge about Benson's relaxation technique

- Meaning
- Technique
- Causes
- Importance
- Steps of technique demonstration

Evaluation phase

In both study and control groups, the researchers reassess sleep quality levels after two days of Benson relaxation technique intervention for children by using tool II used before as a pretest.

Statistical analysis

SPSS for Windows, version 20, was used for data entry. For qualitative and quantitative variables, respectively, descriptive statistics were displayed as frequencies and percentages and means, and SDs. The t-test for differences between the two means was applied. The Chi-square (χ^2) test was used to compare qualitative values. To evaluate the level of association between two sets of variables, Pearson's correlation coefficient () test was performed. It was thought to have statistical significance at a P-value <0.05 .

Results

Table 1 shows that the average age of the children studied in the PICU was 10.33 3.84 in the study group and 10.34 2.89 in the control group. The age range of 6- to 12 years old was the most common (60% and 56.6% in the study and control groups, respectively), and it can be seen from the same table that 66.7% and 60% of the studied children were boys in both the study and control groups. The same

table showed that 83.3 percent of the investigated group's children lived in urban regions, compared to 76.7% in the control group. In terms of sociodemographic variables, there was no statistically significant difference between the study and control groups.

Table (2) shows that in the study and control groups, respectively, 90 and 86.7% of the examined children had never been admitted to a PICU. The same table also shows that in both groups, respectively, 86.7% and 93.4% of the studied children had a history of other diseases. Children in the study group and the control group, respectively, had a history of consuming analgesics in proportions of 66.7% and 73.3%. There was no statistically significant difference in medical data between the study and control groups.

Table 3: Shows that, while statistically significant differences were discovered following the intervention (P 0.001), there were no differences between the study and control group's PSQI scores before the intervention (P=0.847). Following the use of the Benson relaxation technique, the study group's scores for sleep quality were lower than those of the control group (7.122.54 vs. 9.895.76, respectively).

Table (4) illustrates an association between children's use of the Benson relaxation technique and their age and educational level. The children's results on the Benson relaxation technique did not, however, show a statistically significant relationship with their gender.

Table (1): Frequency and percentage distribution of the studied children according to their demographic characteristics (n=60)

Demographic characteristics	Study group		Control group		P-value
	No	%	No	%	
Age (Yrs.)					
• 1 - ≤ 6	4	13.4	5	16.6	1.78
• 6- ≤ 12	18	60.0	17	56.6	
• 12- ≥ 18	8	26.6	8	26.6	
Mean± SD	10.33 ± 3.84		10.34 ± 2.89		
Gender					1
• Boy	20	66.7	18	60.0	
• Girl	10	33.3	12	40.0	
Educational level					1.03
• Primary level	9	30.0	8	26.7	
• Preparatory level	15	50.0	17	56.6	
• Secondary level	6	20.0	5	16.7	
Residence:					1.42
• Urban	25	83.3	23	76.7	
• Rural	5	16.7	7	23.3	

Table (2): Frequency and percentage distribution of the studied children according to their medical data (n=60)

Medical data	Study group (n=30)		Control group (n=30)		P-value
	No	%	No	%	
Previous admission to CCU:					
• Yes	3	10.0	4	13.3	1.38
• No	27	90.0	26	86.7	
History of other diseases:					
• Yes	4	13.3	2	6.6	1
• No	26	86.7	28	93.4	
History of analgesic consumption:					
• Yes	20	66.7	22	73.3	1.63
• No	10	33.3	8	26.7	

Table (3): Mean differences between pre/post- Benson relaxation technique intervention regarding sleep quality in both control and study groups

Sleep Quality	Study group (30)	Control group (30)	P-value
Before the intervention	10.22 ±3.79	10.18±5.46	0.847
After the intervention	7.12±2.54	9.89±5.76	P<0.001**

*Significance at P<0.001**

Table (4): Correlation between Benson relaxation technique and demographic data of the studied children (n=60)

Personal data of children (n=60)	Benson relaxation technique	
	R	P
Gender	-0.106	0.447
Age	-0.353	0.014*
Educational level	-0.372	0.0071*

Discussion

The results of the current study showed a significant difference and improvement in the children who were studied, with higher sleep quality scores both before and after using Benson's technique. It proved the beneficial effect of Benson's relaxing technique on the caliber of sleep, according to the researchers. With less stimulation of the sympathetic nervous system and more activation of the parasympathetic nervous system, this technique regulates the hypothalamus. Nonpharmacological therapies like Benson's relaxation technique, for example, can help minimize and control patients' problems and give them more psychological improvement to help them cope with their physical condition (Sahrakhil et al., 2017).

According to the results of the current study, boys made up more than half of the children. These results are corroborated by Abd El Khalik et al., (2020), who

investigated "The Effectiveness of Using Breathing Exercise on Sleep Quality among Hospitalized Patients" and found that men made up the majority of the study groups.

The present study findings revealed that the majority of the studied critically ill children who suffer from mild and moderate sleep disturbance did not have a history of admission to CCU. It's thought that the physiological and psychological stress of being admitted to the CCU lowers sleep quality.

The current study's findings demonstrated that following the intervention, there were statistically significant differences ($P < 0.001$). Following the application of the Benson relaxation technique, the study group's scores for sleep quality were worse than those of the control group. Between the study and control groups, there was a very statistically significant difference. The researchers concluded that it supported the effectiveness of this calming method. Similarly, Xiao et al. (2020) examined the effects of relaxation interventions on patients' negative emotions and sleep quality, finding that relaxation decreased patients' anxiety and increased the quality of their sleep.

According to the study's findings, the study group's post-intervention sleep quality score was lower than that of the control group. This outcome demonstrates the benefit and significance of using a relaxation technique to enhance children's sleep. This finding was in line with a study by Seyedi et al., (2018) that examined "the influence of relaxation method on the relieving fatigue and increasing quality of sleep in patients diagnosed with chronic obstructive pulmonary disease" and observed that relaxing can enhance sleep (Ferendiuk et al., 2018).

The findings of this study are consistent with other studies on the benefits of Benson's relaxation technique for anxiety and sleep quality in females (Wilczyska et al., 2019), prenatal anxiety (Rajeswari, & SanjeevaReddy, 2019), sleep quality in patients with fractures (Xie, Deng, & Zhang, 2016), and early breast cancer in female patients (Gok, et al., 2016). According to Annal et al., (2014) study, relaxing techniques have a positive impact on improving patients' sleep quality and reducing anxiety. This study focused on sleep disturbances that happened among children, adolescents, and adults who were diagnosed with psychomotor impairment. This is connected to sleep quality, which can induce relaxation in the body, effectively reduce and relieve anxiety, and foster quality sleep (Liu et al., 2020).

According to the study's findings, there is a statistically significant correlation between children's use of the Benson relaxation technique and their age and educational level. Due to their early age, the children in the study may not have enough understanding of the illness, which increases their worry and is thought to be the primary cause of their poor sleep quality. This may be explained by the age of the children in the study.

Sleep is a physiological state of reversible unconsciousness that takes up around one-third of a person's life. Several reports indicate that over 61 percent of hospitalized patients complained of bad sleep. There are several reasons why

people have poor sleep. Poor sleep quality in hospitalized patients, particularly in PICUs, has a significant impact on the pathophysiology of the primary illness. The prevalence of ongoing careful observation, diagnostic testing, and medical assistance such as mechanical ventilation or medications was equally high in the PICU setting (Wilczynska et al., 2019).

The loud environment, the severity of the illness, and medications are the primary causes of sleep disturbance in critically ill patients. Disrupting sleep has various detrimental effects on the body and mind (Aitken et al., 2017). In a study by Daneshmandi et al. (2012) titled "Effect of Eye Mask on Sleep Quality in Patients with Acute Coronary Syndrome," which included 60 patients, it was found that more than half of the study sample was admitted for the first time, and stress caused by admission to the CCU could be the cause of poor sleep quality. More than two-thirds of the patients analyzed in Magdy et al., (2019), study "Study of Sleep Quality Among Patients Hospitalized to the Respiratory Intensive Care Unit" were admitted to the RICU for the first time.

Conclusion

Based on the results and hypotheses of the present study, the study findings concluded that Benson relaxation therapy implementation was an effective and safe intervention used to improve sleep quality among children in the pediatric intensive care unit. The study revealed that there was a difference between mean pretest and posttest scores that were found statistically significant at $p < 0.05$ level in the study group regarding sleep quality.

Recommendations

The following suggestions are made based on the current study's findings:

- Benson relaxation therapy is recommended alongside treatment for children in pediatric intensive care units to improve their sleep quality
- Simple Arabic Booklets and brochures containing sufficient knowledge about sleeping patterns and their effect on children should be available to nurses in the PICU unit, printed, and kept in clinics and hospitals.
- Further studies and replication of the current study with a larger sample in different settings are required for generalizing the results.

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