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Improving Sleep Quality in ICU Patients Through Foot Massage: A Literature Review

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ABSTRACT

Background: Sleep disturbances are common among critically ill patients admitted to the Intensive Care Unit (ICU) due to environmental factors, invasive procedures, pain, and psychological stress. Poor sleep quality may delay recovery and negatively affect patients' physical and psychological conditions. Foot massage has been increasingly used as a complementary nursing intervention because it is safe, inexpensive, and easy to perform without disrupting intensive care equipment.
Objective: This literature review aimed to analyze the effectiveness of foot massage in improving sleep quality among patients admitted to the Intensive Care Unit (ICU).
Methods: A literature review was conducted following the PRISMA approach and PICOS framework. Articles were searched through Google Scholar using Medical Subject Headings (MeSH)-based keywords related to foot massage, sleep quality, and ICU patients. Studies published between 2017 and 2022 in Indonesian or English were considered. From an initial 154 articles, eight studies met the inclusion criteria and were included in the review.
Results: All reviewed studies consistently reported that foot massage improved sleep quality among ICU patients. The intervention was generally administered for 10–20 minutes, once daily or before bedtime, for two consecutive days. Foot massage promoted relaxation, reduced anxiety and muscle tension, enhanced parasympathetic activity, stimulated endorphin and serotonin release, and ultimately improved patients' sleep quality. Several studies also reported statistically significant improvements in sleep quality following the intervention ($p < 0.05$).
Conclusion: Foot massage is an effective complementary nursing intervention for improving sleep quality in critically ill patients in the ICU. Its simplicity, low cost, minimal risk, and non-invasive nature make it a practical intervention that can be incorporated into routine nursing care to support patient recovery.

1. INTRODUCTION

An intensive care unit is a specialised segment of a hospital that provides comprehensive care with trained medical personnel and specialised equipment to monitor and treat individuals with severe and complex illnesses that can be life-threatening if not treated promptly, and are often exposed to various stresses (Afianti & Mardhiyah, 2017).

Critically ill patients treated in the Intensive Care Unit (ICU) are individuals who experience life-threatening body function problems, are in an unstable condition, and require intensive care, such as the use of a ventilator, as well as administration of vasoactive drugs through continuous infusion (Suwardianto & Astuti, 2020).

Critically ill patients in intensive care units often experience sleep problems due to invasive procedures, noise from equipment, and pain. Research shows that sleep problems are the second most common complaint for patients in the ICU after pain. Sleep problems are often overlooked by medical staff because sleep evaluations are personal, making it challenging for them to analyze and take appropriate action to address these sleep issues (Sari & Utami, 2022). Sleep is one of the fundamental needs for humans, which is crucial for the processes of regeneration, healing, and maintaining physical and mental functions (Medrzycka-Dabrowska et al., 2018).

Quality sleep can improve mental well-being and is crucial in the recovery of health and survival of patients in critical condition. Sleep quality refers to the state in which sleep provides a feeling of freshness and increased stamina upon waking (Robby, Agustin, & Hanifan Azka, 2022).

Where the individual shows no signs of fatigue, anxiety, or dark circles under the eyes and is often seen yawning due to a lack of quality sleep (Imardiani et al., 2019), this sleep quality includes quantitative aspects of sleep such as sleep duration and latency, subjective aspects such as deep sleep and rest (Robby, Agustin, & Hanifan Azka, 2022).

Overcoming sleep problems can be done through two methods, namely with the help of drugs or without drugs. The pharmacological approach refers to the use of drugs to help someone sleep. Usually, drugs given in intensive care consist of the benzodiazepine group, such as lorazepam, midazolam, and diazepam (Oldham & Pisani; dalam Afiant & Mardhiyah, 2017).

However, this method tends to have adverse effects if applied in the long term. Therefore, handling sleep problems through non-drug therapy can be achieved through various approaches, including additional therapies such as physical activity, hypnosis, acupressure, acupuncture, and massage (Robby, Agustin, & Hanifan Azka, 2022).

Efforts in the health sector that can be made to improve sleep quality include the implementation of complementary therapies that enhance treatment outcomes without producing side effects. One example is the use of foot massage as a complementary therapy to improve sleep quality in patients in the ICU. This is a suitable choice for nurses because it poses a low risk, requires minimal equipment, and has been proven to be more effective than other therapies (Sari & Utami, 2022).

Foot massage is a form of complementary therapy that can be used to support the improvement of quality of life for patients in critical condition in the ICU. A foot massage can provide a significant sense of relaxation, reduce anxiety levels, alleviate physical discomfort and pain, and improve sleep quality (Afianti & Mardhiyah, 2017).

This foot massage is performed by gently rubbing or massaging the feet with hands, using lotion or baby oil to facilitate the process. The process begins at the soles of the feet, then moves to the ankles, the back of the feet, and finally to the toes, each area being held for 15 seconds (Robby, Agustin, & Hanifan Azka, 2022).

The use of foot massage in patients in the intensive care unit is due to the ease of access, allowing massage to be provided to the feet without requiring a change in the patient's position. This is important because patients in the ICU are usually connected to various devices attached to their bodies to monitor their health conditions, which makes changing positions impractical. In addition, foot massage offers

affordable costs, minimal risk of complications, and a straightforward procedure, making it a recommended method for improving sleep quality (Afianti & Mardhiyah, 2017).

Foot massage can not only increase blood flow, but can also reduce swelling and serve as passive exercise for the patient's joints. Through this action, the nurse can create comfort due to the direct contact between the patient's skin and the nurse, which in turn can improve the patient's well-being (Puthuseril, 2006; Prapti, Petpichetchian, & Chongcharoen, as cited in Afianti & Mardhiyah, 2017).

Foot massage stimulates the parasympathetic system, which then sends neurotransmitter signals to the brain, organs, and bioelectricity throughout the body. The signals forwarded to the brain induce alpha waves *within it* (Guyton, dalam Afianti & Mardhiyah, 2017). The nerve signals that appear when performing a foot massage will be sent to the hypothalamus to produce Corticotropin Releasing Factor (CRF) which can stimulate the pituitary gland to increase the production of Proopiomelanocortin (POMC) so that the adrenal glands produce endorphins which will be released into the bloodstream and can affect the mood to become calmer (Ganong, dalam Afianti & Mardhiyah, 2017).

The alpha waves previously emitted play a role in reducing a person's stress, allowing the individual to feel calmer. It also helps relax muscles that produce chemicals in the brain (neurotransmitters) that stimulate the Reticular Activating System (RAS) located at the top of the brainstem. With reduced RAS activity, control is taken over by a part of the brainstem known as the Bulbar Synchronisation Area (BSR), which releases hormones such as serotonin, acetylcholine, and endorphins. These hormones create feelings of comfort and relaxation. This condition can reduce cortisol levels in the blood, provide emotional stability, reduce mental tension, and cause drowsiness, thereby improving sleep quality for patients in ICU care (Azis, dalam (Afianti & Mardhiyah, 2017).

Therefore, the author compiled this Literature Review to understand the impact of foot massage therapy on the quality of sleep of patients in the Intensive Care Unit (ICU). Through this literature review, it is expected to provide benefits for nurses in the ICU, aiming to improve and enhance the quality of sleep for patients experiencing sleep problems in the unit.

2. METHODS

The method applied in compiling the Literature Review uses the PRISMA checklist to determine the selection of studies and uses the PICOS format. The data sources used are secondary data. The data collection process is conducted through electronic databases, such as Google Scholar. Search terms are adjusted to the Medical Subject Headings (MeSH) and consist of :

Table 1. Literature Review Keywords

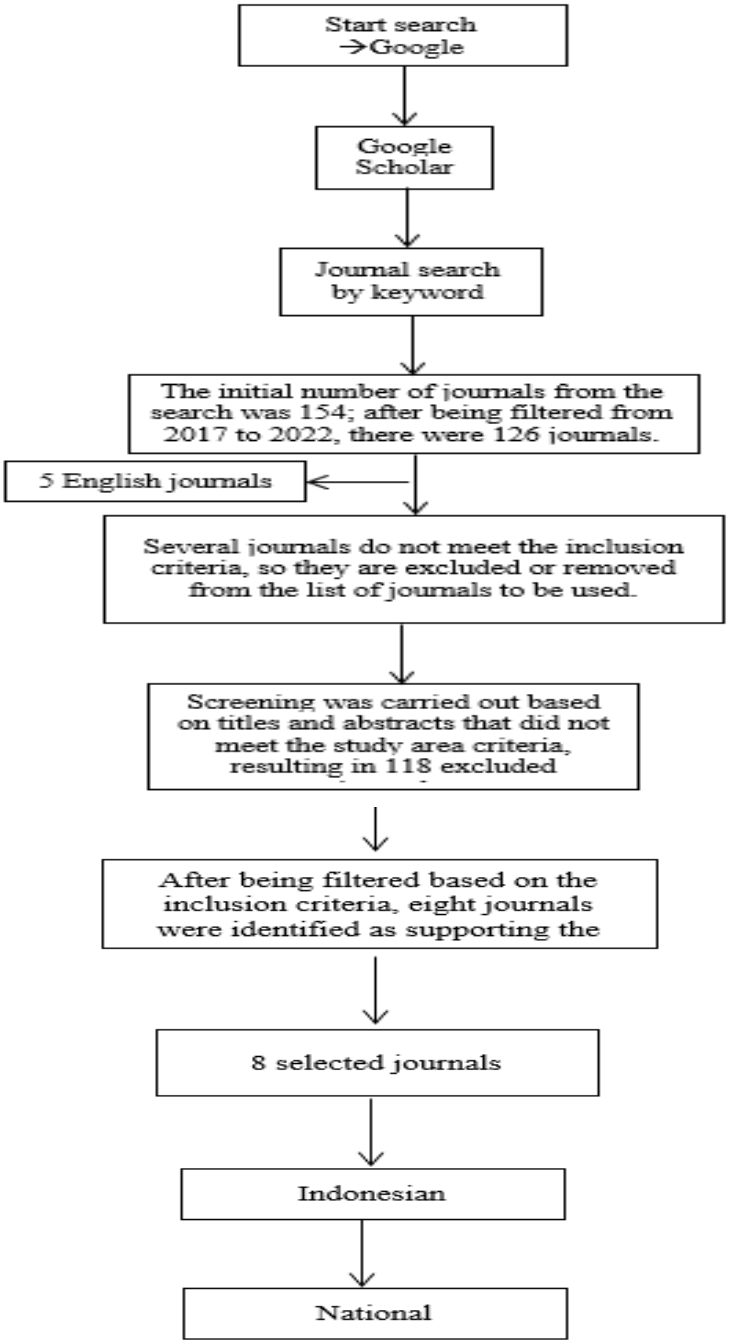
Pijatan	Kualitas Tidur	Keperawatan Kritis
Foot Massage	Kualitas Tidur	*High Care Unit*
Foot Massage	Kualitas Tidur	Keperawatan
OR	*OR*	*OR*
Foot Massage	*Sleep Disorder*	ICU

Table 2. Inclusion and Exclusion Criteria in Literature Review

Criteria	Inclusion	Exclusion

Population	Study on the effect of applying foot massage on improving sleep quality in critical patients experiencing sleep disorders in the ICU	There is no
Intervention	Foot Massage Therapy Intervention	There is no
Comparison	*Non Comparator*	
Result	The effect of applying foot massage on the sleep quality of critical patients in the ICU	Does not explain the effect of foot massage on the sleep quality of critical patients in the ICU
Study Design	The research method uses a literature review. The research design is a randomized controlled trial, a clinical trial, and a quasi-experiment, both single-masked and double-masked. Experiments with pre-post treatment design (pretest-posttest with control group design), Pittsburgh Sleep Quality Index (PSQI)	There is no
Publication Year	After 2016	After 2016
Language	Indonesian	Indonesian, English

Figure 1. Literature Review Collection Procedure Diagram



3. RESULTS AND DISCUSSIONS

The research location in the Literature Review was conducted in 1 country. Respondent characteristics in several of these studies were patients being treated in the ICU, where sleep disorders are one of the complaints in critical patients and can have an impact on the physical and psychological conditions of patients. Of the eight journals listed that influenced the results, there was an effect of foot massage therapy on the quality of sleep of patients in the ICU. During the initial search of journals, 154 titles were identified. After being filtered from 2017 to 2022, 126 journals remained. Five journals were written in English. Researchers selected 118 journals with titles and abstracts that did not match the study area criteria. Thus, the total number of journals that could be reviewed was eight.

Table. 3 The effect of foot massage application on patient sleep quality in the ICU

No	Writer	Title	Design and Sampling	Nursing Care Plan	Results
1.	(Hartatik & Sari, 2021)	Effectiveness of Foot Massage Therapy	The research method employs a literature review, specifically analyzing 25 journal samples related to the topic, and then filtering them according to inclusion and exclusion criteria to select nine relevant journals. Researchers use databases such as Google Scholar, PubMed, Research Gate and Elsevier.	Foot massage therapy is performed 2-3 times a week, with a duration of 5-30 minutes in one procedure.	The results of the sleep quality study conducted with ICU patient respondents, who met the criteria of being fully conscious, cooperative, communicative, and maintaining eye contact, with stable hemodynamics, a mild pain scale, and using spontaneous mode ventilators. The number of respondents was 24, with ages ranging from 18 to 40 years; the majority were male, comprising 54.16%, and 87.5% of patients reported experiencing sleep disorders. The results of the study, following foot massage, showed a significant difference in the respondents' sleep quality scores, with a p-value of 0.002 ($p < 0.05$).
2.	(Sari & Utami, 2022)	Literature Review: Massage to Improve Sleep Quality in Critical Patients.	This study employs a literature review method with a research design that includes randomized controlled trials, clinical trials, quasi-experiments,	A combination of using hands and valerian or lavender essential oil to be applied to the feet of critical patients with a	The results of an analysis of nine articles conducted by researchers show that, overall, complementary therapy in the form of

			and both single-masked and double-masked studies. The inclusion criteria used were experimental research designs that tested the effects of massage on improving sleep quality. A total of 107 articles were identified, but only nine met the specified criteria. Respondents were critical patients with stable hemodynamics who were able to communicate verbally and evaluate the comparative effects of massage on improving sleep quality in the control group compared to the intervention group.	massage dose of 1 x a day, with repetitions for two consecutive days, for a duration of 10-20 minutes, and carried out before going to bed.	massage performed on critically ill patients has a positive effect on improving sleep quality. Massage can stimulate nerve sensors, whose stimulation is forwarded to the hypothalamus, and produce corticotropin-releasing factor (CRF). CRF stimulates the pituitary gland to increase the production of Proopiomelanocortin (POMC). This stimulates the adrenal medulla and increases the secretion of endorphins, which activate the parasympathetic nervous system, allowing tense muscles to become more relaxed. This condition stimulates the body to release serotonin, helping to enhance sleep stimuli and improve a person's sleep quality (Sarisoy & Ovayolu, 2020).
3.	(Robby, Agustin, &	The Effect of Foot Massage	This research method uses a literature study. The population of this	Foot massage intervention in patients treated in	Based on the study's findings, it can be concluded that foot

	Hanifan Azka, 2022)	on Sleep Quality	study comprises articles retrieved from national and international databases, including Google Scholar, ScienceDirect, the National Library, and PubMed. Population data collection is primary data, specifically article searches conducted over 10 years, from 2011 to 2021. The results obtained are 18 relevant journals and articles. The samples in the 18 journals are patients treated in the ICU who have sleep disorders.	the intensive care unit (ICU) who have sleep disorders.	massage is an effective tool in nursing care, providing a profound relaxation effect, reducing anxiety, alleviating pain and physical discomfort, and improving sleep quality. Based on the results of several studies, foot massage interventions should be provided to patients experiencing sleep disorders to improve the quality of their sleep. It is recommended that nursing services apply foot massage as an effort to improve the quality of service in health care institutions for patients who experience sleep disorders.
4.	(Mulia, 2019)	The Effect of Foot Massage on Sleep Quality in Chf (Congestive Heart Failure) Patients in the Cempaka 2 HCU Room, Dr Adnaan Wd Payakumbuh	A quantitative study with a Quasi-Experiment one-group pretest-posttest design, where the researcher conducted an experiment or treatment on the independent variable and then measured the effects of the experiment on the dependent variable. The population in this study consisted of CHF	Foot Massage intervention on the feet where the feet are touched, rubbed or squeezed for 10 minutes.	From 10 respondents, the average sleep quality of CHF patients was assessed before and after the foot massage intervention in the HCU Cempaka 2 room of Dr Adnaan WD Hospital; a significant difference was observed. After the foot massage intervention was carried out twice on

		Hospital in 2019	patients who met the established criteria and were treated in the HCU Cempaka 2 room at Dr Adnaan WD Payakumbuh Hospital in 2019. A total of 10 individuals were selected using the accidental sampling technique, as determined by the Slovin formula.		CHF (Congestive Heart Failure) patients in the HCU Room, sleep quality measurements (posttest) were conducted. There was a decrease in the score indicating sleep quality after foot massage, which was 2.900 with a standard deviation of 876. The results of the statistical test yielded a p-value of 0.000, indicating a significant effect of providing foot massage intervention on patient sleep quality.
5.	(Afianti & Mardhiyah, 2017)	The Effect of Foot Massage on the Quality of Sleep of Patients in the ICU	The research design employed in this study was a Quasi-Experiment with a pretest and Posttest Control Group Design. This quasi-experimental study employed a control group and a treatment group, with each group assessed both before and after the intervention. The study included 24 patients, with 12 responses for each group. The sleep quality instrument used the Richard	A foot massage intervention was conducted before bedtime for two consecutive days, with a 10-minute massage duration for each foot, in the intervention group of patients treated in the ICU Room of Dr Hasan Sadikin General Hospital, Bandung.	Foot massage has a positive effect on the quality of sleep in patients in the ICU, as indicated by a significant increase in the quality of sleep score in the intervention group after receiving foot massage treatment compared to the control group. This is supported by the significant difference in the initial pretest scores between the control group and the intervention group, where the intervention group

			Campbell Sleep Questionnaire (RCSQ).		had a lower sleep quality score than the control group in the ICU Room of Dr Hasan Sadikin Hospital, Bandung.
6.	(Pramesti et al., 2019)	*The Effect Of Foot Massage On Sleep Quality In The Elderly*	This study employed a Quasi-Experiment with a pretest and posttest control group design, using purposive sampling to select 20 respondents, comprising 10 participants in the intervention group and 10 participants in the control group. Data were collected using the SMH (St. Mary's Hospital Sleep) questionnaire. Data analysis used the Mann-Whitney test.	Foot Massage Intervention	There is an effect of giving foot massage on the quality of sleep of the elderly in the intervention group, with a p-value of 0.008
7.	(Tussolihah, 2018)	Analysis of Nursing Clinical Practice in Coronary Artery Disease (CAD) NON-STEMI Patients with Foot Massage Therapy Innovation Intervention on Sleep Quality in the Intensive Cardiac Care Unit (ICCU)	The research method used was the Pittsburgh Sleep Quality Index (PSQI).	Foot massage intervention 3 x for 3 days	Analysis revealed an increase in the sleep quality questionnaire score before and after the procedure. The final results for the 3-day hemodynamics remained stable, and the results of the PSQI questionnaire showed an improvement in the client from a score of 12 (poor) to 4 (good) in the Intensive Cardiac Care Unit of Abdul Wahab Sjahranie Hospital, Samarinda.

		of Abdul Wahab Sjahranie Hospital Samarinda in 2018.			
8.	(Salmiyah et al., 2019)	The Effect of Foot Massage While Listening to Al-Quran Recitation on the Quality of Sleep of Patients in the ICU Room of the Sayang Cianjur Regional Hospital	Quantitative approach with a quasi-experimental method designed by the Non-equivalent Control Group Design. The sample consisted of 15 patients in the ICU room who served as respondents. The analysis method used was the dependent sample T-Test with SPSS software.	Foot massage action while listening to the recitation of the Al-Qur'an	There is an effect of foot massage while listening to the recitation of the Qur'an on the quality of sleep of patients in the ICU room of Sayang Hospital, Cianjur Regency.

Quality sleep can improve mental well-being and is crucial in the recovery of health and survival of patients in critical condition. Sleep quality refers to the state in which sleep provides a feeling of freshness and increased stamina upon waking (Robby, Agustin, & Hanifan Azka, 2022).

Sleep disturbance in critical patients in the ICU is one of the problems that must be addressed immediately because it can harm their health. This can occur due to noise from the equipment, lighting, and environment (Afianti & Mardhiyah, 2017).

Patients in the ICU must have sufficient quality sleep because the sleep an individual undergoes can produce freshness and fitness upon waking, allowing them to feel less lethargic. Their. Their eyelids can also improve their health condition (Khoirunnisaa & Hudiyawati, 2019).

For this reason, treatment is needed to improve and enhance the quality of sleep in patients in the ICU in addition to using drugs to provide a sense of relaxation to patients, reduce anxiety and stimulate patients to be able to sleep if given for a long time it will hurt the patient's condition so that treatment is needed using complementary therapy as an alternative to improve the quality of sleep for patients in the ICU, one of which is the application of foot massage (Robby, Agustin, & Azka, 2022).

Several studies have been conducted to improve and enhance the quality of sleep for patients in the ICU using complementary therapies, specifically foot massage therapy. From 8 research journals that have been reviewed, it has been described that foot massage is one of the most effective

complementary therapy methods in nursing services that aims to improve the quality of sleep in patients who experience sleep disorders in the ICU because there is a relaxation effect felt by the patient, so that the patient feels comfortable and finds it easy to fall asleep.

Efforts to improve sleep quality by using Foot Massage in the ICU where massage is culturally acceptable, and foot massage is safe to give to patients in the ICU, besides not needing to change the patient's position, this massage can provide a sense of security because of the presence of a nurse who has direct skin-to-skin contact with the patient (Afianti & Mardhiyah, 2017).

The consideration of foot massage is due to its low cost, low possibility of complications, and easy procedure, making it recommended for improving sleep quality (Oshvandi et al., 2014).

Giving a foot massage that starts with a foot massage and ends with a foot massage responds to the foot nerve sensors which then massages the feet to increase the neurotransmitters serotonin and dopamine whose stimulation is forwarded to the hypothalamus and produces Cortocotropin Releasing Factor (CRF) which stimulates the pituitary gland to increase the production of Proopioidmelanocortin (POMC) and stimulates the adrenal medulla to increase the secretion of endorphins which activate the parasympathetic so that vasodilation occurs in the vessels and smoothens blood flow so that it helps tense muscles to relax so that the RAS is stimulated to release serotonin and helps the emergence of sleep stimulation and improves a person's sleep quality. This foot massage is performed for 10 minutes using lotion or baby oil, starting from the soles of the feet, ankles, insteps, and toes, with 15 seconds dedicated to each part before going to bed (Afianti & Mardhiyah, 2017).

The choice of foot massage as an intervention used in critical patients is because the feet are easily accessible, the patient does not need to be repositioned so that it will not affect the equipment used by the patient, can stimulate blood circulation which can make the patient's mood comfortable, relaxed, and has a positive influence so that it will affect the patient's sleep quality (Oshvandi et al., 2014).

Thus, the foot massage intervention provided to respondents in the ICU room includes touch movements, massage, and systematic and rhythmic kneading of the lower legs, which aim to reduce muscle tension and create a relaxed atmosphere that can ultimately improve the patient's sleep quality (Afianti & Mardhiyah, 2017).

Implications

This literature review can help nurses, especially those in the ICU, utilize complementary therapy, such as foot massage, to improve patient sleep quality.

4. CONCLUSION

The Literature Review above, which is based on several studies conducted by various researchers, specifically regarding the Effect of Foot Massage Application on the Quality of Sleep of Patients in the

Intensive Care Unit (ICU), has proven effective. This foot massage can provide a deep relaxation effect, reduce anxiety, alleviate pain, alleviate physical discomfort, and improve sleep quality.

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