



THE EFFECTIVENESS OF SLOW STROKE BACK MASSAGE AND HOT STONE MASSAGE ON ANXIETY AND SLEEP QUALITY IN ORTHOPEDIC SURGERY PATIENTS

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ABSTRACT

Post-surgical sleep disturbance is a common problem with a prevalence of 64.9%, while pre-operative anxiety is also frequently experienced by almost all patients undergoing surgery. Pharmacological interventions such as sedatives and analgesics often carry side effects such as dependence and over-sedation. Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) have emerged as promising non-pharmacological alternatives, but scientific evidence regarding the effectiveness of these two techniques in the orthopedic surgical population is still limited. This literature review aims to examine the effectiveness of Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) in reducing anxiety and improving sleep quality in orthopedic surgery patients. This study used a literature review method based on the PICOT approach. Articles were searched systematically through the PubMed, ProQuest, Cochrane Library, and Google Scholar databases with keywords: "slow stroke back massage", "hot stone massage", "anxiety", "sleep quality", "orthopedic surgery", and "postoperative". Inclusion criteria included full-text articles, orthopedic surgery patient population, SSBM or HSM intervention, anxiety and/or sleep quality outcomes, and publications between 2013 and 2026. Of the 2,222 identified articles, 6 articles met the inclusion criteria for review. The six articles reviewed consisted of 4 Randomized Controlled Trial (RCT) studies and 2 Quasi-Experiment studies. The results showed that SSBM and HSM significantly reduced postoperative anxiety levels with a p value <0.001 and improved sleep quality in orthopedic surgery patients with a p value <0.001. The duration of the intervention varied between 5 to 15 minutes, with a frequency of 1-2 times a day. Both massage techniques showed better effectiveness than routine care without massage. Non-pharmacological interventions in the form of SSBM and HSM were proven to be significantly effective in reducing anxiety and improving sleep quality in post-orthopedic surgery patients. Both massage techniques are considered safe, economical, and can be implemented independently by nurses. However, study limitations such as small sample sizes, protocol heterogeneity, and lack of control for additional medications emphasize the need for large-scale randomized controlled clinical trials to strengthen the existing evidence.

Keywords: anxiety; hot stone massage; orthopedic surgery; sleep quality; slow stroke back massage

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INTRODUCTION

Sleep is a normal physiological process that is vital for all of us (Hall, 2015). Postoperative sleep disturbance is a common issue with a prevalence reaching 64.9%, and it is associated with various factors such as moderate to severe pain, depression, light exposure, male gender, secondary education, low income, anxiety, poor social support, and emergency surgery (Seid Tegegne & Fenta Alemnew, 2022). In patients with significant postoperative pain, sleep disturbances worsen and require priority management (Seid Tegegne & Fenta Alemnew, 2022). Effective interventions to address postoperative sleep disturbances particularly in orthopedic patients, who often experience chronic pain and limited mobility are urgently needed as part of comprehensive nursing care.

Almost all patients about to undergo surgery experience anxiety because they view the operation as something frightening (Seid Tegegne & Fenta Alemnew, 2022). Untreated anxiety can activate the hypothalamic pituitary adrenal (HPA) axis, causing massive sympathetic activation, (Seid Tegegne & Fenta Alemnew, 2022), and influencing the regulation of inflammatory factors, leading to tachycardia, hypertension, and impaired wound healing (Seid Tegegne & Fenta Alemnew, 2022).

Pharmacological interventions such as sedatives and analgesics often entail side effects such as dependence, excessive sedation, or cognitive impairment (Hidayati, 2015). Alternatively, non pharmacological therapies such as massage are increasingly being developed (Waslikhah et al., 2024). Two quite popular techniques include the slow-stroke back massage (SSBM) a form of complementary massage therapy involving slow strokes performed over 10–15 minutes at a rate of 10-12 strokes per minute. This technique is executed using both hands to cover an area extending 5 cm outward from the spine, starting at the center of the lower back and moving upward toward the areas between the shoulder blades (Martini et al., 2024; Murni & Safitri, 2025). Hot stone massage (HSM), which uses warm volcanic stones to enhance relaxation (Wardhani et al., 2025). However, scientific evidence regarding the effectiveness of these two techniques in orthopedic surgical populations remains limited.

Currently, there are several systematic reviews on Slow Stroke Back Massage (SSBM) for reducing stress and improving sleep quality in the elderly, but not in orthopedic surgery patients (Asriadi et al., 2025). A systematic review of the physiological and psychological effects of Slow Stroke Back Massage (SSBM) on the elderly; however, the study population consisted of the general elderly population rather than orthopedic surgery patients (Harris & Richards, 2010). A review of the Hot Stone Massage (HSM) intervention for patients with low back pain indicates pain reduction and generally improved sleep quality; however, this applies to patients with low back pain (LBP), not those who have undergone orthopedic surgery (Bayu Febrianto et al., 2023). A systematic review of Slow Stroke Back Massage (SSBM) in cancer patients; SSBM is an effective intervention for cancer patients, though not for orthopedic surgery patients (Rahman et al., 2025). However, evidence regarding its effectiveness is limited to the post orthopedic surgery population and is insufficient to establish an applicable evidence based guideline. Therefore, this literature review aims to examine the effectiveness of Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) in reducing anxiety and improving sleep quality among orthopedic surgery patients.

METHOD

This study is a literature review based on the PICOT approach. PICOT serves as an analytical framework for articles to address the research question. This framework is also utilized to summarize articles, enabling researchers to easily identify their objectives and utility. The PICOT components comprise P (population/patient), I (intervention), C (comparison), O (outcome/result), and T (time). Formulating a PICOT question assists researchers in selecting articles that meet the desired study criteria. A systematic search for articles was conducted using databases such as PubMed, ProQuest, the Cochrane Library, and Google Scholar. The search process employed keywords in both English and Indonesian such as "slow stroke back massage," "hot stone massage," "anxiety," "sleep quality," "orthopedic surgery," and "postoperative," along with their Indonesian equivalents ("ansietas", "kualitas tidur", and "bedah ortopedi"). The search was limited to the period between 2013 and 2026. Inclusion criteria were: (1) full-text articles; (2) a population of orthopedic surgery or postoperative patients; (3) SSBM or HSM interventions; (4) outcomes regarding anxiety and/or sleep quality; and (5) publication within the last 10 years (excluding relevant classic articles). Based on the search results, four key articles aligning with the topic and criteria were selected for in-depth review.

Table 1.
Deskripsi PICO

P (Population)	<i>Orthopedic surgery patients (pre-operative, post operative)</i>
I (Intervention)	<i>Slow Stroke Back Massage (SSBM) or Hot Stone Massage (HSM)</i>
C (Comparison)	<i>No intervention</i>
O (Outcome)	<i>Anxiety and sleep quality</i>
T (Time)	<i>The care period typically ranges from a few days to one week post-surgery, with measurements taken before and after the intervention.</i>

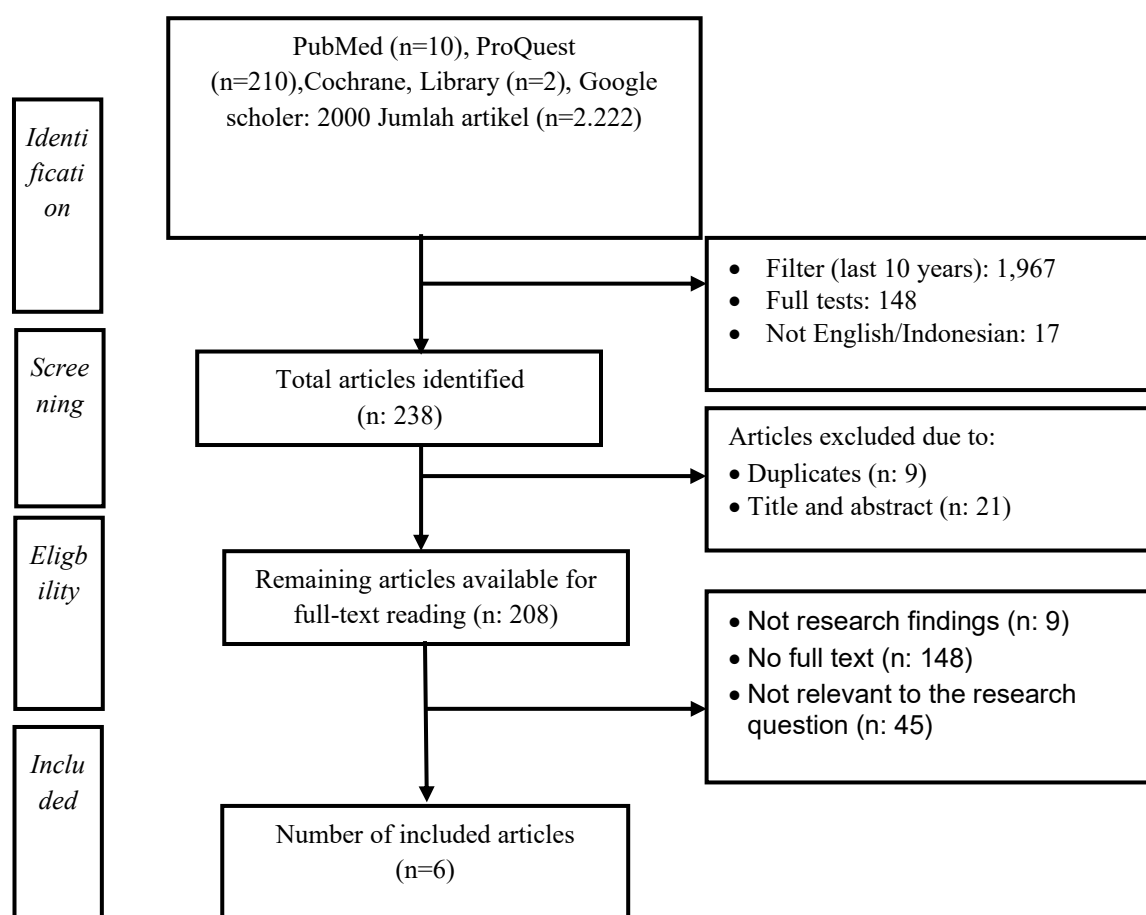


Figure 1. Article selection and exclusion flowchart

RESULT

Table 2.

Information: RCT = Randomized Controlled Trial; RCSQ = Richard Campbell Sleep Questionnaire; SSBM = Slow Stroke Back Massage; HSM = Hot Stone Massage

Author (year /publication/ country)	Research design	Sample size	Age	Form of Intervention	Instrument	Administration timing (duration/frequency/length of time)	Outcome	Results	Practitioner
The therapeutic effect of two different massages on the sleep quality of orthopedic surgery	RCT	A sample of 99 orthopedic surgery patients was divided into three groups:	18–65 years old	SSBM vs. HSM vs. routine care	RCSQ (sleep quality)	10–15 minutes, twice daily (morning & evening)	Slow-stroke back massage and hot stone massage lead to better sleep quality compared to routine care that does not	Sleep quality in the SSBM and HSM groups improved significantly compared to the control group ($p <$	Nurses and research team members who are healthcare professionals

Author (year /publication/ country)	Research design	Sample size	Age	Form of Intervention	Instrument	Administratio n timing (duration/freq uency/length of time)	Outcome	Results	Practitioner
patients: A randomized controlled study (Ansari et al., 2024) The Journal of Science and Healing, AS		SSBM, HSM, and routine care (control).					involve massage.	0.001).	
Effectiveness of Slow stroke Back and Hot Stone Massage Therapy on Postoperative Anxiety Management in Orthopedic Patients: A Randomized Clinical Trial Study (Ansari et al., 2025) Journal of PeriAnesthesia Nursing, AS	RCT	A sample of 99 orthopedi c surgery patients was divided into three groups: SSBM, HSM, and routine care (control).	18–65 years old	SSBM vs HSM vs routine care	Spielberger Anxiety Inventory	10–15 minutes, twice daily (morning & evening)	Massage therapy, such as slow stroke back massage or hot stone massage, can serve as an effective complementar y and alternative treatment for reducing postoperative anxiety in orthopedic patients.	Anxiety levels in the SSBM and HSM groups decreased significantly compared to the control group (P < .001).	Nurses and research team members who are healthcare profession als
Therapeutic back massage: Anonpharmac ological approach to enhance sleep quality in orthopedic patients (Rajeswari et al., 2025) Journal of Education and Health Promotion, India	Quasi- Experimen tal	80 patients in the experime ntal group (n=40) and the control group (n=40)	≥ 21 years old	Therapeutic back massage	Groningen Sleep Quality Scale	Duration: 10 minutes, twice daily for 7 days.	Back massage has been proven effective as a non- pharmacologi cal (drug free) intervention to improve the sleep quality of orthopedic patients.	Therapeutic back massage significantly and effectively improves sleep quality in orthopedic patients (t- value = 10.04, P < 0.001).	Researchers who are nursing professionals
The Effects of Slow Stroke Back Massage (SSBM) Therapy on the Sleep Quality of Post- Operative Patients at RSI Sultan Agung of Semarang (Melastut & Avianti, 2015) Rustida Scientific Health Journal, Indonesia	Quasi- Experimen tal	17 postopera tive patients	Not specifi ed	Slow Stroke Back Massage.	Sleep quality questionnair e	Duration of 3- 10 minutes at a speed of 12- 15 massage strokes per minute.	SSBM is effective in improving sleep quality in post- operative orthopedic patients.	A statistically significant improvement in sleep quality scores (p < 0.001) was observed in the SSBM group compared to the routine care group.	A researcher who is a nursing profession al
The Effect of Relaxation Techniques and Back Massage on Pain and Anxiety in Turkish Total Hip or Knee	RCT	60 patients undergoi ng Total Hip Arthropla sty (THA) or Total	24 – 83 years old	Relaxation Techniques and Back Massage on Pain	McGill Pain Questionnai re Short Form (MPQ -SF) and State Anxiety Inventory (SAI)	Days 1 to 3 post- operation; duration, frequency, and timing of administration are not specified.	This study provides strong scientific evidence supporting the use of relaxation techniques	The intervention involving relaxation techniques and back massage significantly reduced pain	The primary profession that administer s relaxation techniques and back

Author (year /publication/ country)	Research design	Sample size	Age	Form of Intervention	Instrument	Administratio n timing (duration/freq uency/length of time)	Outcome	Results	Practitioner
Arthroplasty Patients (Büyükyılmaz & Aşti, 2013) Pain Management Nursing, New York dan Philadelphia		Knee Arthropla sty					and back massage as an effective nonpharmacol ogical intervention for post- operative orthopedic patients.	(F=14.50; p=0.000), anxiety (F=19.13; p=0.000), and vital signs during the three days following surgery.	massages is nursing.
Effect of a Brief Massage on Pain, Anxiety, and Satisfaction With Pain Management in Postoperative Orthopaedic Patients (Miller et al., 2015) Orthopaedic Nursing Philadelphia, AS	RCT	25 orthopedi c post- operative patients (25 sessions without massage, 25 sessions with massage)	32-86 years old	Massage on Pain	A valid and reliable measuring instrument, though not specifically identified.	Two 5 minute treatments	A brief massage following orthopedic surgery has been proven effective in reducing pain and anxiety, as well as improving satisfaction with pain management.	Pain and anxiety scores in both groups (patients receiving only analgesic medication and those receiving analgesic medication combined with massage) decreased following medication administratio n. Significance was set at p < 0.05.	healthcare profession als, especially nurses

Table 3.
Risk of Bias Assessment (Higgins et al., 2019)

(Penulis, Tahun)	Random sequence generation (Selection bias)	Allocation concealment (Selection bias)	Selective reporting (reporting bias)	Other sources of bias (other biases)	Blinding of participants and personnel (performance bias)	Blinded outcome assessment (detection bias)	Incomplete result data (attrition bias)
(Ansari et al., 2024)	+	?	+	+	-	?	+
(Ansari et al., 2025)	+	?	+	+	-	?	+
(Rajeswari et al., 2025)	+	?	+	?	?	?	+
(Melastut & Avianti, 2015)	-	-	+	+	?	?	+
(Büyükyılmaz & Aşti, 2013)	+	+	+	+	-	-	+
(Miller et al., 2015)	+	?	+	+	-	-	+

Note: (+) low risk of bias, (-) high risk of bias, (?) unclear risk of bias

Table 4.
Question of Critical Appraisal

No	Critical Appraisal Questions	(Ansari et al., 2024)	(Ansari et al., 2025)	(Rajeswari et al., 2025)	(Melastut & Avianti, 2015)	(Büyükyılmaz & Aşti, 2013)	(Miller et al., 2015)
1.	Does the trial address a focused issue?	yes	yes	yes	yes	yes	yes
2.	Was patient assignment for treatment done randomly?	yes	yes	no	no	yes	yes
3.	Were all patients participating in the trial correctly accounted for in the conclusions?	yes	yes	Yes	yes	yes	yes
4.	Are patients, healthcare workers, and research personnel 'blinded' to the treatment?	no	no	no	Don't know	no	no
5.	Were the groups similar at the start of the trial (baseline characteristics)?	yes	yes	It warrants close attention.	Don't know	yes	yes
6.	Apart from the experimental intervention,	yes	yes	yes	no	yes	yes

No	Critical Appraisal Questions	(Ansari et al., 2024)	(Ansari et al., 2025)	(Rajeswari et al., 2025)	(Melastut & Avianti, 2015)	(Büyükyılmaz & Aşti, 2013)	(Miller et al., 2015)
	<i>were the groups treated the same?</i>						
7.	<i>How large is the treatment effect? (p-value)</i>	yes	yes	Very significant effect	yes	yes	Yes
8.	<i>How precise is the estimate of the treatment effect? (MD & CI)</i>	Don't know	Don't know	Information not available Information not available	Don't know	Don't know	Don't know
9.	<i>Can the results be applied to the local population, or in your context?</i>	It requires consideration	It requires consideration.	It requires consideration.	Don't know	It requires consideration.	It requires consideration.
10.	<i>Were all clinically important outcomes considered?</i>	Yes	Yes	Yes	Yes	Yes	Yes
11.	<i>Are the benefits worth the losses and costs?</i>	Yes	Yes	Yes	Yes	Yes	Yes

RESULT

Study Characteristics

Based on the systematic review conducted, six scientific articles meeting the inclusion criteria were identified. These articles comprised four Randomized Controlled Trials (RCT) and two quasi experimental studies. All articles were sourced from a search of scientific publications spanning the years 2013 to 2025. The review selected full-text articles focusing on orthopedic surgery patients, specifically adults aged 18 to 86. A key focus of the selection process was examining the use of Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) to reduce anxiety and improve sleep quality among patients. Titles, abstracts, and full articles were screened against inclusion and exclusion criteria; eligible studies were required to provide comprehensive information, including author names, publication year, country, study design, participant age and sample size, study population, and the specific type of complementary therapy investigated.

Effectiveness for Anxiety

Research on the effectiveness of massage interventions on anxiety in orthopedic surgery patients consistently demonstrates that this non-pharmacological therapy is beneficial for patient recovery. A study by Ansari et al.(2025) revealed that Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) administered for 10 -15 minutes twice daily significantly reduced anxiety levels compared to the control group ($p<0.001$). Similar results are supported by Büyükyılmaz & Aşti, (2013) , which found that a combination of relaxation techniques and back massage significantly reduced anxiety levels ($p=0.000$) and pain in orthopedic postoperative patients over a three-day monitoring period. Besides that, Miller et al. (2015) It is also confirmed that the administration of two brief, 5 minute massages by nurses is effective in reducing anxiety and increasing patient satisfaction with the pain management received ($p<0.05$). Overall, these studies recommend massage intervention as an effective complementary measure that can be implemented by nurses and other healthcare professionals to improve the quality of postoperative care for orthopedic patients.

Effectiveness Regarding Sleep Quality

Various studies indicate that massage interventions specifically Slow Stroke Back Massage (SSBM) are highly effective as a non-pharmacological therapy for improving sleep quality in orthopedic surgery patients. Ansari et al. (2024) found that SSBM and HSM administered for 10–15 minutes, twice daily, significantly improved sleep quality compared to routine care. These results are consistent with research Rajeswari et al. (2025) .which demonstrates that a 10-minute therapeutic back massage administered twice daily is effective in improving patients' sleep quality, with a significance value of $P<0.001$. In addition, the effectiveness of SSBM in improving sleep quality in post-orthopedic surgery patients was also confirmed by studies showing significant improvements in sleep quality scores. Furthermore, research by Melastut & Avianti,(2015) in Indonesia also supports the finding that SSBM has a statistically significant effect on improving the sleep quality of postoperative patients compared to the control group ($p<0.001$).

Bias Risk Assessment

An evaluation of methodological quality using a risk of bias assessment tool revealed several systematic weaknesses and limitations in the reviewed studies. Most studies exhibited uncertainty or risk of bias regarding allocation concealment (indicated by a question mark symbol) and the blinding of outcome assessment (detection bias), both of which were generally rated as unclear; similar issues were noted regarding the blinding of participants and personnel (performance bias). Conversely, the majority of studies were assessed as having a low risk of bias concerning random sequence generation, selective reporting, and the completeness of outcome data. These methodological limitations necessitate caution when interpreting the findings and underscore the importance of employing more rigorously blinded and controlled research designs.

Assessment of Study Feasibility and Level of Evidence

Based on the results of the critical appraisal of the six included studies (Ansari et al., 2024, 2025; Büyükyılmaz & Aşti, 2013; Melastut & Avianti, 2015; Miller et al., 2015; Rajeswari et al., 2025) All studies were assessed as addressing a focused research problem, properly including all patients in the conclusions, and considering important clinical outcomes and benefits commensurate with harms and costs. Most studies used random assignment (randomized controlled trial / RCT), except for a few studies that used a quasi experimental design. However, there are several aspects that consistently scored "No" or "Don't know" across studies, especially in question number 4 regarding blinding of patients, health workers, and research personnel, as well as question number 8 regarding the accuracy of estimates of treatment effects using MD and CI. Overall, all studies reviewed were deemed appropriate for inclusion because they met basic methodological eligibility criteria and provided a strong level of evidence for evaluating non-pharmacological interventions in orthopedic patients.

DISCUSSION

Comparison of the Effectiveness of SSBM and HSM

Based on literature reviews, both Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) have been shown to be effective as non-pharmacological interventions for addressing psychological issues and sleep quality in orthopedic surgery patients. The study, conducted by Ansari et al. (2024, 2025) demonstrate that both massage methods significantly improve sleep quality ($p < 0.001$) and reduce postoperative anxiety levels ($p < 0.001$) compared to the group receiving only routine care. Although the study compared these two interventions, the results indicate that, collectively, they yield better outcomes than care without massage. This is further supported by other research confirming that back massage techniques whether SSBM or therapeutic back massage in general are highly effective in improving sleep quality and reducing anxiety and pain in postoperative orthopedic patients. Thus, both SSBM and HSM represent suitable complementary interventions for nurses to enhance recovery among orthopedic patients.

Underlying Physiological Mechanisms

The physiological mechanisms underlying the effectiveness of Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) in reducing anxiety and improving sleep quality among orthopedic surgery patients are linked to the capacity of these nonpharmacological interventions to induce relaxation. Administering slow-stroke back massage (SSBM) or hot stone massage (HSM) routinely for 10-15 minutes has proven effective in lowering postoperative anxiety levels. Furthermore, relaxation techniques and back massage have been shown to significantly reduce pain and anxiety, thereby contributing to enhanced patient comfort. The improvements in sleep quality achieved through these interventions supported by consistent statistical significance ($p < 0.001$ and $p < 0.05$) demonstrate that therapeutic touch via massage can facilitate a bodily relaxation response that supports the recovery process for orthopedic surgery patients.

Limitations of the Reviewed Studies

An analysis of the reviewed studies reveals several methodological and operational limitations that must be considered when interpreting the research findings. First, most of the studies examined utilized relatively small sample sizes ranging from 17 to 80 participants and were confined to specific patient groups within single institutions. This significantly limits the generalizability (external validity) of the findings to the broader, more diverse population of postoperative orthopedic patients; consequently, the results require confirmation through large-scale, multicenter studies. Second, there was considerable heterogeneity regarding the non-pharmacological intervention protocols applied, including wide variations in massage duration (3 to 15 minutes), frequency of administration, and techniques employed ranging from Slow Stroke Back Massage to Hot Stone Massage. This situation is compounded by the use of diverse measurement instruments to assess sleep quality and anxiety levels, thereby hindering efforts to standardize clinical protocols universally and complicating direct comparisons between studies. Third, another critical weakness is the inadequate control of confounding variables, particularly regarding the recording and management of supplemental analgesics or sedatives administered to patients during the postoperative period. Insufficient documentation concerning the dosage, type, and administration schedule of these medications potentially obscures the isolated effect of the massage intervention, as the observed reductions in pain and anxiety might stem, in part, from the pharmacological effects of the medications rather than the massage therapy itself. Overall, these three limitations indicate that current evidence remains in the preliminary stage; further research is required in the form of robustly designed, adequately powered randomized controlled trials featuring standardized protocols and strict control over concurrent medication use to generate more valid and reliable clinical recommendations.

Implications for Nursing Practice

The findings of the various studies reviewed provide significant implications for professional nursing practice, particularly in surgical and orthopedic nursing care settings. Non-pharmacological intervention in the form of back massage techniques (such as Slow Stroke Back Massage and Hot Stone Massage) has been statistically proven to be effective as a safe and economical complementary therapy for reducing pain levels, alleviating anxiety, and improving the quality of sleep in post-operative patients. Therefore, nurses as part of a professional health team have a great opportunity to integrate these relaxation techniques into standard operating procedures (SOP) for routine pain and anxiety management in hospitals. This independent implementation by nurses not only supports the patient's holistic comfort, but can also optimize the patient's physical and psychological recovery in a comprehensive manner without adverse pharmacological side effects.

CONCLUSION

Non-pharmacological interventions specifically Slow Stroke Back Massage (SSBM) and Hot Stone Massage (HSM) have proven significantly effective in reducing anxiety levels and improving sleep quality among postoperative orthopedic patients. This effectiveness stems from the physiological mechanisms of therapeutic touch, which facilitate the body's relaxation response, thereby alleviating pain, reducing anxiety, and supporting holistic patient recovery. Both SSBM and HSM demonstrated superior outcomes compared to routine care without massage; however, as no significant difference in effectiveness was observed between the two, they represent equally viable complementary intervention options. These findings hold significant practical implications for professional nursing practice, as back massage techniques are safe, cost-effective, and can be independently implemented by nurses as part of standard operating procedures for pain and anxiety management in orthopedic surgical wards. Nevertheless, the study results are limited by relatively small sample sizes (17-80 respondents), heterogeneity in intervention protocols (varying durations of 3-15 minutes, frequencies, and techniques), and limited control over confounding variables such as the use of additional analgesics and sedatives. Therefore, current evidence supports the use of SSBM and HSM as complementary therapies.

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