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The effectiveness of Transcutaneous Electrical Nerve Stimulation (TENS) and music therapy in postoperative pain management: A systematic literature review

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Abstract

Postoperative pain is a common clinical problem experienced by patients following surgical procedures. With the growing emphasis on non-pharmacological approaches to pain management, various alternative interventions have been increasingly investigated due to their safety, minimal side effects, and potential use as adjunctive therapies. Two widely applied non-pharmacological methods are Transcutaneous Electrical Nerve Stimulation (TENS) and music therapy. This study aimed to evaluate the effectiveness of TENS and music therapy in postoperative pain management based on previously published research findings. A systematic literature review method was employed. Data were collected through electronic literature searches, and data analysis involved data reduction, data presentation, and conclusion drawing. The results indicate that both TENS and music therapy are effective non-pharmacological interventions for postoperative pain management, demonstrating benefits in reducing pain intensity, anxiety levels, and the need for pharmacological analgesics. The integration of these two methods has the potential to serve as a safe, non-invasive, and cost-effective strategy for improving the quality of postoperative care. However, further studies with more rigorous research designs are required to confirm the effectiveness of the combined interventions and to determine optimal intervention protocols.

Keywords: Transcutaneous electrical nerve stimulation, Music therapy, Pain management, Postoperative care

Introduction

The postoperative period is the phase that follows a surgical procedure, characterized by the presence of a surgical incision that is subsequently closed through wound suturing. After surgery, patients are transferred to a recovery unit for observation until the evaluation process is completed (Ching Cing & Hardiyani, 2022). This phase is frequently accompanied by pain. Pain is a subjective experience, meaning that only the individual experiencing it can accurately describe the sensation. Pain may be defined as whatever a person perceives and acknowledges as pain and occurs whenever the individual states that pain is present (Hidayatulloh, 2020). Postoperative pain arises as a physiological response to tissue damage caused by surgical incisions, organ manipulation, and the wound healing process.

Postoperative pain remains a significant issue in global healthcare services. Approximately 50% of patients undergoing elective surgery report experiencing pain following surgical procedures, which may increase the risk of developing chronic pain and reduce patient satisfaction with healthcare services (Lupis & Sitepu, 2021). The experience of postoperative pain is subjective and varies among individuals. Pain intensity is influenced by multiple factors, including age, sex, cultural background, pain perception, level of attention, anxiety, fatigue, previous experiences, coping mechanisms, as well as family and social support (Rahmatun & Heru, 2020).

Postoperative pain is a condition that requires appropriate management to prevent delays in patient recovery. When pain is not optimally managed, it may lead to limited mobilization, increased stress, and decreased comfort and patient satisfaction with healthcare services. Therefore, pain management is a crucial component of postoperative care. Along with the development of pain management approaches, non-pharmacological interventions have gained increasing attention due to their perceived safety, minimal side effects, and suitability as adjunctive therapies alongside pharmacological treatment. Various alternative methods have been extensively studied and implemented in clinical practice.

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Among the most commonly used non-pharmacological interventions are Transcutaneous Electrical Nerve Stimulation (TENS) and music therapy, both of which have demonstrated potential in reducing pain intensity and improving postoperative patient comfort. TENS is a therapeutic modality that utilizes low-frequency electrical currents to stimulate peripheral nerves, thereby reducing pain perception. Its analgesic effects are mediated through the Gate Control Theory and the stimulation of endogenous endorphin release, which functions as a natural pain-relieving mechanism within the body (Faana et al., 2025). Several studies have reported that TENS is effective in reducing pain intensity and enhancing functional capacity in patients with chronic low back pain (LBP) (Febriyani & Alpiah, 2026).

In addition, music therapy represents an independent intervention that can be implemented by nurses in pain management practices. A growing body of evidence indicates that classical music is particularly effective in alleviating pain. This effectiveness is attributed to its tempo, typically ranging between 60 and 80 beats per minute, which closely aligns with the human heart rate. Previous studies have also demonstrated that classical music produces relaxation effects, fosters feelings of safety and well-being, facilitates emotional expression, reduces preoperative anxiety, and contributes to a decreased perception of pain and stress levels (Astuti & Merdekawati, 2016).

This study contributes to the theoretical development of postoperative pain management by demonstrating that non-pharmacological interventions such as Transcutaneous Electrical Nerve Stimulation (TENS) and music therapy play a significant role in reducing pain intensity and enhancing patient comfort. These findings extend the existing theoretical framework, which has traditionally emphasized pharmacological approaches, and introduce a broader, more holistic and multidisciplinary perspective on pain management. The aim of this study is to evaluate the effectiveness of TENS and music therapy in postoperative pain management based on evidence from previously published research.

Methods: This study employed a systematic literature review methodology. A Systematic Literature Review (SLR) is a structured research approach designed to identify, critically appraise, synthesize, and present findings from multiple studies relevant to a specific research topic or question. This method is considered systematic because it follows consistent, standardized, and widely recognized procedures within scientific research practice (Sari et al., 2023).

Data were collected through electronic literature searches conducted in PubMed, Scopus, ScienceDirect, and Google Scholar, covering publications from 2016 to 2026. The search strategy utilized the following keywords: "TENS," "Transcutaneous Electrical Nerve Stimulation," "Music Therapy," and "Postoperative Pain Management."

Data analysis was performed through several stages, including data reduction, data presentation, and conclusion drawing. Data reduction involved selecting, focusing, and simplifying the retrieved studies to ensure relevance to the research objectives. The reduced data were then presented in the form of narratives, tables, or matrices to facilitate interpretation and analysis. The final stage involved drawing conclusions through systematic data interpretation to identify key patterns, meanings, and major findings in relation to the research questions.

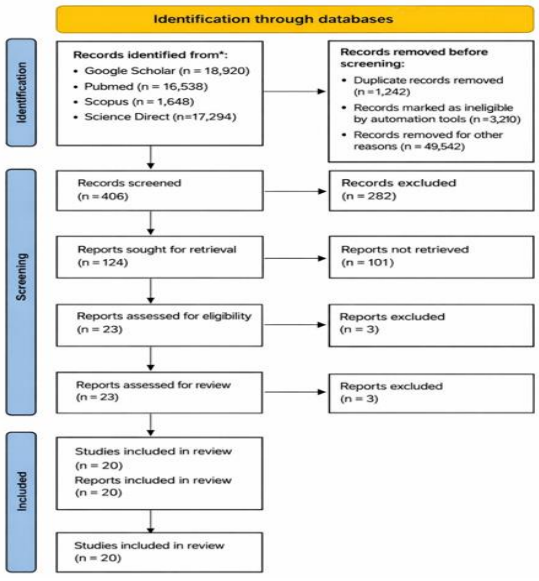

Figure 1. Prism diagram

Results and Discussion

Table 1. Literature review of the effectiveness of Transcutaneous Electrical Nerve Stimulation (Tens) in postoperative pain management

Author & Year	Research Objectives	Populasi	Intervention	Comparison	Results
Eidy Et Al., 2016	Assessing the Effect of Preoperative Tens on Post-Hernioplasty Pain	66 Pasien Hernia Inguinalis	Tens Administered 1 Hour Before Surgery	Intervention and control groups (N = 33 each)	Pain intensity at 2 and 4 hours postoperatively was significantly lower in the TENS group (P<0.05), but not There is a Meaningful Difference at 6 and 12 hours postoperativel.
Engen Et Al., 2016	Assessing the effectiveness of additional tens on pain and opioid consumption post-vats.	A total of 56 patients underwent video-assisted thoracoscopic surgery.	Tens administration was combined with opioids for 48 hours postoperative.	The Tens + opioid group was compared to the opioid group alone.	There was no significant difference in pain scores between groups (P>0.05), but a significant decrease in opioid consumption between 24–48 hours in the TENS group (P=0.005).
Mahure Et Al., 2017	Assessing the effectiveness of TENS against pain and opioid consumption after shoulder surgery.	A total of 37 patients after shoulder surgery.	Administer active tens 4 times/day for 45 minutes in the first week postoperatively accompanied by standard analgesics.	The active tens group was compared with the placebo group (21 vs 16).	Pain scores in the first week were lower in the active tens group (Vas 3.6±2.1 vs 5.8±1.2; p=0.008) and opioid consumption in the first 48 hours and first week postoperatively was significantly lower (p<0.05).
Jahangirifard Et Al., 2018	Assessing the effect of TENS on pain intensity and lung function in post-cabg patients.	A total of 100 patients after coronary artery bypass surgery.	The administration of tens immediately after admission to the ICU is accompanied by routine treatment.	The intervention group was compared with the placebo group (50 vs 50).	Resting pain and coughing were significantly lower in the Tens group (P<0.05), accompanied by an increase in Fvc and Fev1 and a decrease in narcotics use.
Beckwée Et Al., 2018	Exploring the effects of tens burst on pain after total knee arthroplasty.	A total of 68 post-tka patients.	Tens Burst is administered during continuous passive mobilization every day.	Burst tens group compared to fake tens.	No significant differences were found in the intensity of knee pain and analgesic consumption between the two groups (P>0.05).
Prayogi Et Al., 2018	Assessing the effect of tens on pain intensity after sectio caesarea.	A total of 30 post-Sc patients.	Tens is administered for 15 minutes postoperativel.	No Comparison Groups.	Postoperative pain intensity decreased significantly after administration of TENS (P<0.05).
Elboim-Gabyzon Et Al., 2019	Testing the effects of TENS on pain and mobility during the acute phase after hip fracture.	A total of 41 patients after hip fracture fixation.	The administration of active tens for 30 minutes is in addition to standard rehabilitation.	The active tens group is compared to the false tens group.	The decrease in pain when walking was greater in the active tens group (p=0.0011) as well as an increase in walking distance and mobility.
Yılmaz Et Al., 2019	Assess the effect of TENS on pain, vital signs, and patient satisfaction after hernioplasty.	A total of 52 patients after inguinal hernia surgery.	Tens was given for five sessions for 30 minutes postoperativel.	The intervention group was compared with the control group.	Lower pain scores and higher patient satisfaction were reported in the TENS group (P<0.05), with no significant changes in vital signs.
Çebi, 2019	Assessing the	A total of 30	Giving tens as an	Routine	Vas scores at 6, 8, 24 hours and

	therapeutic effect of TENS on postoperative pain of wisdom teeth impaction.	patients after odontectomy.	addition to routine postoperative care.	treatment without tens as a comparison.	days 2 to 5 postoperatively were significantly lower in the TENS group (P<0.05).
Borges Et Al., 2020	Determine the effectiveness of active tens compared to placebo and control tens.	A total of 78 postoperative patients.	Tens is administered for 30 minutes in the first 24 hours postoperativel.	The active tens group was compared with the placebo and control tens.	A reduction in pain ≥2 vase points occurred in 53.8% of active TENS patients compared to 11.5% at placebo, Demonstrated greater clinical effectiveness.
Xu Et Al., 2020	Assess the feasibility and acceptance of TENS given independently by the patient.	A total of 10 postoperative patients.	The use of independent tens with a median duration of 5.3 hours/day.	No Comparison Groups.	Most patients stated that Tens is easy to use (90%) and safe with no side effects.
Cansever Et Al., 2021	Investigating the effects of TENS on early pain and long-term quality of life after thoracotomy.	A total of 100 post-thoracotomy patients.	Giving Postoperative Tens.	The tens group was compared to the non-tens group (50 vs 50).	Length of hospitalization was shorter in the TENS group (p=0.008) and long-term pain and better quality of life (p<0.05).
Parseliunas Et Al., 2021	Assessing the role of TENS in multimodal therapy of post-inguinal hernia pain.	A total of 80 male patients after hernioplasty.	Provision of local and segmental tens on the first and second days postoperativel.	The TENS group was compared with the placebo-tens.	Vase scores and non-opioid analgesic needs were significantly lower in the TENS group (P<0.001)
Erden Et Al., 2022	Investigating the effects of TENS on pain and clinical outcomes after radical mastectomy.	A total of 80 patients after radical modified mastectomy.	Giving Postoperative Tens.	The intervention group was compared with the control group.	Lower pain and improvements in mobilization, sleep, and anxiety in the TENS group (p<0.05).
Alizadeh Et Al., 2023	Assessing the effect of TENS on pain, edema, and trismus after odontectomy.	A total of 37 patients with third molar impaction of the mandible.	Tensing 50 Hz for 15 minutes for 6 days.	The tens quadrant was compared with the placebo quadrant.	Pain and analgesic consumption were significantly lower in the TENS group (P<0.001).
Angelini Et Al., 2025	To explore patients' experiences of the use of TENS as a postoperative complementary therapy.	A total of 20 patients after laparoscopic cholecystectoy.	administration of tens as an alternative to pharmacological analgesics.	No Comparison Groups.	Patients reported increased sense of security, relaxation, and pain control.
Özbaş Et Al., 2025	Assessing the effect of TENS on pain, function, quality of life, and analgesic consumption after tkr.	A total of 52 patients after total knee replacement.	Conventional Tens Dispensing Postoperatively.	The intervention group was compared with the control group.	Vas and womac scores decreased and quality of life improved significantly in the TENS group (p<0.05).
Chu Et Al., 2025	Assessing the effectiveness of paravertebral tens against pain after vats	A total of 56 patients after Vats lobectomy.	Perioperative Dispensing of Ptens.	The ptens group is compared to the sham-ptens.	Postoperative pain scores and incidence of chronic pain were significantly lower in the Ptens group (P<0.001), accompanied by decreased opioid use and

	lobectomy.				inflammatory markers.

Postoperative pain represents a physiological and psychological response that is almost universally experienced by patients following surgical procedures. Tissue trauma resulting from surgical incisions, tissue manipulation, and inflammatory processes activates peripheral nociceptors, which subsequently transmit pain signals to the central nervous system (Eidy et al., 2016). When inadequately managed, postoperative pain may impede early mobilization, prolong hospital length of stay, increase opioid consumption, and contribute to the development of chronic postoperative pain (Saputri et al., 2023).

Contemporary postoperative pain management emphasizes a multimodal approach, combining pharmacological and non-pharmacological therapies to achieve optimal pain control while minimizing adverse effects. This approach aims to reduce dependence on opioid analgesics, which are associated with risks such as respiratory depression, nausea, constipation, and addiction (Nurdiansyah, 2016). Consequently, non-pharmacological interventions such as Transcutaneous Electrical Nerve Stimulation (TENS) and music therapy have gained increasing attention as safe and easily applicable complementary therapies.

Transcutaneous Electrical Nerve Stimulation (TENS) is a non-invasive electrical stimulation modality that delivers low-frequency electrical currents through surface electrodes applied to the skin (Alizadeh et al., 2023; Elboim-Gabyzon et al., 2019; Prayogi, 2018). The primary mechanisms underlying TENS are explained by the Gate Control Theory, whereby stimulation of large-diameter afferent nerve fibers inhibits nociceptive signal transmission at the spinal cord level, as well as by enhanced release of endogenous endorphins that function as natural analgesics (Parseliunas et al., 2021).

Across studies investigating TENS, the majority of evidence suggests that TENS is effective in reducing acute postoperative pain, particularly during the early postoperative period. Studies by Eidy et al. (2016) and Mahure et al. (2017) reported significant reductions in pain scores within the first 2–48 hours following surgery, accompanied by decreased opioid consumption. Similar findings have been observed in patients undergoing major surgical procedures such as coronary artery bypass grafting (CABG) and thoracotomy, where TENS not only reduced pain intensity but also improved pulmonary function and patient mobilization (Jahangirifard et al., 2018; Cansever et al., 2021).

However, not all studies have demonstrated consistent outcomes. Several investigations reported no significant differences in pain intensity between TENS and control or placebo groups. Studies by Engen et al. (2016) and Beckwée et al. (2018) indicated that although pain scores did not differ significantly, TENS provided additional benefits, including reduced opioid consumption and improved comfort during rehabilitation. These findings suggest that the effectiveness of TENS may be influenced by variations in treatment protocols, timing of application, type of TENS, and patient characteristics.

Beyond TENS, music therapy is a non-pharmacological intervention that operates through psychological and neurophysiological mechanisms (Guo & Li, 2025). Music has been shown to divert attention away from pain stimuli, reduce sympathetic nervous system activity, and modulate the release of neurotransmitters such as dopamine and serotonin, which play key roles in emotional regulation and pain perception. The relaxation effects induced by music also contribute to reduced anxiety, a factor known to exacerbate postoperative pain perception (Muawanah & Sulastri, 2023; Aprilianto et al., 2024).

A substantial body of evidence demonstrates the effectiveness of music therapy in reducing postoperative pain. Ciğerci and Özbayır (2016) and Dai et al. (2020) reported significant reductions in pain scores and analgesic consumption among post–coronary artery bypass grafting (CABG) patients who received music therapy. Similarly, Gallagher et al. (2018) and Mondanaro et al. (2017) found that music therapy consistently reduced pain and anxiety for several days following orthopedic and spinal surgery. In contrast, Saputri et al. (2023) reported no significant effect of music therapy on pain intensity, suggesting that factors such as intervention duration, type of music, and study design may influence

outcomes.

Furthermore, several studies indicate that music therapy yields more favorable outcomes when combined with other interventions. Muawanah and Sulastri (2023) demonstrated that the combination of early mobilization and music therapy was more effective in reducing postoperative pain than music therapy alone. These findings suggest that music therapy has considerable potential as a component of a multimodal pain management strategy, rather than as a standalone intervention.

With regard to the combined use of TENS and music therapy, although direct empirical evidence remains limited, both theoretical and empirical considerations support the potential synergistic effects of these interventions. TENS primarily targets the physiological pathways of pain, whereas music therapy modulates the cognitive and emotional dimensions of pain perception. Ma (2022) suggested that the combination of TENS and music therapy may provide more comprehensive postoperative pain relief and reduce the need for analgesic medications, with key advantages including non-invasiveness, safety, low cost, and ease of application.

Based on the findings of this systematic literature review, both TENS and music therapy play important roles in postoperative pain management, although their effectiveness may vary depending on clinical context. Integrating these interventions within a multimodal approach has the potential to offer additional benefits through complementary mechanisms of action. Therefore, the combination of TENS and music therapy may be considered an innovative strategy in nursing and clinical practice to enhance the quality of postoperative patient recovery.

Table 2. Literature review of the effectiveness of music therapy in postoperative pain management

Author & Year	Research Objectives	Populasi	Intervention	Comparison	Results
Saputri Et Al., 2023	Knowing the Effect of Music Therapy on Postoperative Pain Intensity	40 Postoperative Patients	Music Therapy After Surgery	None	There was no significant effect of music therapy on pain intensity (p = 0.157); Stronger intervention controls are needed
Guo & Li, 2025	Evaluating the efficacy of music therapy as an adjunct therapy in postoperative oral cancer patients	106 Patients	Structured Music Therapy and Standard Treatment	Standard Vs Music Therapy	Vase scores, anxiety, sleep disturbances, analgesic consumption, and physiological indicators were significantly lower in the group Musik (P < 0,05)
Muawanah & Sulastri, 2023	Knowing the Effect of Early Mobilization and Music Therapy on Postoperative Pain	32 Patients	Early Mobilization and Music Therapy	Music vs. Combination	The combination of early mobilization and music was more effective in reducing pain (p = 0.015)
Setyono & Rohana, 2021	Describe pain before and after music therapy	4 Postoperative Patients	Music Therapy for 3 Days	None	Decrease in pain scale of 1.2–1.8 points in all respondents
Nurdiansyah, 2016	Assessing the Effectiveness of Music Therapy on Postoperative Pain Response	34 Patients	Music Therapy	Intervention Vs Control	greater pain reduction in the music group (2.65 vs 1.59); Confounding Factors Have No Effect
Aprilianto Et Al., 2024	Assessing the Effectiveness of Music	30 Patients	15 Minute Instrumental	None	the average pain decreased from 6.67 to

	Therapy in Post-Lymphomamy Pain		Music		4.8; 90% of patients experience mild pain
Purwaningtyas, 2020	Assessing the Effectiveness of Classical Music Against Post Sc Pain	15 Mother Post Sc	Classical music	None	There was a significant reduction in pain before and after the intervention (P = 0.000)
Mutmainnah & Rundulemo, 2020	Assessing the Effect of Music Therapy on Postoperative Pain	10 Patients	Music Therapy	None	Music Therapy Has a Significant Effect on Reducing Pain (P = 0.005)
Cecyli Et Al., 2024	Evaluate the effects of music therapy on pain, stress, and physiological parameters	60 Patients	Post-Operative Music Therapy	Control Vs Intervention	Pain, stress, and physiological parameters decreased significantly in the music group
Gogoularadja & Bakshi, 2020	Assessing the Effectiveness of Music Therapy on Pain and anxiety of septoplasty	59 Patients	Music Selection 2×30 Minutes/Day	Standard Vs Music	There is a significant decrease in anxiety and pain until the 2nd day postoperatively (p < 0.001)
Ciğerci & Özbayır, 2016	Assessing the effects of music therapy on pain and use of post-cabg analgesics	68 Patients	Music Therapy	Music Vs Control	Pain scores and analgesic use were significantly lower in the music group
Dai Et Al., 2020	Assessing the effect of music therapy on pain, anxiety, and postpartum depression	99 Patients	Music Therapy	Music Vs Rest Vs Standard	Nrs, SAS, and SDS scores were significantly lower in the music group
Laframboise-Otto Et Al., 2021	Evaluating Music as an Analgesic Adjunctive Therapy	50 Arthroplasty Patients	Selected music 30 minutes	Analgesics Vs Music + Analgesics	lower emotional pain and distress; No Difference in Analgesic Consumption
Gallagher Et Al., 2018	Assessing the impact of music therapy on pain and anxiety after orthopaedic surgery	163 Patients	Daily Music Therapy	Music Vs Standards	Significant reduction in pain and anxiety up to day 3 (p < 0.001)
Astuti & Merdekawati, 2016	Assessing the Influence of Classical Music on Postoperative Pain	36 Patients	Classical music	None	Skala Nyeri Menurun Signifikan Dari 4,64 Menjadi 2,92 (P = 0,002)
Leonard, 2019	Evaluating Music Therapy and Physical Exercise for Pain Rehabilitation	32 Patients	Live Music and Practice	Intervention Vs Control	There was no significant difference in subjective pain; Observational Pain Shows Significant Interaction
Nur Et Al., 2020	Assessing the Influence of Classical Music on Post Op Fracture Pain	16 Patients	Classical music	None	Pain score decreased significantly after intervention (P = 0.000)
Erwin & Antoro, 2019	Assessing the Effectiveness of Music Therapy on Response	34 Patients	Music Therapy	Intervensi Vs Kontrol	greater pain reduction in the music group; Confounding Factors

	Postoperative Pain				Have No Effect
Mondanaro Et Al., 2017	Assessing Music Therapy On Patients' Recovery After Spinal Surgery	60 Patients	Live Music Therapy	Music + Standard Vs Standard	Vas score decreased significantly in the music group (p = 0.01)
Sulastri Et Al., 2021	Assessing the Effect of Music Therapy on Postoperative Pain	16 Patients	Listening to Music	None	Average pain decreased from 6.25 to 4.68 (P = 0.001)

Conclusion

Transcutaneous Electrical Nerve Stimulation (TENS) and music therapy are effective non-pharmacological interventions for postoperative pain management, both when applied independently and as components of a multimodal approach. The majority of studies indicate that TENS effectively reduces pain intensity, decreases opioid consumption, and improves clinical outcomes such as patient mobilization and quality of life. Meanwhile, music therapy contributes significantly to reductions in pain, anxiety, and physiological stress responses following surgery. The implications of these findings underscore that integrating TENS and music therapy into clinical and nursing practice represents a safe, non-invasive, and cost-effective strategy for enhancing the quality of postoperative patient care while reducing reliance on pharmacological analgesics. Nevertheless, current evidence is limited by a lack of studies that specifically examine the simultaneous application of TENS and music therapy. Therefore, further research employing robust experimental designs, larger sample sizes, and standardized intervention protocols is essential to confirm the effectiveness, optimal dosage, and appropriate timing of combined interventions.

Daftar Pustaka

Alizadeh, A., Karagah, A., Tabrizi, R., Shadman, L., Arjmand, A., Tofangchiha, M., & Patini, R. (2023). Effect Of Transcutaneous Electrical Nerve Stimulation On Pain, Edema, And Trismus After Surgical Removal Of Impacted Third Molars: A Split-Mouth Randomized Clinical Trial. *Medicina Oral, Patología Oral Y Cirugía Bucal*, *29*(2), E211. Https://Doi.Org/10.4317/Medoral.26193

Angelini, E., Josefsson, C., Ögren, C., Andréll, P., Wolf, A., & Ringdal, M. (2025). Patients Experiences Of Tens As A Postoperative Pain Relief Method In The Post-Anesthesia Care Unit After Laparoscopic Cholecystectomy: A Qualitative Study. *Bmc Anesthesiology*, *25*(1), 18. Https://Doi.Org/10.1186/S12871-024-02872-4

Aprilianto, A., Novitasari, D., & Sebayang, S. (2024). Implementasi Terapi Musik Untuk Menurunkan Nyeri Pasien Post Operasi Laparatomi. *Jurnal Peduli Masyarakat*, *6*(2), 637-644. Https://Doi.Org/10.37287/Jpm.V6i2.3511

Astuti, A., & Merdekawati, D. (2016). Pengaruh Terapi Musik Klasik Terhadap Penurunan Tingkat Skala Nyeri Pasien Post Operasi. *Jurnal Ipteks Terapan*, *10*(3), 148-154. Https://Www.Academia.Edu/Download/54053854/526-1427-3-Pb.Pdf

Beckwée, D., Bautmans, I., Lefeber, N., Lievens, P., Scheerlinck, T., & Vaes, P. (2018). Effect Of Transcutaneous Electric Nerve Stimulation On Pain After Total Knee Arthroplasty: A Blind Randomized Controlled Trial. *The Journal Of Knee Surgery*, *31*(02), 189-196. Https://Doi.Org/10.1055/S-0037-1602134

Borges, M. R., De Oliveira, N. M. L., Antonelli, I. B. S., Silva, M. B., Crema, E., & Fernandes, L. F. R. M. (2020). Transcutaneous Electrical Nerve Stimulation Is Superior Than Placebo And Control For Postoperative Pain Relief. *Pain Management*, *10*(4), 235-246. Https://Doi.Org/10.2217/Pmt-2019-0063

Cansever, L., Sezen, C. B., Yaran, O. V., Duman, S., Seyrek, Y., Hatipoğlu, M., ... & Bedirhan, M. A. (2021). The Effect Of Transcutaneous Electric Nerve Stimulation On Chronic Postoperative Pain And Long-Term Quality Of Life. *Turkish Journal Of Thoracic And Cardiovascular Surgery*, *29*(4), 496. Https://Doi.Org/10.5606/Tgkdc.Dergisi.2021.19800

Çebi, A. T. (2019). Effects Of Transcutaneous Electrical Nerve Stimulation On Pain After Impacted Third Molar Surgery. *Medicina Oral, Patologia Oral Y Cirugia Bucal*, *24*(3), E404. Https://Doi.Org/10.4317/Medoral.22871

Cecyli, C., Vasika, R., Jagadeeswari, J., Priyadarsini, A., & Dayana, B. A. A. (2024). Impact Of Music Therapy On Pain, Stress, And Physiological Parameters Among Postoperative Patients. *Journal Of Pharmacy And Bioallied Sciences*, *16*(Suppl 3), S2895-S2897. Https://Doi.Org/10.4103/Jpbs.Jpbs_543_24

Chu, H., Wang, B., Wei, S., Xu, X., Zhao, R., Li, S., ... & Zheng, H. (2025). Efficacy Of Paravertebral Transcutaneous Electrical Nerve Stimulation In Perioperative Analgesia And Enhanced Recovery After Thoracoscopic Lobectomy: A Randomized, Sham-Controlled Clinical Trial. *Anesthesiology And Perioperative Science*, *3*(4), 1-15.

Ciğerci, Y., & Özbayır, T. (2016). The Effects Of Music Therapy On Anxiety, Pain And The Amount Of Analgesics Following Coronary Artery Surgery. *Turkish Journal Of Thoracic And Cardiovascular Surgery*, *24*(1). Https://Doi.Org/10.5606/Tgkdc.Dergisi.2016.12136

Cing, M. T. G. C., & Hardiyani, T. (2022). Pengaruh Indeks Massa Tubuh Terhadap Kejadian Mual Muntah Post Operasi. *Faletehan Health Journal*, *9*(01), 8-12. Https://Www.Journal.Lppm-Stikesfa.Ac.Id/Index.Php/Fhj/Article/View/377

Dai, W. S., Huang, S. T., Xu, N., Chen, Q., & Cao, H. (2020). The Effect Of Music Therapy On Pain, Anxiety And Depression In Patients After Coronary Artery Bypass Grafting. *Journal Of Cardiothoracic Surgery*, *15*(1), 81.

Eidy, M., Fazel, M. R., Janzamini, M., Rezaei, M. H., & Moravveji, A. R. (2016). Preemptive Analgesic Effects Of Transcutaneous Electrical Nerve Stimulation (Tens) On Postoperative Pain: A Randomized, Double-Blind, Placebo-Controlled Trial. *Iranian Red Crescent Medical Journal*, *18*(4), E35050. Https://Doi.Org/10.5812/Ircmj.35050

Elboim-Gabyzon, M., Andrawus Najjar, S., & Shtarker, H. (2019). Effects Of Transcutaneous Electrical Nerve Stimulation (Tens) On Acute Postoperative Pain Intensity And Mobility After Hip Fracture: A Double-Blinded, Randomized Trial. *Clinical Interventions In Aging*, 1841-1850. Https://Doi.Org/10.2147/Cia.S203658

Engen, D. J., Carns, P. E., Allen, M. S., Bauer, B. A., Loehrer, L. L., Cha, S. S., ... & Wahner-Roedler, D. L. (2016). Evaluating Efficacy and Feasibility of Transcutaneous Electrical Nerve Stimulation for Postoperative Pain After Video-Assisted Thoracoscopic Surgery: A Randomized Pilot Trial. *Complementary Therapies in Clinical Practice*, *23*, 141-148. Https://Doi.Org/10.1016/J.Ctcp.2015.04.002

Erden, S., Yurtseven, Ş., Demir, S. G., Arslan, S., Arslan, U. E., & Dalcı, K. (2022). Effects of Transcutaneous Electrical Nerve Stimulation On Mastectomy Pain, Patient Satisfaction, And Patient Outcomes. *Journal of Perianesthesia Nursing*, *37*(4), 485-492. Https://Doi.Org/10.1016/J.Jopan.2021.08.017

Erwin, T., & Antoro, B. (2019). Pengaruh Terapi Musik Tradisional Terhadap Respon Nyeri Pada Pasien Paska-Operasi Di Rumah Sakit Imanuel Bandar Lampung. *Holistik Jurnal Kesehatan*, *13*(2), 163-171. Https://Doi.Org/10.33024/Hjk.V13i2.1225

Faana, J., Amalina, S., & Simanjuntak, J. (2025). Pengaruh Pemberian Tens Dan Frictionmassage Terhadap Penurunan Nyeri Pada Kasus Carpal Tunnel Syndrome Di Klinik Sehat Bersama Fisioterapi Medan. *World Health Digital Journal*, *2*(1), 35-40. Https://Wolgitj.Science.Web.Id/Wolgitj/Article/View/51

Febriyani, K. A., & Alpiah, D. N. (2026). Efektivitas Electrical Nerve Stimulation (Tens) Yang Dipadukan Dengan Latihan Peregangan Pada Pasien Low Back Pain: Literatur Review. *Journal Sains Student Research*, *4*(1), 92-101. Https://Ejurnal.Kampusakademik.Co.Id/Index.Php/Jssr/Article/View/7446

Gallagher, L. M., Gardner, V., Bates, D., Mason, S., Nemecek, J., Difiore, J. B., ... & Bethoux, F. (2018). Impact of Music Therapy On Hospitalized Patients Post-Elective Orthopaedic Surgery: A Randomized Controlled Trial. *Orthopaedic Nursing*, *37*(2),

124-133. Https://Doi.Org/10.1097/Nor.0000000000000432

Gogoularadja, A., & Bakshi, S. S. (2020). A Randomized Study On the Efficacy of Music Therapy On Pain and Anxiety in Nasal Septal Surgery. *International Archives of Otorhinolaryngology*, *24*(02), E232-E236. Https://Doi.Org/10.1055/S-0039-3402438

Guo, Y., & Li, J. (2025). Effect of Music Therapy On Postoperative Pain Management In Patients With Oral Cancer: A Retrospective Study. *Noise and Health*, *27*(128), 722-730. Https://Doi.Org/10.4103/Nah.Nah_99_25

Hidayatulloh, A. I. (2020). Pengalaman Dan Manajemen Nyeri Pasien Pasca Operasi Di Ruang Kemuning V Rsup Dr. Hasan Sadikin Bandung: Studi Kasus. *Jurnal Ilmu Keperawatan Dan Kebidanan*, *11*(2), 187-204. Https://Scholar.Archive.Org/Work/B57kf5klmna3xfuv62zmg7wewu/Access/Wayback/Https://Ejr.Stikesmuhkudus.Ac.Id/Index.Php/Jikk/Article/Download/795/523

Jahangirifard, A., Razavi, M., Ahmadi, Z. H., & Forozeshfard, M. (2018). Effect of Tens On Postoperative Pain and Pulmonary Function in Patients Undergoing Coronary Artery Bypass Surgery. *Pain Management Nursing*, *19*(4), 408-414. Https://Doi.Org/10.1016/J.Pmn.2017.10.018

Laframboise-Otto, J. M., Horodyski, M., Parvataneni, H. K., & Horgas, A. L. (2021). A Randomized Controlled Trial of Music for Pain Relief After Arthroplasty Surgery. *Pain Management Nursing*, *22*(1), 86-93. Https://Doi.Org/10.1016/J.Pmn.2020.09.003

Leonard, H. (2019). Live Music Therapy During Rehabilitation After Total Knee Arthroplasty: A Randomized Controlled Trial. *Journal of Music Therapy*, *56*(1), 61-89. Https://Doi.Org/10.1093/Jmt/Thy022

Lubis, K. A., & Sitepu, J. F. (2021). Angka Kejadian Nyeri Pasca Operasi Kebidanan Di Rumah Sakit Umum Delima Medan Sumatera Utara Tahun 2020. *Jurnal Kedokteran Ibnu Nafis*, *10*(2), 110-115.

Ma, Y. (2022). Transcutaneous Electrical Nerve Stimulation and Music Pain Manage After Surgery: Literature Review.

Mahure, S. A., Rokito, A. S., & Kwon, Y. W. (2017). Transcutaneous Electrical Nerve Stimulation for Postoperative Pain Relief After Arthroscopic Rotator Cuff Repair: A Prospective Double-Blinded Randomized Trial. *Journal of Shoulder and Elbow Surgery*, *26*(9), 1508-1513. Https://Doi.Org/10.1016/J.Jse.2017.05.030

Mondanaro, J. F., Homel, P., Lonner, B., Shepp, J., Lichtensztein, M., & Loewy, J. V. (2017). Music Therapy Increases Comfort and Reduces Pain in Patients Recovering from Spine Surgery. *Am J Orthop (Belle Mead Nj)*, *46*(1), E13-E22.

Muawanah, K., & Sulastri, S. (2023). Controlling Post-Operative Pain with Early Mobilization and Music Therapy. *Jurnal Kesehatan*, *14*(1), 150-156. Https://Doi.Org/10.26630/Jk.V14i1.3746

Mutmainnah, M., & Rundulemo, M. (2020). Efektivitas Terapi Musik Terhadap Penurunan Nyeri Pada Pasien Post Operasi. *Pustaka Katulistiwa: Karya Tulis Ilmiah Keperawatan*, *1*(1), 40-44.

Nur, S. A., Morika, H. D., & Sardi, W. M. (2020). Pengaruh Terapi Musik Klasik Terhadap Tingkat Nyeri Pasien Post Op Fraktur Di Bangsal Bedah Rs Dr Reksodiwiryo Padang. *Jurnal Kesehatan Medika Saintika*, *11*(2), 175-183.Http://Dx.Doi.Org/10.30633/Jkms.V11i2.778

Nurdiansyah, T. E. (2016). Pengaruh Terapi Musik Terhadap Respon Nyeri Pada Pasien Dengan Post Operasi Di Rsud A. Dadi Tjokrodipo Kota Bandar Lampung. *Jurnal Kesehatan*, *6*(1). Https://Doi.Org/10.26630/Jk.V6i1.20

Özbaş, N., Ersoy, E., Korkmaz, M., & Olçar, H. A. (2025). Effect Of Transcutaneous Electrical Nerve Stimulation On Patients With Total Knee Replacement: A Randomized Controlled Trial. *Pain Management Nursing*, *26*(1), 4-13. Https://Doi.Org/10.1016/J.Pmn.2024.07.003

Parseliunas, A., Paskauskas, S., Kubiliute, E., Vaitekunas, J., & Venskutonis, D. (2021). Transcutaneous Electric Nerve Stimulation Reduces Acute Postoperative Pain and Analgesic Use After Open Inguinal Hernia Surgery: A Randomized, Double-Blind, Placebo-Controlled Trial. *The Journal of Pain*,

22(5), 533-544. Https://Doi.Org/10.1016/J.Jpain.2020.11.006

Prayogi, A. S., Yuliana, Y., & Ratnawati, A. (2018). Pengaruh Tens (Transcutaneus Electrical Nerve Stimulation) Terhadap Intensitas Nyeri Pada Pasien Post Operasi Sectio Caesarea. *Pengaruh Tens (Transcutaneus Elektrical Nerve Stimulation) Terhadap Intensitas Nyeri Pada Pasien Post Operasi Sectio Caesarea*, *14*(2), 91-100. Https://Doi.Org/10.31101/Jkk.424

Purwaningtyas, N. (2020). Efektivitas Pemberian Terapi Musik Klasik Terhadap Penurunan Intensitas Nyeri Pada Pasien Post Sectio Caesarea Di Ruang Flamboyan 1 Rsud Salatiga. *Journal of Holistics and Health Sciences (Jhhs)*, *2*(2), 37-51. Https://Doi.Org/10.35473/Jhhs.V2i2.51

Rahmatun, V., & Heru, W. (2020). Penerapan Tehnik Distraksi Nafas Ritmik Untuk Menurunkan Nyeri Pada Pasien Post Apendiktomi. *Jurnal Manajemen Asuhan Keperawatan*, *4*(1), 43-52. Https://Jurnal-D3per.Uwhs.Ac.Id/Index.Php/Mak/Article/View/81

Saputri, V. A., Mutmainna, A., & Irmayani, I. (2023). Pengaruh Terapi Musik Terhadap Intensitas Nyeri Pasien Pasca Operasi Di Rs Ibnu Sina Makassar. *Jimpk: Jurnal Ilmiah Mahasiswa & Penelitian Keperawatan*, *3*(2), 30-36.

Sari, A. D. I., Herman, T., Sopandi, W., & Jupri, A. (2023). A Systematic Literature Review (Slr): Implementasi Audiobook Pada Pembelajaran Di Sekolah Dasar. *Jurnal Elementaria Edukasia*, *6*(2), 661-667.

Setyono, A., & Rohana, N. (2021). Penerapan Terapi Musik Untuk Menurunkan Tingkat Nyeri Pada Pasien Post Operasi Di Rs Paru Dr. Ario Wirawan Salatiga. *Jurnal Ners Widya Husada*, *8*(2). Https://Doi.Org/10.33666/Jnwh.V8i2.457

Sulastri, S., Samidah, I., & Murwati, M. (2021). Pengaruh Terapi Musik Terhadap Penurunan Intensitas Nyeri Pada Pasien Post Operasi Di Rs. Ummi Kota Bengkulu. *Jurnal Riset Media Keperawatan*, *4*(2), 88-93. Https://Doi.Org/10.51851/Jrmk.V4i2.332

Xu, W., Varghese, C., Wells, C. I., Bissett, I. P., & O'grady, G. (2020). Patient-Administered Transcutaneous Electrical Nerve Stimulation for Postoperative Pain Control After Laparoscopic Cholecystectomy: A Randomized, Sham-Controlled Feasibility Trial. *Neuromodulation: Technology At The Neural Interface*, *23*(8), 1144-1150. Https://Doi.Org/10.1111/Ner.13242

Yılmaz, E., Karakaya, E., Baydur, H., & Tekin, İ. (2019). Effect Of Transcutaneous Electrical Nerve Stimulation On Postoperative Pain And Patient Satisfaction. *Pain Management Nursing*, *20*(2), 140-145. Https://Doi.Org/10.1016/J.Pmn.2018.06.003