



Effectiveness of Transcranial Magnetic Stimulation and Slow Beat Acoustic Music (TEMATIK SB) on Low Back Pain Patients' Pain: Literature Review

Ety Wulandari¹(✉), Edy Soesanto², and Sri Rejeki²

¹ Master of Nursing, Faculty of Nursing and Health, University of Muhammadiyah Semarang, Semarang, Indonesia

etykiutbanget@gmail.com

² Master of Nursing Lecturer, Faculty of Nursing and Health Sciences, University of Muhammadiyah Semarang, Semarang, Indonesia

edysoes@unimus.ac.id

Abstract. Background: Low Back Pain is pain that is located below the lower border of the ribs (costa) and above the folds of the lower buttocks (gluteal inferior), with or without lower leg pain caused by mechanical stimulation, degenerative diseases or sprains and is a global problem and a disease that causes Highest Disability since 2007.

Aim: to determine the effectiveness of Transcranial Magnetic Stimulation and Slow Beat Acoustic Music (SB THEMATIC) on pain in Low Back Pain patients at the Nerve Clinic K.R.M.T Wongsonegoro Hospital with previous research.

Method: This research is a literature review referring to the Preferred Reporting Item for Systematic Review and Meta-Analyses (PRISMA). Article search through Scopus, Proquest, Pubmed, Google Scholar and Science Direct in the last 5 years (2017–2022), full text and using English. The keywords used are “Transcranial Magnetic Stimulation”AND”Music”AND”Low Back Pain”. After the article is found, an analysis and synthesis of the article will be carried out according to the inclusion and exclusion criteria. Exclusion criteria: (1) The article does not have a complete structure (2) in the form of an article review.

Results: Transcranial Magnetic Stimulation and Slow Beat Acoustic Music are effective for reduce the intensity of pain in patients with low back pain.

Conclusion: Transcranial Magnetic Stimulation and Slow Beat Acoustic Music (THEMATIC SB) are very effective in reducing the pain of Low Back Pain patients, and can be used as a non-pharmacological therapy.

Keywords: Thematic · Music · Pain · Low Back Pain

1 Introduction

Low Back Pain is a problem that, based on epidemiological data, is often found in all races throughout the world, with varying incidence rates. Globally, it can be estimated

that around 60-70% of citizens in developed countries will experience non-specific low back pain at least once in their lifetime. Approximately 20% of patients with acute low back pain will continue to experience chronic symptoms and cause global disability, activity limitations and absenteeism from work and has increased since 1990 [1, 2]

World Health Organization (WHO) said that in industrialized countries, 2–5% of employees experience lower back pain each year, while the absenteeism rate in the steel industry and trade industry is 15% due to Low Back Pain. United States statistics show that the annual incidence rate is around 15 – 20%. As many as 90% of cases of back pain are not caused by organic diseases, but by wrong body position at work [3, 4].

Cases of low back pain in Indonesia in recent years have seen a significant increase (Riskesdas, 2018) of 7.6 to 37%, while based on the top ten diseases that cause Disability (Years Lived with Disability –YDLs) in 2007 - 2017 the ranking (ranking) the first is Low Back Pain around 21.3%. [5]. By looking at the high prevalence rates above, the problem of Low Back Pain is not only seen as a health problem that is individual localistic in nature, but has become a very broad and global health problem. Therefore treatment is not only from a medical perspective, but also from a psycho-social and cognitive perspective based on a public health approach through primary, secondary and tertiary prevention efforts [6, 7]. Management of pain reduction in Low Back Pain patients can be done conservatively, intervention and surgery. Conservation pain management can be carried out pharmacologically, psychologically and non-pharmacologically [8, 9].

Pharmacological management of the use of analgesic drugs depends on the type of pain and its etiology [8]. If the pain is nociceptive, the drug given is paracetamol at a dose of 3 g/day, non-steroidal anti-inflammatory drugs (NSAIDs) are very effective in acute low back pain, and weak opioids such as tramadol can be given in acute low back pain, either as monotherapy or in combination. Combination with NSAIDs and paracetamol. If the pain has a neuropathic component, antineuropathic drugs should be administered [8, 10].

The management of acute pain and chronic pain requires different therapeutic approaches. In patients with acute pain, drugs are needed that can relieve pain quickly. Patients are more able to tolerate the side effects of drugs than the pain. In chronic pain sufferers, patients are less able to tolerate the side effects of drugs [11].

Guidelines and systematic reviews state that adjuvant analgesics, namely anticonvulsants, are the first-line therapy for the treatment of neuropathic pain. Gabapentin and pregabalin are the first line of treatment for postherpetic neuropathic pain and diabetic neuropathy. Meanwhile, carbamazepine is used as the first line for cases of trigeminal neuralgia. Lamotrigine, oxcarbazepine, topiramate, zonisamide, levetiracetam, and valproic acid in several randomized controlled trials are also effective for the treatment of neuropathic pain [11].

Pharmacological therapy sometimes causes side effects which can also cause euphoria, nausea, vomiting, constipation and respiratory depression and must be used with caution in clients with respiratory problems [12]. There are many choices of non-pharmacological therapy which are independent actions by nurses with various benefits and advantages including no side effects, simple and not expensive. This therapy can be done by means of distraction (auditory distraction which is usually done by listening

to music), stimulation of the skin area, massage (massage), movement therapy, physical therapy and guided imagination [8].

One of the efforts made to reduce pain in Low Back Pain patients is to use non-pharmacological therapy, namely Transcutaneous Electric Nerve Stimulation, commonly known as Transcranial Magnetic Stimulation (TMS), namely by stimulation of the skin area or cutaneous stimulation (counter stimulation) [13].

Transcranial Magnetic Stimulation is a non-pharmacological technique as one of the techniques that is believed to activate endogenous opiates, which are a group of morphine-like neuropeptides that inhibit the transmission of pain impulses [14]. In addition, music therapy is also one of the nurse's independent actions in pain management, various studies have shown that the type of music that is effective for reducing pain is classical music. This is because classical music has a tempo ranging from 60–80 beats per minute in tune with the human heart rate, and affects pulse and respiration [15]. Several studies have shown that classical music can reduce the level of emotional tension or physical pain, make a person relax, create a sense of security and well-being, release feelings of joy, sadness, release pain and reduce stress levels.

The results of research on the benefits of Transcranial Magnetic Stimulation and Acoustic Music Therapy with Slow Beats can reduce the pain scale of low back pain patients, including research by Sharkawy, Hen M, et al. (2017) [16], Kusuma, Rian Dwi et al. (2017) [17], Shirazi, Zahra Rojhani and Tahere Rezaeian (2017)[18] One of them was a study conducted by El-Sharkawy, Hend M, et al. The results of his research were, Repetitive Active Transcranial Magnetic Stimulation (RTM) causes an increase in postural stability and produces analgesic and pain relief effects in patients with Chronic Low Back Pain (CLBP). Meanwhile, Messika's 2018 research revealed that Music Therapy in critical nursing is effective for reducing anxiety and pain. Golini's research in 2019 stated that music therapy is an active support for reducing breathing frequency, pulse, pain and anxiety levels. In this study, the decrease in pain scale was measured using the Numerical Rating Scale (NRS) [8].

Based on the above background, it is necessary to conduct research to determine the effectiveness of Transcranial Magnetic Stimulation with Slow Beat Acoustic Music (SB Thematic) on the pain of Low Back Pain patients at the neurological clinic of KRMT Wongsonegoro Regional Hospital. The purpose of this systematic review is to find out The effectiveness of Transcranial Magnetic Stimulation with Slow Beats Acoustic Music (SB Thematic) on the pain of Low Back Pain patients at the neurological clinic of KRMT Wongsonegoro Hospital with previous studies.

2 Methods

This research is a literature review referring to the Preferred Reporting Item for Systematic Review and Meta-Analyzes (PRISMA). Article search through Scopus, Proquest, Pubmed, Google Scholar and Science Direct in the last 5 years (2017–2022), full text and using Indonesian and English. The keywords used in the search for “transcranial magnetic stimulation” AND “music” AND “Low Back Pain”. After the article is found, an analysis and synthesis of the article will be carried out according to the inclusion and exclusion criteria. Inclusion criteria for adult patients visiting the neurological clinic at

the K.R.M.T Wongsonegoro Regional Hospital who meet the inclusion criteria are as follows (1) Aged 20–45 years, (2) Willing to be a respondent (3) Patients diagnosed with Low Back Pain (4) After 2 h of taking the drug (5) The patient likes slow beat acoustic music.

In this study, the research sample was 30 respondents with one pretest-post test group who received treatment, and 30 respondents who were the control group. This research was conducted from July to September 2022 at the neurological clinic of RSD KRMT Wongsonegoro. The article search process will be carried out in April–June 2022. The article search uses keywords that have been determined by the compiler and provides limits on inclusion and exclusion criteria. The data obtained is then selected one by one by the compiler to determine the suitability of the desired article and delete the same article. After getting the appropriate articles, the articles are analyzed one by one and grouped to get the results. The next step is to discuss based on the points obtained from the selection results.

An initial literature search yielded 50 articles (30 articles from Scopus, 10 articles obtained from Proquest, 10 articles from Pubmed and Science Direct). After reviewing the abstracts for relevance and matching with inclusion criteria, 18 articles were selected for full text review. There were 12 full text articles that were excluded for reasons not related to non-pharmacological therapy to reduce pain. Finally, 6 articles were selected for review.

3 Results

The analysis of the 6 articles was analyzed using the PICOT framework approach, namely P: Low Back Pain Patients, I: THEMATIC SB (Transcranial Magnetic Stimulation and Slow Beat Acoustic Music), C: 30 respondents with one pretest-post test group who received the treatment (THEMATIC SB) and 30 respondents who are the control group, O: there is the effectiveness of transcranial magnetic stimulation and slow beat acoustic music on the pain of low back pain patients. Q: 2017–2022.

4 Discussion

The results of the analysis of the From the results of the synthesis of 6 articles discussing the Effectiveness of Transcranial Magnetic Stimulation and Slow Beat Acoustic Music on the Pain of Low Back Pain Patients, Sharkawy's research, Hen M, et al., 2017 using RCT (Randomized Controlled Trial) found TMS performed repeatedly (RTMS) proved to be able to produce analgesic effects in patients with chronic low back pain. Research by Kusuma, Rian Dwi, et al., 2017 with a Cohort Study found TMS results were more effective in reducing the quality of pain in Low Back Pain patients. In Shirazi's research, Zahra Rojhani and Tahere Rezaeian. 2017, which used an experimental study research design, it turned out that TMS therapy was able to reduce the intensity and quality of low back pain. Meanwhile, in the research conducted by Pivovarsky, et al. effective for modulating pain, pain relief and increasing pressure pain threshold among individuals with low back painchronic.

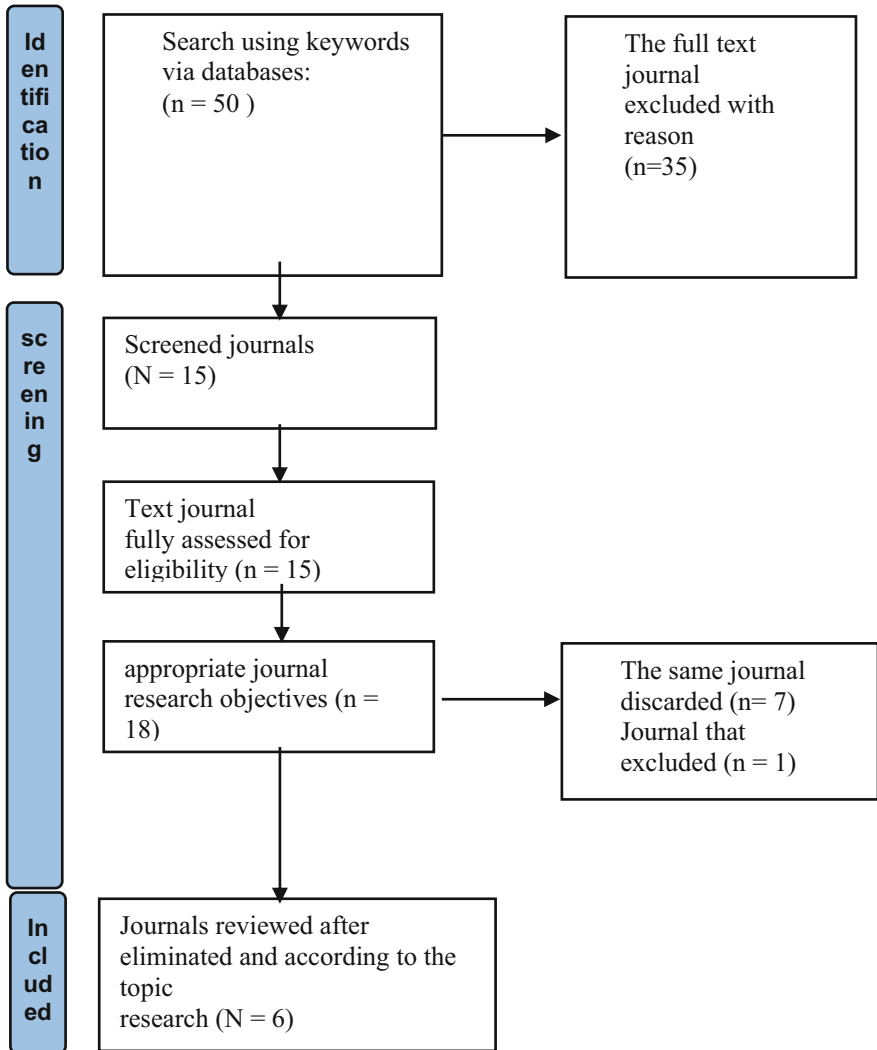


Fig. 1. Prisma study flow diagram

Further research Yang, Seoyon, et al. 2020 with Systematic Narrative Review was obtained rTMS can be used as an alternative treatment method for patients with chronic pain, back pain originating from the central and peripheral nerves for orofacial pain, including trigeminal neuralgia, LBP, hip pain, and CRPS. Argibai, MG et al., 2018 with their meta analysis study found significant evidence regarding the effectiveness of binaural beats on memory, attention, anxiety, and analgesia (Fig. 1 and Table 1).

Table 1. The effectiveness of transcranial magnetic stimulation and slow beat acoustic music on the pain of low back pain patients

No	Researcher, Title, Year	Research methods	Results	Difference
1	Sharkawy, Hen M, et al., 2017. Efficacy of Repetitive Transcranial Magnetic Stimulation on Balance in Patients with Chronic Low Back Pain.[16]	Research design: RCT (Randomized Controlled Trial). Independent Variable: Transcranial Magnetic Stimulation, Dependent Variable: Balance the subject: Chronic low back pain patient	Repetitive Transcranial Magnetic Stimulation (RTMS) produces an effectanalgesic and pain relief in patients with Chronic Low Back Pain (CLBP)	Writer: Research design: descriptive, with a quasi-experimental approach with pretest-posttest control group design. Independent Variable: THEMATIC SB
2	Kusuma, Rian Dwi, et al., 2017. Efficacy of Transcranial Magnetic Stimulation Therapy (TMS) for Clinical Improvement in Low Back Pain Patients at RSUP Dr. Work in Semarang[17]	Research design: Cohort Study, Independent Variable: Transcranial Magnetic Stimulation, The dependent variable: Pain intensity the subject: Chronic LBP Patients	Both TMS and Non TMS therapies can reduce pain intensity. However, TMS therapy is more effective in reducing the quality of pain in low back patients.	Writer: Research design: descriptive, with a quasi-experimental approach with pretest-posttest control group design. Independent Variable: THEMATIC SB
3	Shirazi, Zahra Rojhani and Tahere Rezaeian. 2017. The Effects of Transcutaneous Electrical Nerve Stimulation on Postural Control in Patients with Chronic Low Back Pain.[18]	Research design: Experimental study, Independent Variable: Transcranial Magnetic Stimulation (Transcutaneous Electrical Nerve Stimulation), The Dependent Variable: <i>Postural Control,</i> the subject: Chronic Low Back Pain Patients (Chronic Low Back Pain)	Application of TENS in patients with chronic low back pain can improve postural control in patients and reduce pain intensity in LBP patients.	Writer: Research design: descriptive, with a quasi-experimental approach with pretest-posttest control group design. Independent Variable: THEMATIC SB

(continued)

Table 1. (continued)

No	Researcher, Title, Year	Research methods	Results	Difference
4	Pivovarsky, et al. 2021. Immediate analgesic effect of two models of transcutaneous electrical nerve stimulation on patients with chronic low back pain: a randomized controlled trial.[19]	Research design: A Randomized Controlled Trial, Independent Variable: Transcutaneous electric nerve stimulation, Dependent Variable: Immediate analgesic effect, Subjects: Low Back Pain Patients	<i>Transcutaneous electrical nerve stimulation</i> (TMS)effective for modulating pain, as well as increasing pressure pain threshold among individuals with low back painchronic.	Writer: Research design: descriptive, with a quasi-experimental approach with pretest-posttest control group design. Independent Variable: THEMATIC SB
5	Yang, Seoyon, et al. 2020. Effect of Repetitive Transcranial Magnetic Stimulation on Pain Management: A Systematic Narrative Review.[20]	Research design: Systematic Narrative Review Independent Variable: <i>repetitive transcranial magnetic stimulation</i> Dependent Variable: <i>Pain Management</i>	rTMS can be used as an alternative treatment method for patients with chronic pain, back pain originating from the central or peripheral nerves for orofacial pain, including trigeminal neuralgia, LBP, hip pain, and CRPS.	Writer: Research design: descriptive, with a quasi-experimental approach with pretest-posttest control group design. Independent Variable: THEMATIC SB
6	Argibai, MG et al., 2018. Efficacy of binaural auditory beats in cognition, anxiety, and pain perception: a metaanalysis.[21]	Research design: <i>Meta Analysis</i> Independent Variable: <i>auditory binaural dependent variable:cognition, anxiety and pain perception</i>	This meta-analysis provides strong evidence of the effectiveness of binaural beats on memory, attention, anxiety, and analgesia.	Writer: Research design: descriptive, with a quasi-experimental approach with pretest-posttest control group design. Independent Variable: THEMATIC SB

5 Conclusion

Based on the synthesis of the 6 articles above, it can be concluded that Transcranial Magnetic Stimulation and Slow Beat Acoustic Music (THEMATIC SB) are very effective in reducing the pain of Low Back Pain patients, and can be used as a non-pharmacological therapy that can reduce the intensity of pain in Low Back Pain patients and can used as Evidence Based Nursing in Pain Management.

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