

Non-pharmacological treatments in cancer pain management

Edlin¹, Juliana Lina^{2*}, Novita Mirna Sari Nazara³

Abstract

Non-pharmacological therapies have recently become the focus of attention in many countries, including pain management in patients with cancer. This study aimed to explore the latest scientific evidence regarding pain management using non-pharmacological therapies in patients with cancer. The method used was a scoping review using the PRISMA-ScR framework. A literature search was conducted using four databases: PubMed, DOAJ, and Google Scholar, and published in the range of 2018-2023. There of 992 potentially relevant articles and 10 eligible articles were selected. The results of the study showed that nonpharmacological therapy was effective in reducing the pain scale in cancer patients based on the significant value and effect size of providing interventions to patients.

Keywords: pain management, nonpharmacologic therapy, cancer

Introduction

Cancer is a disease characterized by the presence of abnormal cells that grow rapidly and uncontrollably, can spread to other parts of the body, and requires long-term treatment.^{1,2} In every country worldwide, cancer is a major cause of death. In 2020, almost 10 million people died from cancer, and this number is expected to increase to 16.3 million by 2040 due to population growth and aging.^{3,4} Cancer patients experience pain not only from the disease itself but also from the examination and treatment procedures.⁵ The disease, diagnosis, and treatment of cancer can cause constant stress in patients, affecting not only physical but also psychological function. Patients with cancer show more stress and depression than healthy individuals do.⁶⁻⁸ In 2020, there were an estimated 19.3 million new cancer cases (18.1 million excluding nonmelanoma skin cancer) and almost 10.0 million cancer deaths (9.9 million excluding nonmelanoma skin cancer) worldwide. Female breast cancer was the most commonly diagnosed cancer, with an estimated 2.3 million new cases (11.7%), followed by lung (11.4%), colorectal (10.0%), prostate (7.3%), and stomach (5.6%) cancers. Lung cancer remained the leading cause of cancer death, with an estimated 1.8 million deaths (18%), followed by colorectal (9.4%), liver (8.3%), stomach (7.7%), and female breast (6.9%) cancers.⁴ This massive onslaught of cancer has led the WHO to predict that cancer will become the number one cause of death in the world by the end of this century and become the biggest barrier for humans to increase life expectancy.⁹ Baseline Health Research (Riskesdas) 2018 shows an increase in cancer prevalence from 1.4 per thousand population in 2013 to 1.79 per 1,000 population in 2018 and ranked 8th in Southeast Asia, while ranked 23rd in Asia.^{10,11} The highest case rate for women is breast cancer, which is 42.1 per 100,000 population with an average death of 17/100,000 population, followed by cervical cancer at 23.4 per 100,000 population with an average death of 13.9/100,000 population.¹¹

Cancer pain is a multidimensional experience that can affect the quality of life and patient compliance following treatment. Cancer pain is a complex symptom that can be mild, moderate, or severe,

Affiliation

¹Department of Anesthesiology, Universitas Prima Indonesia

²Department of Pathological Anatomy, Universitas Prima Indonesia

³Undergraduate Programme in Medical Science, Universitas Prima Indonesia

Correspondence

julianalina@unprimdn.ac.id

and can arise from a part of the body affected by cancer or as a result of various types of therapy. Pain is the main complaint most often felt by cancer patients and is the most common reason for seeking medical help.^{12,13} The level of pain depends on the type and stage of cancer and the patient's pain threshold. Pain can be caused by treatments, such as diagnostic examinations, surgery, radiation, and chemotherapy.¹⁴ Most cancer pain can be controlled with drugs, but some patients have too many side effects from drugs or pain in a certain part of the body. Pain can be managed before, during, and after tests and procedures. Cancer-related pain may be treated through one or more of the following approaches: removal or reduction of cancer, palliative surgery or radiation therapy, non-opioid pain medications, and opioids. Cancer pain can be relieved and it is important to remember that all pain can be treated.^{15,16}

Medical and surgical approaches are considered the main methods in cancer pain management, but both have limitations. Patients can experience severe side effects even with optimal pain medications, and surgical techniques are expensive and not available to a wide population.^{17,18} Non-pharmacological therapy has recently become the center of attention in many countries because of the holistic philosophy of complementary therapy, which refers to harmony within the self and health promotion.¹⁹ Non-pharmacological pain therapy refers to treatments that do not involve medication to manage pain. These interventions aim to reduce fear, distress, and anxiety, and provide patients with a sense of control.²⁰ Non-pharmacological treatments can help reduce the amount of medication needed to manage cancer pain, which can help avoid potential side effects and complications associated with long-term medication use.^{21,22} This study aimed to explore the latest scientific evidence regarding pain management through non-pharmacological therapies in cancer patients.

Method

This study used a methodological framework of Xiao & Watson²³ to conduct a scoping review. The scoping review research design was chosen because the reference sources used by researchers varied from journal articles to official websites. Scoping review is a method used to identify in-depth and comprehensive literature obtained through various sources with various research methods and has a relationship with the research topic.²⁴ Scoping review aims to answer questions from the research topic that has been determined by using various sources of similar research articles and then grouped and made conclusions. In preparing this scoping review, the PRISMA-ScR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews) checklist was used to help expand a better understanding of core concepts, terminology and other relevant things.²⁵ Several stages in conducting PRISMA-ScR include identifying eligibility criteria, determining information sources, selecting data, collecting data, and retrieving data. In this study, the inclusion criteria for articles reviewed were related to the effect of non-pharmacological therapy on reducing pain in cancer patients, the time range for publishing articles 2018-2023, English or Indonesian, original research, and open access. The exclusion criteria were theses and research reports. The databases used were PubMed, DOAJ, and Google Scholar. The keywords used in this literature search were "pain management", non pharmacological therapy", and "cancer". Of the 992 journal articles that were identified from various databases, 10 met the inclusion criteria. The

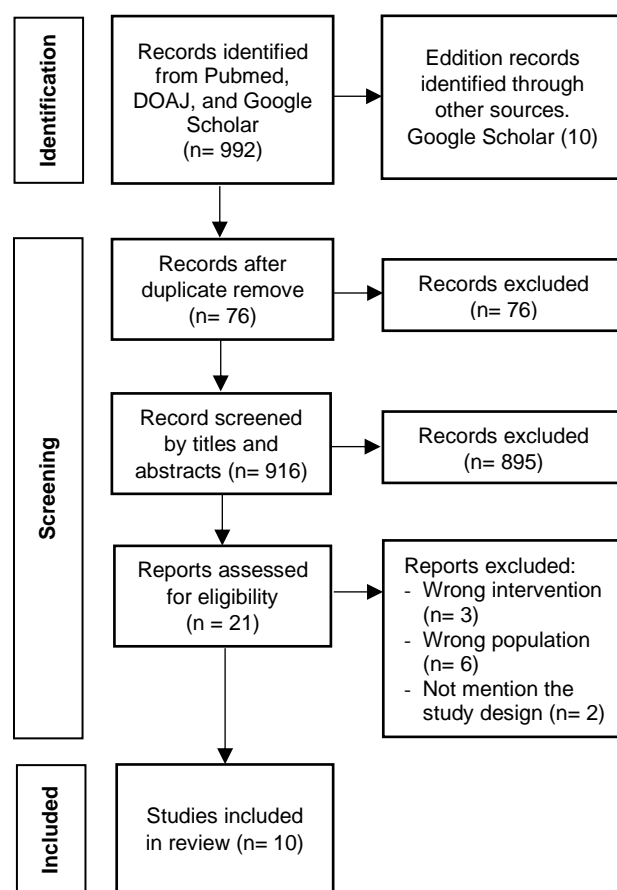


Figure 1. PRISMA flow diagram for study database search

Of the 992 journal articles that were identified from various databases, 10 met the inclusion criteria. The

researcher utilized Mendeley was used as a reference management software for sorting articles, such as checking duplicates, selecting titles and abstracts, and performing full-text reading.

Results

The articles were numbered from A1-A10 and all articles reported on non-pharmacological therapeutic interventions given to cancer patients that aimed to determine the effect of interventions on pain scales in cancer patients. The therapies include: (A1) SEFT therapy (spiritual emotional freedom technique) and respiratory relaxation, (A2) five-finger hypnotherapy, (A3) Guided Imagery, (A4) mural therapy surah ar-rahman, (A5) acupressure, (A6) music therapy, (A7) Benson relaxation therapy, (A8) Swedish massage, (A9) Progressive Muscle Relaxation (PMR), and (A10) Guided Imagery and PMR. A total of three articles discussed non-pharmacological therapies against pain in patients with cervical cancer (A1, A2, A5), three articles discussed the effect of non-pharmacological interventions on breast cancer (A3, A6, A7), one article discussed the effect of non-pharmacological interventions on penile cancer (A4), and two articles discussed the effect of interventions on cancer (A9, A10).

In A1, the intervention was conducted for 3 days in two patients, resulting in a 1-point decrease in the pain scale. In A2, the intervention was performed for 1 d in two patients, which led to a 1-point decrease in the pain scale. In A3, the intervention was performed for 3 days in two patients and caused a 2-point decrease in the pain scale. In A4, the intervention was implemented for 3 days in two patients for 25 min each day, resulting in a 2-point decrease in the pain scale. In A5, the intervention was applied for seven days in one patient and caused a 4-point decrease in the pain scale. In A6, the intervention was administered twice within 24 hours to two respondents for 15-30 minutes each time, leading to a 2-point decrease in the pain scale. In A7, the Benson relaxation technique was applied to two respondents for 3 days. In A8, the intervention was performed on 30 respondents, resulting in a decrease in the pain scale to mild pain in 17 and moderate pain in 13. In A9, the intervention was carried out on 34 people divided into two groups, with 16 people experiencing a decrease in the pain scale, one person not experiencing a decrease, and the others serving as the comparison group. In A10, the intervention was conducted on 104 cancer patients who were divided into two groups: group A experienced a decrease in the pain scale.

Discussion

Pain is the most frequent and dreaded symptom in patients with cancer, and although 80-90% of them are well managed, cancer-related pain remains a global health problem.²⁶ Cancer pain generally results from tumor cell infiltration of pain-sensitive structures such as bone, soft tissue, nerve fibers, internal organs, and blood vessels.²⁷ Pain may also result from surgery, chemotherapy, or radiotherapy therapy. Although the causes of cancer pain and its types vary, the underlying mechanisms have been understood as complex neurophysiologic and neuro pharmacologic phenomena.²⁸⁻³⁰ Pharmacological treatments can be effective in managing moderate to high-intensity pain, but they may not be suitable for all types of pain or patients.³¹ Non-pharmacological pain therapy refers to treatments that do not involve medication to manage pain. These interventions aim to reduce fear, distress, and anxiety, and provide patients with a sense of control.²⁰

When choosing the most effective non-pharmacological technique, factors such as the patient's age, developmental level, medical history, prior experiences, current degree of pain, and anticipated pain should be considered. In a study conducted by Safitri & Machmudah³², it was observed that the combined intervention of respiratory relaxation therapy and SEFT was effective in reducing pain in patients with stage IIIB cervical cancer. The deep breathing relaxation technique is a form of nursing care that aims to reduce pain and tension by relaxing the muscles. This technique involves the parasympathetic nervous system, muscles, and skeletal muscles and aims to reduce pain intensity, prevent atelectation, and increase ventilation and oxygenation. Relaxation techniques can reduce pain by relaxing muscle tension that supports pain. Relaxation techniques consist of abdominal breathing with a slow rhythmic frequency. Patients can close their eyes and breathe slowly and comfortably.³³ The SEFT is a combination of prayer and sincerity that utilizes the body's energy system to improve the state of mind, emotions, and behavior through the suggestion of sentences in the form of prayers and light tapping using two fingertips (tapping)

Table 1. Summary of articles that have met the inclusion criteria according to research objectives

No	Author (Year)	Design	Results	Database
A1	Safitri & Machmudah ³² (2021)	Case study	The results showed a decrease in pain scale from moderate to mild in cervical cancer stage IIIB patients with the intervention of deep breathing relaxation therapy and SEFT (spiritual emosional freedom technique) therapy. On the first day, the pain scale for case 1 was 4, and by the third day, it decreased to 3. For case 2, the pain scale was 3 on the first day, and by the third day, it decreased to 2. This study indicates that deep breathing relaxation therapy and SEFT therapy can reduce pain scale.	Google Scholar
A2	Halim & Khayati ³⁴ (2020)	Case study	The study's results indicate that patients experienced a decrease in pain scale by an average of 1 point after undergoing five-finger hypnotherapy. Hypnotherapy can reduce pain scale in cervical cancer patients because five-finger hypnotherapy can affect the limbic system and autonomic nerves, creating a relaxed, safe, and pleasant atmosphere that stimulates the reward center and the release of chemical substrates such as gamma-aminobutyric acid (GABA), enkephalin, and β -endorphin, which eliminate pain neurotransmitters.	Google Scholar
A3	Milenia & Retnaningsih ³⁵ (2022)	Case study	The study's findings indicate that before the intervention, the participant I's pain level was 7, and participant II's pain level was 6. After the intervention, participant I's pain level decreased to 5, and participant II's pain level decreased to 4. The intervention given was guided imagery therapy. The study concluded that the application of guided imagery therapy was able to reduce the pain levels in breast cancer patients.	Google Scholar
A4	Nurbaiti & Safitri ³⁶ (2023)	Case study	The study results indicate that both patients showed a decrease in pain intensity from a scale of 5 to 2 after three days of Murottal therapy. Murottal therapy can reduce the pain scale in penile cancer patients by increasing endorphin hormones, thereby inhibiting pain mediators and inducing relaxation and calmness. The research suggests that Murottal therapy, by increasing endorphin hormones, can inhibit pain mediators and instruct the body to relax and calm down, leading to a reduction in pain intensity.	DOAJ
A5	Ramadhana et al. ³⁷ (2023)	Case study	The study's findings indicate that pain management intervention using acupressure therapy on LI4, B23, B47, B53, B54, and LV3 points has been proven to reduce pain. In this case, it is marked by a decrease in the pain scale with NRS on the 5th day with a scale of 3 (mild).	Google Scholar
A6	Sitinjak et al. ³⁸ (2018)	Case study	The study results indicate that after the implementation of music distraction therapy technique for 2 sessions of 24 hours, there was an improvement in response, as evidenced by a decrease in pain scale in both patients during the evaluation. The pain scale recorded during the evaluation was 2 for patient 1 and 0 for patient 2. Patient 2 showed a faster improvement compared to patient 1 due to compliance with the protocol during the therapy.	Google Scholar
A7	Fatmawati & Sugianto ³⁹ (2023)	Case study	The study results indicate that there was a decrease in pain for both respondents, where respondent I felt pain with an initial scale of 6 decreased to 2 and respondent II felt pain with an initial scale of 4 decreased to 2 after being given Benson relaxation therapy for 3 days. It is concluded that Benson relaxation therapy is able to reduce pain in cancer patients with mild to moderate scale.	Google Scholar
A8	Purwiyantiningtyas et al. ⁴⁰ (2022)	Pre-experimental with one group pre test post test design	The results of the study show that there is a statistically significant difference in the level of pain before and after Swedish massage ($p=0.000$). The average level of pain before and after Swedish massage is 1.126 points. It can be concluded that massage has an effect on reducing the pain scale. Swedish massage therapy is able to reduce pain through the Gate Control mechanism and natural analgesic stimulation.	Google Scholar
A9	Kartika et al. ⁴¹ (2022)	Quasy experiment with control group pretest-posttest design	The study found that there was a difference in pain scale before and after PMR intervention in lung cancer patients with $p=0.000$ ($p<0.05$). PMR was proven effective in reducing pain scale in lung cancer patients. Pain scale reduction occurred in 16 pairs of data, and there was one pair of data that did not experience any change.	DOAJ
A10	De Paolis et al. ⁴² (2019)	Randomised controlled trial	PMR and IGI can reduce pain scale in patients with advanced stage cancer. The research results indicate that there is a difference in pain intensity (NRS at T3-NRS at T1) of 1.83 in group A and 0.55 in group B, and it is significant in both groups ($p<0.0001$). The average Total Symptom Distress Score decreased by 8.83 in group A and 1.84 in group B. The average difference in emotional symptom subscore ESAS-r (anxiety and depression) was 2.93 in group A ($p<0.0001$) and 0.07 in group B ($p>0.05$)	PubMed

on certain parts of the body.⁴³ The results of the review showed that the Benson relaxation technique is effective in reducing the pain scale of postoperative cancer patients.³⁹ Benson relaxation therapy relieves pain, insomnia, and anxiety by focusing attention on a focus by repeatedly saying the sentence that has been selected and eliminates various distracting thoughts.⁴⁴ Benson relaxation is a relaxation technique that is combined with the beliefs embraced by the patient, and will inhibit sympathetic nerve activity that can reduce oxygen consumption by the body and then the muscles of the body become relaxed resulting in a feeling of calm and comfort.⁴⁵ Another study conducted by Halim & Khayati³⁴ involving two respondents showed the effect of giving five-finger hypnotherapy with a decrease in the pain scale that can be seen at the time after giving therapy; the patient said that the pain felt had decreased. Five-finger hypnosis is a psychological intervention that provides therapy treatment in a relaxed state and then focuses on memories or images while performing therapy.⁴⁶

Progressive Muscle Relaxation (PMR) is a form of non-pharmacological therapy that is commonly used in pain therapy for cancer patients. In this review, two articles were found that examined the effectiveness of this therapy.^{41,42} Kartika et al.⁴¹ reported that the PMR technique was quite effective in reducing the pain scale in lung cancer patients who received chemotherapy treatment. Progressive Muscle Relaxation (PMR) is a relaxation technique that involves deep breathing and progressive relaxation of the major muscle groups. This technique aims to relax physically and mentally, reduce the response to stress, and reduce pain.⁴⁷ PMR is recommended as a complementary therapy as an analgesic treatment to maximize pain reduction in cancer patients, who can reduce negative emotions that can aggravate pain.⁴⁸ De Paolis et al.⁴² combined PMR and interactive guided imagery (IGI) for pain therapy in patients with terminal cancer. After the intervention, there was a difference in the pain intensity between the intervention and control groups. Guided imagery is a relaxation method carried out by inviting patients to imagine something beautiful and a favorite place or distraction from pain, which can be done in a sitting or lying position with eyes closed and focusing attention and concentrating so that the body becomes relaxed and comfortable.⁴⁹ The results of a review of studies also show that guided imagery is effective in reducing the pain scale in breast cancer patients.³⁵ Guided imagery begins by providing stimulus in the form of good words with a clear and soft tone of voice. Then, the patient was asked to breathe deeply and slowly to relax all the muscles. Progressive relaxation exercises can be used as needed to help patients achieve total relaxation.

Findings show that acupressure can reduce the pain scale in cervical cancer patients.³⁷ A systematic review found that acupuncture and/or acupressure were significantly associated with reduced cancer pain and decreased use of analgesics, although the evidence level was moderate.⁵⁰ Acupressure is a complementary treatment that uses fingers and applies pressure to stimulate certain points on the human body.⁵¹ Acupressure therapy is a development of acupuncture, so in principle the acupressure therapy method is the same as acupuncture, the difference is that acupressure therapy does not use needles in the treatment process.⁵² Swedish massage has been found to be effective in alleviating pain experienced by cancer patients undergoing chemotherapy.⁴⁰ A pilot trial study supported these findings.⁵³ During a Swedish massage, the therapist massages the entire surface of the body, resulting in a state of relaxation and comfort. This technique can also improve blood circulation, stimulate the parasympathetic nervous system, and increase endorphin hormones, which can decrease heart rate, blood pressure, and breathing, as well as alleviate stress and pain.⁵⁴

Sitinjak et al.³⁸ reported the effects of music intervention on pain in breast cancer patients. The ability of music to modulate pain has been demonstrated through various studies, which show that it can serve as a distraction, mood regulator, stress reliever, and reward. By briefly summarizing the evidence, it is evident that music has the power to suppress pain in a variety of conditions.⁵⁵ Music therapy can offer a therapeutic diversion from physical pain, including the side effects of pain medication such as nausea, by obstructing pain signals. Enhanced well-being may result in a reduction in perceived pain.⁵⁶ The Ar-Rahman murottal therapy has been demonstrated to be effective in alleviating the severity of cancer pain by having a qori (Qur'an reader) recite the Qur'an in a recording.³⁶ This intervention leads to a state of relaxation, which is characterized by a decrease in blood pressure, a heart rate of up to 24 beats per minute, and a respiratory rate of 4 to 6 breaths per minute.⁵⁷ The therapy influences the brain by promoting external

stimuli (Qur'anic therapy), resulting in the production of neuropeptides, which provide a sense of comfort and well-being.⁵⁸

Some of the interventions mentioned above can be combined with other therapies to achieve more effective results in managing cancer pain. For instance, a combination of music therapy and guided imagery can be used to stimulate the brain and provide pain relief for cancer patients. Non-pharmacological therapies, such as acupuncture, massage, PMR, and hypnotherapy, have been proven effective in reducing cancer pain. These non-pharmacological interventions are considered beneficial because they are easy to apply, cost-effective, and can be done independently. Various non-medical treatments, including complementary or integrative therapies, can be used alongside pain medicines to manage cancer pain. Additionally, non-pharmacological integrative therapies, such as physical therapy, psychosocial therapy, and herbal supplementation, have been explored and found to be successful in managing cancer pain. Non-pharmacological pain management techniques, such as relaxation/guided imagery, hypnosis, and comfort therapy, can also be utilized to better manage and reduce cancer pain. Overall, non-pharmacological approaches, including a wide range of therapies and techniques, have been shown to be effective in reducing cancer pain and can be used in conjunction with medical treatments.

Conclusion

Non-pharmacological therapies have been found to be effective in reducing pain in cancer patients, providing significant value and effect size. These therapies can also help treat other symptoms such as anxiety, stress, depression. These non-pharmacological interventions can be used alone or in combination with pharmacological interventions to manage pain and improve the quality of life for cancer patients.

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