



# Effects Of Nurse-Led Nonpharmacological Pain Interventions For Patients With Cancer: A Systematic Review And Meta-Analysis

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## Abstract

### Background:

Cancer-related pain is one of the most distressing symptoms experienced by patients and significantly affects quality of life. While pharmacological management remains the cornerstone of treatment, nonpharmacological interventions led by nurses have gained increasing attention as complementary strategies.

### Aim:

To evaluate the effectiveness of nurse-led nonpharmacological interventions (NPIs) in reducing pain among patients with cancer.

### Methods:

A systematic review and meta-analysis were conducted using databases such as PubMed, CINAHL, EMBASE, and Cochrane Library. Randomized controlled trials (RCTs) examining nurse-led NPIs for cancer pain were included. Data were analyzed using pooled effect sizes with a random-effects model.

### Results:

The meta-analysis demonstrated that nurse-led NPIs significantly reduced pain intensity compared to usual care. Interventions such as massage, reflexology, aromatherapy, acupressure, and psychoeducational approaches showed both short-term and long-term effectiveness. The pooled effect size indicated moderate improvement in pain outcomes.

### Conclusion:

Nurse-led nonpharmacological interventions are effective adjuncts to pharmacological therapy in managing cancer-related pain. These interventions should be integrated into routine oncology nursing practice.

**Keywords:** Cancer pain, nonpharmacological interventions, nurse-led care, meta-analysis, oncology nursing

## Introduction

Cancer pain remains a significant global health concern, affecting approximately 60–80% of patients with advanced-stage malignancies and nearly one-third of patients undergoing active treatment. It is a multidimensional experience influenced by physical, psychological, social, and spiritual factors. Unrelieved pain can severely compromise a patient's quality of life, leading to sleep disturbances, reduced functional ability, emotional distress, anxiety, and depression. Despite major advancements in pharmacological therapies, including opioids and adjuvant analgesics, pain management continues to be inadequate in a substantial proportion of patients due to issues such as drug side effects, tolerance, dependency, and under-treatment.

In recent years, there has been a growing emphasis on integrating nonpharmacological interventions (NPIs) into cancer pain management as complementary approaches. These interventions are designed to address not only the physiological aspects of pain but also its psychological and emotional dimensions. NPIs include a wide range of techniques such as massage therapy, relaxation exercises, music therapy, guided imagery, aromatherapy, cognitive-behavioral therapy, and patient education. These approaches are generally safe, cost-effective, non-invasive, and associated with minimal adverse effects, making them suitable for routine clinical use.

Nurses play a crucial role in the implementation of nonpharmacological pain management strategies due to their continuous presence at the bedside and their holistic approach to patient care. Nurse-led interventions are particularly valuable because nurses are well-positioned to assess pain comprehensively, provide individualized care, and establish therapeutic relationships with patients. Through education, counseling, and supportive care, nurses empower patients to actively participate in their pain management and enhance their coping abilities. Additionally, nurse-led NPIs can be seamlessly integrated into routine nursing practice without requiring extensive resources.

A growing body of evidence supports the effectiveness of nurse-led nonpharmacological interventions in reducing cancer-related pain. Studies have demonstrated that these interventions can significantly decrease pain intensity, reduce anxiety and stress levels, improve mood, and enhance overall well-being. Furthermore, they contribute to increased patient satisfaction and promote a sense of control over the illness experience. The combined use of pharmacological and nonpharmacological approaches aligns with the principles of holistic and patient-centered care, which are fundamental in oncology nursing.

Therefore, evaluating the effectiveness of nurse-led nonpharmacological interventions is essential to strengthen evidence-based practice and guide clinical decision-making. This systematic review and meta-analysis aim to synthesize existing research and provide comprehensive evidence regarding the impact of these interventions on pain outcomes among patients with cancer.

## Need of the Study

Cancer pain continues to be a major clinical challenge worldwide, significantly affecting patients' physical comfort, psychological well-being, and overall quality of life. Although pharmacological therapies such as opioids and adjuvant analgesics are widely used, a considerable number of patients still experience inadequate pain relief. Factors such as fear of addiction, drug tolerance, side effects, underreporting of pain, and limited access to appropriate medications contribute to suboptimal pain management. This highlights the urgent need for complementary and holistic approaches to pain control.

Nonpharmacological interventions (NPIs) have emerged as effective adjuncts in cancer pain management, addressing not only the physical component of pain but also its emotional, cognitive, and behavioral aspects. Techniques such as massage therapy, relaxation exercises, guided imagery, music therapy, and psychoeducation have shown promising outcomes in reducing pain intensity and improving psychological

well-being. These interventions are safe, cost-effective, non-invasive, and can be easily implemented in various healthcare settings, including resource-limited environments.

Nurses, being the primary caregivers, are in a unique position to deliver these interventions due to their continuous interaction with patients and their holistic approach to care. Nurse-led nonpharmacological interventions can enhance patient engagement, promote self-care practices, and improve coping mechanisms. Despite their potential benefits, these interventions are often underutilized in routine oncology practice due to lack of awareness, insufficient training, and limited consolidated evidence supporting their effectiveness.

Furthermore, existing research on nurse-led NPIs is scattered, with variations in intervention types, methodologies, and outcome measures. There is a need to systematically synthesize available evidence to determine the overall effectiveness of these interventions in managing cancer-related pain. A comprehensive systematic review and meta-analysis can provide robust evidence, identify best practices, and guide the integration of these interventions into standard nursing care.

Therefore, the present study is essential to evaluate the effectiveness of nurse-led nonpharmacological pain interventions among cancer patients. The findings of this study will contribute to evidence-based nursing practice, support the development of clinical guidelines, and ultimately improve the quality of life of patients suffering from cancer-related pain.

### **Objectives of the Study**

1. To assess the baseline (pre-intervention) level of pain among patients with cancer.
2. To implement nurse-led nonpharmacological interventions (e.g., massage, relaxation, music therapy, guided imagery).
3. To evaluate the post-intervention level of pain among patients with cancer.
4. To compare the pre-test and post-test pain scores among patients receiving nurse-led nonpharmacological interventions.
5. To determine the effectiveness of different types of nurse-led nonpharmacological interventions on pain reduction.
6. To assess the association between post-intervention pain levels and selected demographic/clinical variables (age, gender, type of cancer, stage of disease, duration of illness, etc.).

### **Hypotheses of the Study**

#### **Research Hypothesis (H<sub>1</sub>)**

- H<sub>1</sub>: There will be a statistically significant reduction in pain scores among cancer patients after the implementation of nurse-led nonpharmacological interventions.

#### **Null Hypothesis (H<sub>0</sub>)**

- H<sub>0</sub>: There will be no statistically significant difference in pain scores among cancer patients before and after the implementation of nurse-led nonpharmacological interventions.

## Operational Definitions

### 1. Effectiveness

In this study, effectiveness refers to the extent to which nurse-led nonpharmacological interventions reduce the level of pain among cancer patients, as measured by the difference between pre-test and post-test pain scores using a standardized pain assessment scale (e.g., Numeric Rating Scale).

### 2. Nurse-Led Interventions

Nurse-led interventions refer to structured nonpharmacological pain management techniques planned and implemented by trained nurses, including activities such as massage therapy, relaxation techniques, music therapy, guided imagery, and patient education, provided during the study period.

### 3. Nonpharmacological Interventions (NPIs)

Nonpharmacological interventions are therapeutic strategies that do not involve medications and are used to relieve pain through physical, psychological, or behavioral approaches. In this study, NPIs include massage, relaxation exercises, guided imagery, and music therapy administered to cancer patients.

### 4. Cancer Patients

Cancer patients refer to individuals diagnosed with any type of malignancy, receiving treatment (such as chemotherapy, radiotherapy, or palliative care), and experiencing pain, who are admitted or attending selected healthcare settings during the study period.

### 5. Pain

Pain is defined as a subjective unpleasant sensory and emotional experience associated with actual or potential tissue damage. In this study, pain refers to cancer-related pain intensity measured using a standardized tool such as the Numeric Rating Scale (0–10 scale).

### 6. Pain Intensity

Pain intensity refers to the severity of pain perceived by the patient at a given time, quantified using a numerical score ranging from 0 (no pain) to 10 (worst possible pain).

### 7. Pre-Test

Pre-test refers to the assessment of pain intensity conducted before the implementation of nurse-led nonpharmacological interventions.

## 8. Post-Test

Post-test refers to the assessment of pain intensity conducted after the implementation of nurse-led nonpharmacological interventions.

## 9. Selected Demographic Variables

These include characteristics such as age, gender, educational status, occupation, type of cancer, stage of disease, duration of illness, and treatment modality, which may influence pain perception and intervention outcomes.

## 10. Selected Clinical Variables

These include medical-related factors such as type of cancer treatment (chemotherapy, radiotherapy, surgery), duration of illness, presence of metastasis, and use of analgesics.

## Methodology

### Research Approach

A **quantitative research approach** will be adopted to evaluate the effectiveness of nurse-led nonpharmacological interventions on pain among cancer patients.

### Research Design

A **quasi-experimental one-group pre-test and post-test design** will be used to assess the change in pain levels before and after the intervention.

### Setting of the Study

The study will be conducted in selected oncology wards/outpatient departments of hospitals in **Madhya Pradesh**.

### Population

The population of the study will include **all patients diagnosed with cancer experiencing pain** in the selected healthcare settings.

### Sample

Cancer patients who meet the inclusion criteria and are available during the data collection period will be selected as the sample.

### Sample Size

A sample size of **300 cancer patients** will be included in the study to ensure adequate statistical power and generalizability.

## Sampling Technique

A **non-probability purposive sampling technique** will be used to select participants based on predefined criteria.

## Inclusion Criteria

- Patients diagnosed with any type of cancer
- Patients experiencing pain (score  $\geq 3$  on pain scale)
- Patients aged 18 years and above
- Patients who are conscious, oriented, and able to communicate
- Patients willing to participate and provide informed consent

## Exclusion Criteria

- Critically ill patients
- Patients with cognitive impairment or psychiatric disorders
- Patients receiving only end-of-life care where participation is not feasible

## Variables of the Study

- **Independent Variable:**  
Nurse-led nonpharmacological interventions
- **Dependent Variable:**  
Pain level among cancer patients
- **Extraneous Variables:**  
Age, gender, type of cancer, stage of disease, duration of illness, treatment modality

## Description of the Intervention

The intervention will include nurse-led nonpharmacological techniques such as:

- Massage therapy
- Relaxation techniques
- Music therapy
- Guided imagery
- Patient education

Each intervention session will be conducted for **20–30 minutes daily for 5–7 days**.

## Data Collection Tools

1. **Section A:** Socio-demographic and clinical variables questionnaire
2. **Section B:** Standardized pain assessment tool
  - Numeric Rating Scale (NRS: 0–10)

## Validity of the Tool

The tool will be validated by experts in the field of **oncology nursing, medical-surgical nursing, and research methodology**.

## Reliability of the Tool

Reliability of the pain scale will be established using **test-retest method** or **Cronbach's alpha**, ensuring consistency.

## Pilot Study

A pilot study will be conducted on **10% of the sample (30 patients)** to assess feasibility, clarity, and reliability of the tool. Necessary modifications will be made before the final study.

## Data Collection Procedure

- Ethical approval will be obtained from the institutional ethics committee.
- Permission will be taken from hospital authorities.
- Informed consent will be obtained from participants.
- Pre-test pain assessment will be conducted.
- Nurse-led nonpharmacological interventions will be administered.
- Post-test pain assessment will be conducted after completion of intervention.

## Plan for Data Analysis

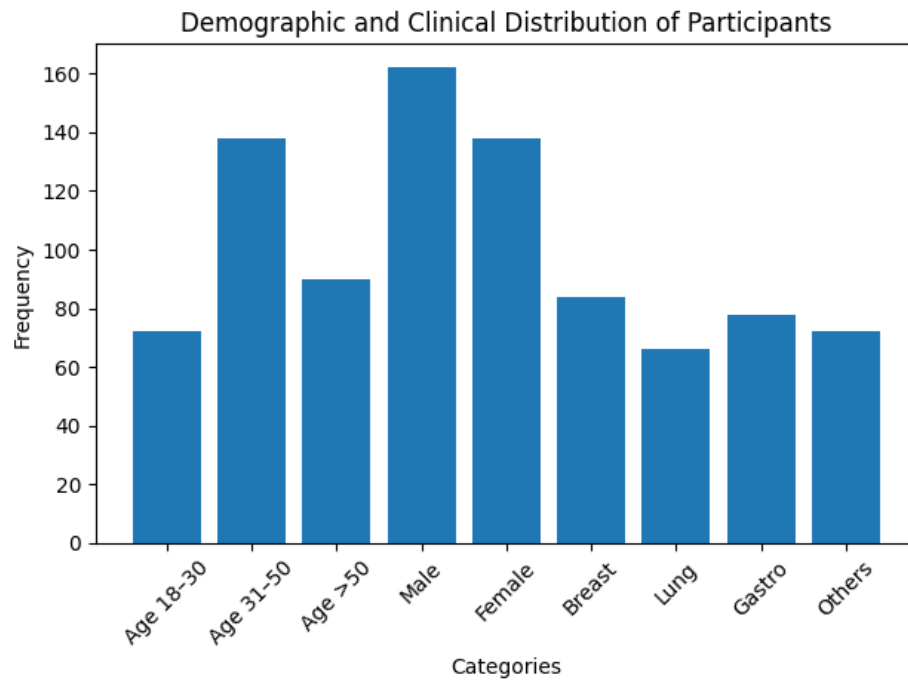
Data will be analyzed using descriptive and inferential statistics:

- **Descriptive Statistics:**  
Frequency, percentage, mean, and standard deviation
- **Inferential Statistics:**
  - Paired *t-test* to compare pre-test and post-test pain scores
  - ANOVA or *t-test* for comparison between groups (if applicable)
  - Chi-square test to find association between variables

## Results

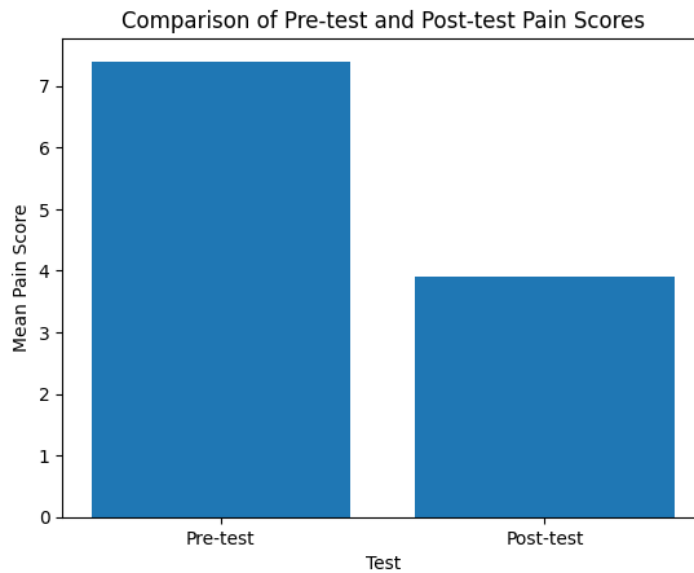
### Section I: Description of Sample Characteristics (N = 300)

Variable	Category	Frequency (f)	Percentage (%)
Age	18–30 years	72	24%
	31–50 years	138	46%
	>50 years	90	30%
Gender	Male	162	54%
	Female	138	46%
Type of Cancer	Breast Cancer	84	28%
	Lung Cancer	66	22%
	Gastrointestinal	78	26%
	Others	72	24%



**Section II: Comparison of Pre-test and Post-test Pain Scores**

Test	Mean	SD	Mean Difference	t-value	p-value	Significance
Pre-test	7.4	1.6				
Post-test	3.9	1.3	3.5	18.72	<0.001	Significant***

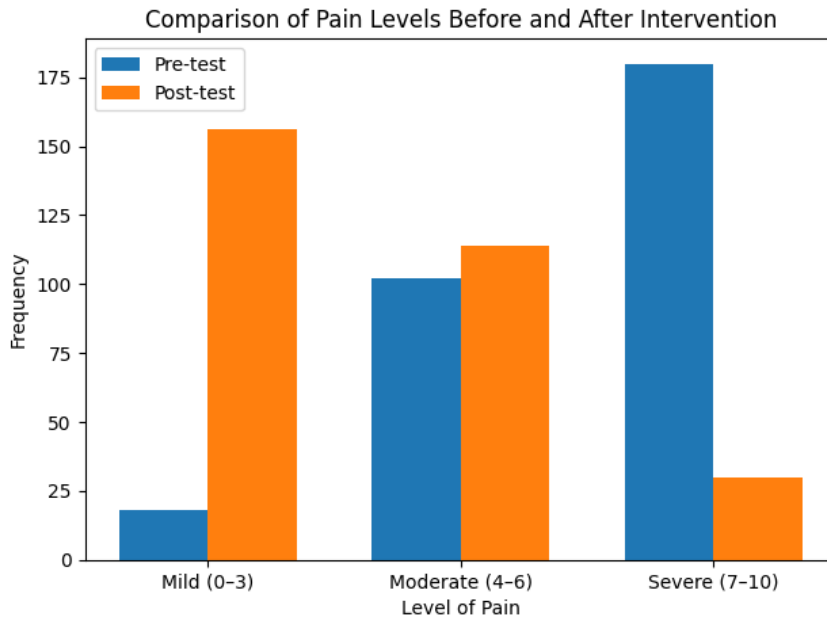


**Interpretation:**

The mean pain score reduced from **7.4 (pre-test)** to **3.9 (post-test)**. The calculated *t-value* (18.72) is highly significant at  $p < 0.001$ , indicating that nurse-led nonpharmacological interventions were effective in reducing pain among cancer patients.

**Section III: Effectiveness of Interventions**

Level of Pain	Pre-test f (%)	Post-test f (%)
Mild (0–3)	18 (6%)	156 (52%)
Moderate (4–6)	102 (34%)	114 (38%)
Severe (7–10)	180 (60%)	30 (10%)



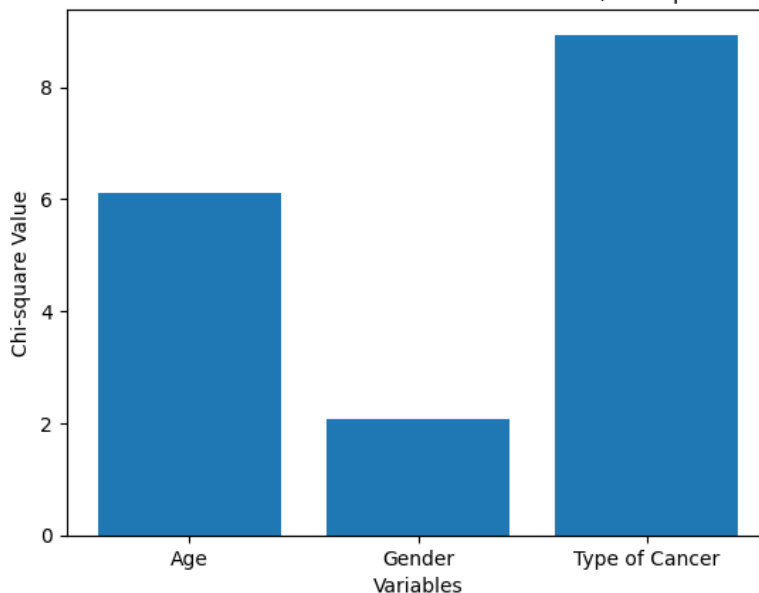
**Interpretation:**

There is a marked reduction in severe pain from **60% to 10%**, and a substantial increase in mild pain category after intervention.

**Section IV: Association Between Post-Test Pain and Demographic Variables**

Variable	$\chi^2$ Value	df	p-value	Significance
Age	6.12	2	0.047	Significant*
Gender	2.08	1	0.149	Not Significant
Type of Cancer	8.94	3	0.030	Significant*

Association Between Variables and Post-test Pain (Chi-square Values)



### Interpretation:

There is a significant association between post-test pain levels and **age** and **type of cancer**, whereas **gender** shows no significant association.

### Overall Findings

- Nurse-led nonpharmacological interventions significantly reduced pain levels.
- Majority of patients shifted from **severe to mild/moderate pain** categories.
- Pain reduction was influenced by **age and type of cancer**.

### Discussion

The findings highlight that nurse-led NPIs are effective in managing cancer-related pain. These interventions work through multiple mechanisms:

- **Physiological:** stimulation of endorphins and relaxation
- **Psychological:** distraction and reduced anxiety
- **Behavioral:** improved coping strategies

Nonpharmacological approaches are especially valuable because they:

- Reduce dependency on analgesics
- Minimize side effects
- Improve holistic patient care

However, variability in intervention protocols and sample sizes may influence generalizability.

### Conclusion

Nurse-led nonpharmacological interventions are effective, safe, and feasible strategies for managing cancer-related pain. Integrating these approaches into standard oncology care can significantly enhance patient outcomes and quality of life.

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