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A study to assess the effectiveness of cryotherapy on knee joint pain among the elderly in a selected rural area of Tirunelveli District

[1]Preetha PS and [2]Dr. Lizy Merlin Lisha

[1] M.Sc. (N), Associate Professor, Department of Community Health Nursing, Sardar Rajas College of Nursing, Tamil Nadu, India

[2]Principal, Department of Child Health Nursing, Sardar Rajas College of Nursing, Tamil Nadu, India

Corresponding Author: Lizy Merlin Lisha

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Abstract

This study examined the effectiveness of cryotherapy in reducing knee joint pain among elderly residents of a rural community in Tirunelveli District. Thirty individuals aged 60–80 years participated in the study. Baseline pain levels were measured using a modified visual analogue scale. Cryotherapy was administered twice daily for seven days, followed by a post-assessment on Day 7. A paired t-test revealed a statistically significant reduction in knee pain ($t = 11.48$, $p > 0.0001$). Findings confirm that cryotherapy is an effective non-pharmacological intervention for managing knee pain among the elderly.

Keywords: Determine, stress, zumba, effectiveness, intervention

Introduction

Knee pain is one of the most common musculoskeletal problems affecting older adults, and its occurrence typically increases with age. Several biological and mechanical factors contribute to this rise. Degenerative changes in joint structures, weakening of supporting ligaments, thinning of cartilage, and age-related inflammatory processes all play an important role in generating discomfort and limiting mobility. In addition, chronic conditions such as osteoarthritis, rheumatoid arthritis, and gout can accelerate tissue breakdown and worsen joint stiffness. Long-term mechanical stress caused by repetitive movements, excess body weight, and reduced muscle strength further elevates the likelihood of knee pain in the elderly population.

Epidemiological studies from different regions consistently show that knee pain prevalence varies across demographic groups. Differences in lifestyle, genetic makeup, occupational habits, and healthcare access influence these variations. Research findings indicate that the incidence of knee osteoarthritis increases significantly after the age of 40 and becomes one of the leading causes of physical disability among older adults. As individuals continue to age, the cumulative wear and tear on the knee joint often results in chronic pain, reduced functional ability, and decreased quality of life.

Cryotherapy, the therapeutic use of controlled cold exposure, has gained considerable recognition for its effectiveness in managing musculoskeletal disorders. When applied to injured or inflamed tissues, cold temperatures trigger vasoconstriction, which temporarily reduces blood flow and limits swelling. Cryotherapy also slows nerve conduction velocity, producing a natural analgesic effect and reducing the sensation of pain. Furthermore, lowering tissue temperature decreases metabolic activity, helping to minimize inflammatory responses and preventing further tissue damage.

In clinical settings, cryotherapy may be applied locally using ice packs, cold compresses, gel packs, or ice massage. Systemic cryotherapy, such as whole-body cryotherapy, exposes the body to extremely low temperatures ranging from −130 °C to −150 °C for short periods—typically 1 to 3 minutes—to achieve rapid cooling effects. These treatments aim to enhance circulation during the rewarming phase, reduce muscle soreness, and improve overall comfort. Some protocols also note that brief exposure within a cryochamber (15–30 seconds during each treatment cycle) enhances therapeutic outcomes by stimulating physiological adaptation responses.

Previous studies involving older adults have repeatedly shown that cryotherapy can significantly reduce knee pain, especially when used consistently for several days. Ice pack application, in particular, is frequently recommended due to its accessibility, affordability, and ease of use. This makes it a practical and valuable tool in community health and geriatric care settings.

Statement of the Problem

A study to assess the effectiveness of cryotherapy on the level of knee joint pain among elderly individuals in a selected rural area of Tirunelveli District.

Objectives
1. To assess the pre-test level of knee joint pain among elderly individuals.
2. To evaluate the effectiveness of cryotherapy in reducing knee joint pain.
3. To identify the association between pre-test knee pain levels and selected demographic variables.

Hypotheses
- **H1:** There will be a significant difference between pre-test and post-test knee pain levels following cryotherapy.
- **H2:** There will be a significant association between the pre-test level of knee joint pain and demographic variables such as age, gender, education, income, habits, exercise, diet, marital status, type of work, and duration of pain.

Research Methodology
A quantitative, pre-experimental one-group pre-test post-test design was adopted for the study to evaluate the effectiveness of cryotherapy. The research was conducted in the Panagudi community of Tirunelveli District, an area with a substantial elderly population. A total of 30 individuals aged 60–80 years who reported knee joint pain were selected through predefined inclusion criteria.
Cryotherapy was administered for 15–20 minutes twice daily, in both the morning and afternoon, over a period of seven consecutive days. Pain levels were measured using the same modified visual analogue scale during both the pre-test and post-test assessments to ensure consistency, reliability, and comparability of data.

Results and Discussion
The findings were interpreted based on the study objectives.

Table 1: Frequency and percentage distribution Pre-test and Post-test Levels of Knee Joint Pain

S. No	Level of Knee Pain	Pre test		Post test	
		(f)	(%)	(f)	(%)
1	Mild	0	0%	30	100%
2	Moderate	15	50%	0	0%
3	Severe	15	50%	0	0%
4	Extreme	0	0%	0	0%

The table shows that before the intervention, half of the participants experienced moderate pain and the remaining half had severe pain. After the cryotherapy intervention, all participants recorded only mild pain.

Table 2: Evaluating the Effectiveness of Cryotherapy (Paired t-test Results)

S. No	Test	Mean	SD	Paired 't' test
1	Pre test	20.73	3.4499	t = 665.09, df = 2.05, $p > 0.05$
2	Post test	13.5	41.00609	

The results in Table 2 show that the mean pre-test score for knee joint pain among the elderly was 20.73 (SD = 3.4499). Following the cryotherapy intervention, the post-test mean decreased to 13.5 (SD = 41.00609). The paired t-test value of t = 665.09, significant at $p > 0.05$, indicates a clear reduction in knee pain and supports hypothesis H1.

The third objective examined the relationship between pre-test pain levels and demographic factors. Similar to the findings of Zenat Khired *et al*. variables such as age, gender, exercise, diet, type of work, and duration of pain showed significant associations with knee pain.

Conclusion
The study confirmed that cryotherapy is an effective non-pharmacological intervention for reducing knee joint pain among the elderly. Regular use of standardized assessment tools along with systematic cryotherapy application can enhance comfort, mobility, and overall well-being among older adults.

Conflict of Interest
Not available

Financial Support
Not available

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