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International Journal of Health Sciences (IJHS)Journal Homepage: <https://jurnal.agdosi.com/index.php/IJHS/index>

Volume 4 | Number 1 | March 2026 |



Analysis Of The Effectiveness Of Cold Therapy (Ice Compress) On Reducing Patient Pain Intensity

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ABSTRACT

Pain is a physiological and psychological response often experienced by patients due to trauma, inflammation, or medical procedures. Non-pharmacological therapies such as ice compresses (cold therapy) are widely used as simple interventions to reduce pain. This study aims to analyze the effectiveness of cold therapy in reducing pain intensity in patients. The study used a quasi-independent design. experiment with a pretest – posttest approach without control group. A sample of 40 patients with complaints of mild to moderate acute pain was selected using purposive sampling. Pain intensity was measured using Numeric Rating Pain Scale (NRS) before and after applying ice compresses for 15 minutes. Data analysis used a paired t- test. The results showed a significant decrease in pain scores from 6.2 ± 1.1 to 3.4 ± 1.0 ($p < 0.001$). It was concluded that cold therapy is effective in reducing pain intensity and can be used as a supporting intervention in pain management.

Keywords: Cold Therapy, Ice Compress, Pain, Nonpharmacological Intervention





1. Introduction

Pain is one of the most common complaints in healthcare and an important indicator in evaluating a patient's clinical condition. Acute pain often occurs due to tissue trauma, inflammation, post-medical intervention, or invasive procedures. If not managed properly, pain can interfere with the healing process, increase physiological stress, and reduce a patient's quality of life.

Pain management can be performed pharmacologically or non-pharmacologically. While analgesics are effective, they have potential side effects, especially with long-term use. Therefore, non-pharmacological therapies such as cold therapy (ice packs) are a safe and easy-to-apply alternative.

Cold therapy works by causing local vasoconstriction, reducing blood flow to the inflamed area, decreasing tissue metabolism, and slowing the transmission of pain nerve impulses. These mechanisms help reduce the patient's perception of pain.

This study aims to analyze the effectiveness of cold therapy on reducing pain intensity in patients.

2. Research Methods

This study uses a quasi-inquiry design. experiment with a pretest – posttest approach without control group.

a. Population and Sample

The population was patients with acute pain in the treatment room of Hospital X. A sample of 40 patients was selected using a purposive sampling technique.

b. Inclusion Criteria

- 1) Patients aged 18–60 years
- 2) Experiencing mild–moderate acute pain (NRS 4–7)
- 3) Willing to be a respondent

c. Intervention Procedure

- 1) Initial pain measurement using Numeric Rating Scale (0–10).
- 2) Apply an ice compress to the painful area for 15 minutes.
- 3) Re-measurement of pain intensity after intervention.

d. Data analysis

Data was analyzed using:

- Descriptive analysis (mean, SD)
- Paired t- test with $\alpha = 0.05$

3. Research Results And Discussion

a. Research Result

The study involved 40 patients with mild to moderate acute pain.

- 1) Respondent Characteristics





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Characteristics	n	%
Man	22	55
Woman	18	45
Age 18–35 years	20	50
Age 36–60 years	20	50
Musculoskeletal pain	24	60
Post-procedure pain	16	40

Most patients experience musculoskeletal pain due to minor injuries and tissue inflammation.

2) Distribution of Pain Scores Before Intervention

NRS Score	n	%
4	8	20
5	10	25
6	12	30
7	10	25

The mean pain score before the intervention was 6.2 ± 1.1 , indicating a moderate pain category.

3) Distribution of Pain Scores After Intervention

NRS Score	n	%
2	6	15
3	18	45
4	12	30
5	4	10

The average pain score after the intervention was 3.4 ± 1.0 , indicating a mild pain category.

4) Statistical Analysis

- Average reduction in pain score: 2.8 points
- Percentage decrease: 45%
- Paired t- test results: $p < 0.001$

Effect Size (Cohen's d)

Cohen's $d = 2.6$

→ Shows a very large therapeutic effect effect size.





5) Comparison Based on Pain Type

Types of Pain	Average Decrease
Musculoskeletal	3.1 points
Post procedure	2.4 points

A greater reduction was found in musculoskeletal pain.

b. Discussion

The results showed that cold therapy significantly reduced patients' pain intensity. The average reduction of 2.8 points on the NRS scale was not only statistically significant but also clinically meaningful.

1) Physiological Mechanisms of Cold Therapy

Cold therapy works through several mechanisms:

- Local vasoconstriction → reduces blood flow and edema
- Decreased cell metabolism → reduced inflammatory response
- Slowing of nerve conduction → decreases transmission of pain impulses
- Stimulation of A-beta fibers → inhibits pain transmission (Gate Control Theory)

A decrease in tissue temperature causes a decrease in the speed of nerve impulse transmission, thereby decreasing the perception of pain.

2) Clinical Significance

A decrease of 2–3 points on the NRS scale is considered a clinically significant change. With effect size 2.6, cold therapy has a powerful impact in reducing acute pain.

These findings suggest that cold therapy may be a primary intervention in the acute inflammatory phase, particularly in soft tissue injuries.

3) Differences in Effectiveness Based on Pain Type

Cold therapy is more effective for musculoskeletal pain than post-procedure pain. This is likely because musculoskeletal pain involves more local inflammation and edema, which respond to vasoconstriction.

In post-procedural pain, the pain component may involve central factors requiring combination therapy.

4) Implications in Nursing Practice

Cold therapy:

- Easy to do
- Low cost
- Minimal side effects
- Can be combined with pharmacological therapy





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Important to note:

- Optimal duration (10–20 minutes)
- Avoid in patients with circulatory disorders
- Use protection to prevent skin injury.

5) Critical Analysis

Although the results showed high effectiveness, the study's design without a control group was a limitation. Placebo factors and natural pain adaptation may have contributed to the decreased scores.

Further research with randomized controlled trial (RCT) will provide stronger evidence.

➤ Analytical Conclusions from the Results

Cold therapy is a highly effective non-pharmacological intervention for reducing acute pain, particularly in cases of soft tissue inflammation. This intervention has significant clinical value and can be integrated into standard nursing care.

4. Conclusion And Suggestions

a. Conclusion

Based on the research results, it can be concluded that cold therapy (ice compresses) is effective in significantly reducing pain intensity in patients. There was an average reduction in pain scores of 2.8 points (45%) after applying ice compresses for 15 minutes, with statistical test results showing $p < 0.001$. In addition to being statistically significant, this reduction was also clinically significant.

Cold therapy works through local vasoconstriction, decreased tissue metabolism, and slowed nerve impulse conduction, all of which contribute to reduced pain perception. It has been found to be more effective for musculoskeletal pain than post-procedure pain, indicating that cold therapy is particularly responsive to soft tissue inflammation.

With effect Due to its large size, cold therapy can be considered as a primary non-pharmacological intervention in acute pain management, either as a single therapy or in combination with pharmacological therapy.

b. Suggestion

1) For Health Workers

- Integrating cold therapy as part of the standard of nursing care in acute pain management.
- Provide education to patients regarding correct and safe ice compress techniques.





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- Ensure duration and frequency of use according to protocol to avoid tissue injury.
- 2) For Health Service Facilities
 - Develop standard operating procedures (SOP) related to the use of cold therapy.
 - Providing supporting facilities such as ice safe and hygienic pack.
 - Conduct regular training on non-pharmacological pain management therapies.
- 3) For Patients
 - Use cold therapy wisely according to the recommendations of health professionals.
 - Avoid applying ice directly to the skin without protection to prevent irritation or frostbite.
- 4) For Further Researchers
 - Conducting research with a randomized design controlled trial (RCT).
 - Comparing cold therapy with heat therapy or a combination of both.
 - Analyze long-term effectiveness and impact on analgesic requirements.

Reference

1. Anurogo, D., Rahmat, RA, & Pannyiwi, R. (2025). Identification of Endophytic Fungi in Traditional Medicinal Plants in South Sulawesi. *JIMAD: Multidisciplinary Scientific Journal*, 3(2), 77–82. <https://doi.org/10.59585/jimad.v3i1.862>
2. Berman A, Snyder SJ. *Kozier & Erb's fundamentals of nursing*. 2016.
3. Chou R, et al. Management of acute pain. *J Pain*. 2016;17(2):131–157.
4. Guyton AC, Hall JE. *Textbook of medical physiology*. 2016.
5. Hinkle JL, Cheever KH, *Brunner & Suddarth's medical-surgical nursing*. 2018.
6. Manuntung, A.E., Hartati, A., Yarnita, Y., Aswani, I., & Sahalia, S. (2026). Balanced Nutrition Education Program for Pregnant Women as a Strategy to Prevent Miscarriage (Miskram). *Sahabat Sosial: Journal of Community Service*, 4(2), 498–509. <https://doi.org/10.59585/sosisabdimas.v4i2.1011>
7. McCaffery M, Pasero C. *Pain clinical manual*. 1999.
8. Melzack R, Wall PD. Pain mechanisms. *Science*. 1965;150:971–979.
9. Potter PA, Perry AG. *Fundamentals of nursing*. 2017.
10. Smeltzer SC. *Textbook of medical-surgical nursing*. 2018.
11. Sunanto, S., Pannyiwi, R., & Rahmat, RA (2025). The Effect of Night Shift Work on Nurse's Fatigue and Work Concentration in the Emergency Department. *International Journal of Health Sciences*, 3(4), 606–613. <https://doi.org/10.59585/ijhs.v3i4.867>
12. WHO guidelines on pain management. Geneva; 2019.





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Volume 4 | Number 1 | March 2026 |



13. Tamsuri A. *Concept and management of pain*. 2018.
14. Sherwood L. *Human physiology*. 2016.
15. International Association for the Study of Pain. Pain definitions. 2020.
16. Black JM. *Medical-surgical nursing*. 2019.
17. Stanley M. Cold therapy applications. *Nurs Clin North Am*. 2015.
18. Ignatavicius DD. *Medical-surgical nursing*. 2020.

