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Research Article

Influence Compress Cold For Lower Intensity Post- operative pain On Fracture Patients With Open Reduction and Internal Fixation (ORIF)

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ABSTRACT

Cold compresses can help reduce swelling and inflammation, and help relieve pain. Pain is one of the signs and symptoms of fractures. Pain after surgery is one of the problems faced by patients. Damaged tissue due to surgical procedures that open the skin triggers pain impulses. The type of surgery Open Reduction Internal Fixation (ORIF) is one of the most widely performed treatments. Open Reduction Internal Fixation (ORIF) functions as a fixation tool or connector for broken bones to return them to their proper shape. The purpose of this study was to determine whether cold compresses could effectively reduce the severity of postoperative pain in fracture patients. This study used a quantitative research design with two groups undergoing experimental treatment (two groups pre-test and post-test). Pharmacological therapy in the control group was effective in reducing pain, the combination of pharmacological therapy and cold compresses in the experimental group provided a more optimal analgesic effect .

INTRODUCTION

Accident Then cross is road accidents involving cars, pedestrians, or other road users, who can cause damage, injury, or death. In Indonesia, on In 2022, an estimated 62,975 cases accident happen, make it happen reason main death (Center Lighting Criminal Police, 2022). Injuries suffered can in the form of broken bone consequence collision hard (Saputra, 2018). Broken bone is damage on structure bones that can caused by by pressure or collision (Ridwan et al., 2019), and if No quick overcome, this causes problem like damage nerves and infections (Nurhayati , 2022).

Open *Reduction Internal Fixation* (ORIF) is method general For overcome broken bones although patient can experience painful post surgery (Saputra et al., 2021). Pain is consequence from damage network and reaction nerves that can triggered by procedure surgery (Setyawati et al., 2018). Using compress cold is Wrong one way to relieve pain. Research show that compress with cold water on temperature 13°C for 10 minutes effective relieve pain (Made, 2020; Khasanah,2021). Temperature the considered ideal in practice nursing For management pain (Zakiyah, 2015).

There is two approach in treatment painful on patient broken bones, namely pharmacological and non- pharmacological approaches pharmacology covering use analgesic in accordance level pain : paracetamol For painful light, NSAIDs and tramadol for moderate pain, and morphine For painful severe. Meanwhile, the approach non-pharmacological covers therapy like compress cold, relaxation, therapy music, and distractions that provide effect positive in relieve pain. Compress cold recognized effective reduce edema, inflation network, and pain because *vasoconstriction* as well as hinder flow blood excessive. This is important Because potential reduce swelling and pain control. Some studies show that patient with closed fracture Can feel more pain A little after use cloth cold. In research Suryani and Soesanto, patients report decline painful from 3 and 2 points respectively after therapy. Another study by Malorung show decline painful from scale 6 to 2 after 3 days usage compress cold. Finally , the research Hardianto also noted decline scale painful from 7 to 2 in three day after use compress cold , showing effectiveness in relieve discomfort post- fracture surgery.

research has differences in time, location, action operation, type tool compress temperature, and homogeneity compared to with study previously. Research previously by Suryani and Soesanto (2020), and Malorung and Hardianto (2022), conducted on 2020 and 2022, while This research was carried out on in 2025 at the Halmahera Siaga Bandung Regional General Hospital. Action the operation under study is *Open Reduction Internal Fixation* (ORIF), with temperature the compress used different ; this study used ice packs on temperature around 13°C, compared to with 13-16°C in study previously. In matter homogeneity, this study divides patient become two group : group receiving control drug without compress cold, and groups experiments that receive drug as well as compress cold. Use compress cold aim For reduce pain , bleeding , and increased flow blood local. From the results studies introduction research also noted that from month August until February 2025, there were 69 patients post-fracture surgery, with majority aged 20-60 years. Implementation compress cold done 8-12 minutes every 8 hours or 3 times in One day, for lower scale pain. Purpose this research is used ensure whether compress cold can in a way effective reduce severity painful post operation on patient broken bone so that writer interested research implementation compress cold For lower intensity painful post- fracture surgery at

the Halmahera Siaga Bandung Regional General Hospital.

METHOD

This research uses design quantitative with two group in treatment Quasi Experiment *(two group pre-test and post-test)* for evaluate degrees reliever painful patient broken bone. Pain measured before *(pre-test)* and after *(post-test)* therapy compress cold , done for 8-12 minutes every 8 hours or 3 times in one day during care. Group control and group experiment get attention through methodology learning based problem.

Population in this research is a object / subject with characteristics certain, in this matter, the whole fracture patients at the Halmahera Siaga Bandung Regional General Hospital in 2025. Sample study is an item of population considered represent overal (Notoatmodjo, 2018) taken through *purposive sampling* that meets criteria inclusion like willing so respondents, experienced fractures with ORIF procedure, patient aware compost mentis, patient various sex male , patient with age range 20-60 years, patients who have do first 12-24 ORIF post- operative measures or in One days, and exclusions like no willing become respondents and fracture patients with complications Sample is 16 respondents for each group.

Data collection on research includes primary data results measurement painful according to SOP from House Pain and secondary data that includes information demographic patient.

Location and time study was carried out at the Halmahera Siaga Bandung Regional Hospital, starting on April 2025 during One month.

Data analysis aims produce meaningful conclusions. Analysis univariate try explain every variables, whereas analysis bivariate see how one variables independent and one variables dependent each other related. Test Shapiro Wilk normality done as step beginning for determine type test appropriate statistics. If the data is normal, the Paired Sample T-test will be used, if No test Wilcoxon will be performed .

This research has accept certificate ethics from commission ethics study general Achmad University Yani Cimahi with number *Ethical Clearance* 010/KEPK/ FITKes-Unjani-IV-2025

RESULTS

Table 1 Frequency distribution of respondents by age and gender sex fracture patients with ORIF procedure

Age	Compress Cold		Without Compress Cold		Total	
	N	%	F	%	N	%
< 35 Years	6	37.5	7	43.8	13	4 0, 6
36-4 5 Years	4	2 5.0	6	3 7 , 5	1 0	31.3
> 4 6 Years	6	37.5	3	1 8 , 8	9	28.1
Total	16	100	16	100	32	100
Type Sex						
Man	16	100.0	16	100.0	32	100.0
Woman	0	0.0	0	0.0	0	0.0
Total	16	100	16	100	32	100

Source: Primary Data, 2025

Based on Table 1, it shows that 13 respondents (40.6%) were aged less than 35. year And also based on Table 1 it shows that all respondents were male, as many as 32 respondents (100%), none were female.

Table 2 Frequency distribution of respondents Pain scale before and after cold compress and without cold compress in fracture patients with ORIF procedure

Pain scale before	**Compress cold**		**Without Compress cold**		**Total**	
	F	**%**	**N**	**%**	**N**	**%**
Nothing painful	0	0,0	0	0,0	0	0,0
Painful light	0	0 ,0	1	6, 2	1	3 , 1
Moderate pain	11	68 , 8	11	68 , 8	2 2	68 , 8
Painful heavy	5	3 1 , 2	4	2 5.0	9	28 , 1
Total	16	100	16	100	32	100
Pain scale after						

Nothing painful	0	0.0	0	0.0	0	0.0
Painful light	16	100.0	7	43.8	23	71.9
Pain medium	0	0.0	9	56.2	9	28.1
Painful heavy	0	0.0	0	0.0	0	0.0
Total	16	100	16	100	32	100

Source: Primary Data, 2025

Based on Table 2 shows scale painful before given action compress cold as many as 11 respondents (68.8%) experienced moderate pain, whereas For scale painful before without action compress as many as 11 respondents (68.8%) experienced moderate pain. And also Based on Table 2 shows scale painful after done action compress cold experience change all respondents as many as 16 respondents (100.0%) experienced painful light there are no more respondents who experienced moderate and severe pain , whereas For scale painful after without action compress cold as many as 9 respondents experience moderate pain.

Table 3 distribution of respondents n=32 Pain scale before and after cold compress treatment for fracture patients with ORIF treatment at Halmahera Siaga Bandung Regional General Hospital in 2025

Variables	Treatment	Mean	Elementary School		Min	Max
Pain scale with compress cold	Before	5.5	1.5916	4		8
	After	1.3	1,5000		1	2
Pain scale without compress cold	Before	5.0	1.4605		3	7
	After	3.0	1.3165		1	4

Source: Primary Data, 2025

Based on Table 3 shows average grade level scale painful before done action compress cold 5.5 after done action compress cold average scale value painful experience decline to 1.3 which means there is a change average scale value painful before and after given action compress cold, minimum value before given compress cold 4 experienced decline after given compress cold 1 value maximum before given compress cold 8 experienced decline after given compress cold 2.

The average value of the pain scale level before the action without cold compress was 5.0 after the action without cold compress the average value of the pain scale decreased to 3.0 which means there was a change in the average value of the pain scale before and after being given the action without cold compress, the minimum value before being given without cold compress 3 decreased after without being given cold compress 1 maximum value before not being given cold compress 7 decreased after without being given cold compress 4. From the data above the average value of the pain scale after cold compress was lower indicating that cold compress is more effective in reducing the pain scale than without cold compress.

Table 4 Shapiro Wilk Normality Test Pain Scale before and after cold compress and without cold compress in fracture patients with ORIF procedure

Variables	Treatment	N	p-value	Conclusion
Pain scale with cold compress	Before	6	0.004	Abnormal
	After	6	0,000	Abnormal
Pain scale without cold compress	Before	6	0.001	Abnormal

Based on Table 4 shows results test normality using Shapiro Wilk p-value is obtained for scale painful before and after with compress cold each as big as before 0.004 <α (0.05) this shows distributed not normal and after 0.000 < α (0.05) this shows the data is distributed not normal, and for the p-value for scale painful before and after without compress cold each as big as before 0.001 <α (0.05) this shows distributed not normal and after 0.000 < α

(0.05) this shows the data is distributed abnormal .

Table 5 distribution Differences in pain scales before and after action compress cold and without compress cold fracture patients with ORIF procedure

Variable Pairs	N	Average	Number of Ranks	Z	Asymp. Sig. (2-tailed)
Pain scale before compression Pain scale after compress	16	8.50	136.00	-3,534	0,000
Pain scale before without cold compress Pain scale after without cold compress	16	8.50	136.00	-3,622	0,000

Based on Table 5 shows results test Wilcoxon presented Z -value count For each variable -3.534 and Sig 0.000, it is concluded that there is significant difference in a way statistics between pain scales after Compression and Pain Scale before compress and for variable -3.622 and Sig 0.000, it is concluded there is significant difference in a way statistics between pain scales after without compress cold and pain scale before without compress cold fracture patients with ORIF action at Halmahera Siaga Bandung Regional General Hospital in 2025.

Table 6 Test Homogeneity of pain scale after action compress cold and without compress cold fracture patients with ORIF procedure

Variable Pairs	Sig	Information
Pain scale after compress and pain scale after without cold compress	0,000	Not homogeneous

Based on Table 6 shows results test *homogeneity* presented that Sig value 0.000 (<0.05), then based on results analysis can concluded that the data is not varies homogeneous .

Table 7 Distribution Differences in pain scales before and after action compress cold and without compress cold fracture patients with ORIF procedure

Group	Mean	Asymp. Sig. (2-tailed)	Information
Cold compress	0,000	0,000	Significant
Without cold compress	50,000	0.003	Significant

Based on Table 7 shows results test Mann-Whiteney obtained mark second group Asymp.sig 2 tailed 0.000 (< 0.005) which means show existence significant difference in a way statistics between second group on level 95% confidence, meaning can concluded there is significant difference in a way statistics between pain scales after without compress cold and pain scale before without compress cold fracture patients with ORIF action at the Halmahera Siaga Bandung Regional General Hospital in 2025.

DISCUSSION

Based on results study show that average scale value painful on group experiment before compress cold is 5,5000 and after compress cold decrease to 1.3750. At group control, average value of the scale painful before is 5,0000 and after without compress cold decrease to 3,0000. This data shows decline scale more pain significant on group experiment compared to group control. Decline scale more pain big on group experiment (4.1250 points)

compared group control (2,0000 points) indicates effectiveness compress cold as therapy non-pharmacological in management postoperative pain in fractures. This finding is consistent with studies meta-analysis by Kusuma et al. (2024) who analyzed 17 studies and found that compress cold lower scale average pain 3.8 points on post- operative patients orthopedics, compared with a decrease of 1.9 points on group control that only accept analgesic standard.

Results test normality use Shapiro-Wilk (Table 5) shows that the data is not normally distributed ($p < 0.05$), so that analysis difference use test Wilcoxon (Table 5). Results test Wilcoxon show Z value calculated -3.534 with Sig. value 0.000 for group experiment and Z count -3.622 with Sig. value 0.000 for group control, which means there is difference significant on scale painful before and after intervention on second group .

Although second group show difference significant, decrease scale painful on group experiment more big compared to group control. This shows that although therapy pharmacological on group control effective in lower pain, combination therapy pharmacological and compress cold on group experiment give effect more optimal analgesics with notes all the patient is given painkillers that is Metamizole, for combination drug only patient with degrees pain 7-8 wearing type drug Narcotics for example (Morphine,Tramadol,Fentanyl) which are used For overcome painful heavy.

This result is in line with study Indarwati & Sulistyorini (2023) who compared effectiveness various intervention non-pharmacological as adjuvan therapy analgesic on post- ORIF surgery patients. Study the find that compress cold has the largest effect size ($d = 0.87$) compared to therapy music ($d = 0.54$) and technique relaxation breath in ($d = 0.63$). On results This study shows that that compress cold effective lower intensity post- ORIF surgery pain in fracture patients. Decrease scale painful from moderate pain becomes painful light after intervention show effectiveness this therapy is significant.

This is in accordance with theory from Hardianto et al. (2021) who explained that compress cold Work by causing vasoconstriction vessels blood, so that reduce flow blood local, lower inflammation , and reduce stimulation nerve nociceptive (receptors painful).

Results This research is in line with what you do by Suryani and Soesanto (2020) show decline pain 2–3 points after compress cold, Malorung (2022) pain decrease from scale 6 to scale 2 after ice compress for 3 days, Hardianto (2022) two respondents show decline painful from scale 7 and 8 to scale 2.

Study latest by Hanifah & Pratama (2024) used modeling computing show that optimal temperature for TRPM8 activation without activates TRPA1 (a channel that mediates painful cold) is 13-16°C, which is in line with with temperature used in this research. This finding explains Why compress cold on temperature the effective reduce painful without cause discomfort excessive on patient.

Compress cold is component important in multimodal management of postoperative pain orthopedics. Study by Permana & Kurniati (2024) shows that addition compress cold on regime analgesic standard (NSAIDs and opioids) reduce opioid needs by up to 35% and accelerate mobilization post -extremity ORIF surgery patients down . Reduction the need for opioids is very high important in context global efforts to reduce risk opioid dependence and effects side related (Pratiwi & Setiawan , 2023).

Besides effect analgesic, compress cold also contributes on acceleration post- operative recovery through various mechanism. According to Handayani & Purwanto (2023)

compression cold reduce bleeding microvascular and extravasation liquid, so that reduce post- operative edema. This reduction in edema improves perfusion tissue and oxygenation create optimal environment for healing wounds . However, this study has superiority from side design, because use two group homogeneous (experimental and control) and measurement done in a way systematically 3 times for 3 days, so that can describe effectiveness therapy in a way more comprehensive .

This research has a number of necessary limitations considered in interpretation results :

a. Homogeneity Sample : All respondents in this research is men, so that results study Possible No can generalized For population women. Differences physiological and perceptual painful between men and women can influence response to therapy compress cold .

b. Term Time Research : This research only evaluate effect compress cold in term short (during the home care period sick). Effect term long therapy compress cold on recovery and rehabilitation post- fracture surgery patients have not evaluated .

c. Variables Confounding : Although study has make an effort control variables confounding factor through criteria inclusion and exclusion, some variables like threshold individual pain, condition psychological patients, and variations in technique operation Possible influence results study.

d. Limitations Measurement : Measurement painful in this research only using a Numeric Rating Scale that relies on report subjective patient. Measurement objective such as physiological parameters (blood pressure) blood, pulse heart) or pain biomarkers No used For complete evaluation subjective .

e. Generalizability : Research done in one House sick (Halmahera Siaga Bandung Regional Hospital), so that results Possible No reflect population fracture patients in other clinical settings with characteristics demographics and protocols maintenance different .

Implications from results This nursing shows that compress cold more effective lower intensity post- ORIF surgery pain in fracture patients with temperature 130 C, done 3 times in One day for 8-12 minutes. proven with decline scale painful from moderate pain becomes painful light after intervention show effectiveness this therapy is significant compared to with pharmacology just.

CONCLUSION AND RECOMENDATION

Based on the results of the study, it was shown that the average pain scale value in the experimental group before the cold compress was 5.5000 and after the cold compress decreased to 1.3750. In the control group, the average pain scale value before was 5.0000 and after without the cold compress decreased to 3.0000.

There was a significant difference in the pain scale before and after the intervention in both groups with a Sig. value of 0.000 for the experimental group and a Sig. value of 0.000 for the control group.

Based on This research is expected to make the house Sick Can add and compile action SOP nursing on patient broken bones, hopefully findings this research can made into input about intervention nursing on patient broken bone besides with method pharmacology .

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