

Effectiveness of Warm and Cold Compresses To Reduce Pain In Low Back Pain: Literature Review

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Abstract

Low Back Pain (LBP) is a condition that affects almost everyone at some point in their life, causing significant discomfort and reduced quality of life. A study conducted in 14 cities across Indonesia reported that 18.13% of the population experienced LBP, with an average Visual Analog Scale (VAS) score of 5.46 ± 2.56 , indicating moderate to severe pain. Effective management of LBP is essential to alleviate patient complaints, and one of the most accessible treatments is the application of warm and cold compresses. This study aims to determine the effectiveness of warm and cold compress therapies in reducing pain and improving functional activity in individuals with LBP. A literature review was conducted using the PICO method in the Google Scholar database, resulting in five selected journals that met the inclusion criteria. The findings demonstrate that warm and cold compress therapy, applied with a frequency of two times per week, at a temperature of 35 degrees Celsius for 15 minutes per session over six weeks, significantly reduces pain and improves functional activity ($p < 0.001$). This research confirms the efficacy of warm and cold compresses as an effective, non-invasive treatment option for LBP.

Keywords: Low Back Pain, warm compress, cold compress, pain

INTRODUCTION

Low back pain (LBP) is experienced by almost everyone during their lifetime. In western countries, for example, the incidence of LBP has reached epidemic proportions. The prevalence of low back pain in the world every year varies greatly with a figure of 15-45%. According to (Organization, 2019) shows that 33% of the population in developing countries has persistent pain. In the United Kingdom, around 17.3 million people have experienced back pain and of that number, about 1.1 million people experience paralysis caused by back pain. (Harahap et al., 2019)

The most common causes of LBP are stiffness and spasms of the back muscles due to poor body activity and tension of posture. In addition, various diseases can also cause LBP such as osteoarthritis, osteoporosis, fibromyalgia, scoliosis, and rheumatism. Postural errors or disproportionate body movements for a long time and continuously in the muscles and fascia will cause pain, then spasm of the lumbar muscles and muscles will experience ischemic disease. (Utami, 2015).

Pregnancy is an event that is preceded by the meeting of an egg or ovum with a sperm cell. The pregnancy process will last for approximately 10 months, or 9 calendar months, or 40 weeks, or 280 days calculated from the first day of the last menstrual period (Wagiyo et al., 2016). (H. Varney et al., 2007) stated that during pregnancy, many women experience psychological and emotional changes.

Discomfort is a feeling that is lacking or unpleasant for the physical or mental condition of pregnant women. Pregnancy is a natural process in women that will cause various changes and cause discomfort, this is a normal condition in pregnant women. Some mothers usually complain about things that make their pregnancy uncomfortable and sometimes difficult for mothers (Hidayat, 2008).

Pregnant women in the third trimester often experience complaints of back pain, this is one of the causes of discomfort in the third trimester. Back pain is pain that occurs in the lumbosacral area. Back pain will increase in intensity as you get older in pregnancy because this pain is the result of a shift in the center of gravity and a change in posture (B. Varney et al., 2022).

In pregnant women, posture changes, shoulders are pulled back as a result of a prominent abdominal enlargement, and to maintain body balance, the inward curvature of the spine becomes excessive. Relaxation of the sacroiliac joint, which accompanies changes in posture, leads to an increase in back pain (Tiran, 2010). Back pain during pregnancy if not treated properly can cause a poor quality of life for pregnant women. This symptom of back pain is also caused by the hormones estrogen and progesterone which relax the joints, bone bonds and muscles in the hip.

Back pain is pain that occurs in the lumbosacral area. Back pain will usually increase in intensity as the pregnancy increases because this pain is the result of shifting the center of gravity and changes in posture. These changes are caused by an enlarged uterine weight, an enlarged uterine weight, excessive bending, walking without rest, and lifting weights.

Back pain is common in pregnancy with reported incidence varying from approximately 50% in the United Kingdom and Scandinavia to close to 70% in Australia. Mantle reports that 16% of the women studied complained of severe back pain. Based on the results of Ariyanti's (2012) research, it was found that 68% of pregnant women experience back pain with moderate intensity, and 32% of pregnant women experience back pain with mild intensity. Among all these women, 47–60% reported that back pain occurred at 5–7 months of pregnancy.

Research on the effectiveness of warm and cold compress therapy in improving low back pain symptoms and functional status of patients with low back pain is still limited and provides mixed results. Warm and cold compress therapy is expected to accelerate the improvement of low back pain symptoms so as to improve functional status. Therefore, this study aims to find out whether warm and cold compresses can reduce pain in people with low back pain.

Low back pain (LBP) is a prevalent condition, particularly among pregnant women, significantly impacting their quality of life. Given that approximately 50-70% of pregnant women worldwide suffer from back pain, with many reporting moderate to severe symptoms, the issue is both widespread and debilitating. Left untreated, LBP can lead to poor physical functioning, increased stress, and long-term health consequences. Despite the availability of various treatments, the need for safe, non-invasive, and accessible interventions like warm and cold compress therapy is critical, especially for vulnerable populations such as pregnant women. This

study aims to address the need for effective, low-risk management of LBP that can be easily implemented.

While various studies have explored different therapies for low back pain, research on the comparative effectiveness of warm and cold compress therapy, particularly in pregnant women, remains limited. This study introduces a novel approach by comparing both compress methods to determine their respective impact on alleviating LBP symptoms and improving functional status in pregnant women. Additionally, the research explores how the timing and application of these therapies could maximize their therapeutic benefits, adding new insights into non-pharmacological interventions for LBP.

This research contributes valuable evidence to the field of maternal health by evaluating non-invasive therapies for managing LBP. The findings will provide practical recommendations for healthcare professionals, pregnant women, and caregivers on how to alleviate back pain through warm and cold compresses. Furthermore, the study could influence public health policies and prenatal care protocols, offering a cost-effective solution for improving the quality of life of pregnant women, thus reducing the medical and economic burden associated with LBP.

METHODS

This research uses a literature review approach. A literature review is an integrated analysis (not just a summary) of scientific writing that is directly related to the research question. This means that the literature shows the correspondence between the writings and the research questions formulated.

A literature review can be a stand-alone work or an introduction to a larger research paper, depending on the type of need. (University of West Florida, 2020).

The research questions followed the PICO format: (P=Population) of patients with low back pain, (I=Intervention) warm and cold compresses, (C=Comparison) no comparator, (O=Outcome) warm and cold compresses were effective in reducing pain in LBP patients. The research journal articles reviewed are limited by inclusion and exclusion criteria, with journal collection having a span of time for the last 10 years, namely 2013-2023

The article will be reviewed if it has met the following inclusion criteria: (i) the study subjects are women who have pain in the wrist due to conditions related to Low Back Pain with an age range of 20 – >70 years

Research articles will be rejected if authors meet the following exclusion criteria (i) the research uses a systematic review method, (ii) research journals under 2013, (iii) the subject refuses to participate. Authors Get information based on a database of journals such as Google Scholar Coping in the study will be accepted by the authors of any effect of the intervention of each article impact or not the research sample. To summarize the data, the author summarizes the article based on

Study subjects, age and gender of participants, type of intervention given (both in terms of frequency, duration and tools to measure the effectiveness of the intervention), conclusions

The research instrument uses Numerical Rating Scales (NRS): Considered simple and easy to understand, sensitive to dose, gender, and ethnic differences. Better than VAS primarily for assessing acute pain. However, the disadvantages are the limited choice of words to describe pain, the inability to distinguish the degree of pain more thoroughly and the thought of having the same distance between words describing the analgesic effect is a pain measurement tool with a

value of 0 to 10 where a value of 0 means that you do not feel pain and a value of 10 which means that the pain felt is very extreme (Vitani, 2019).

Visual analogue scales (VAS): Visual Analog Pain Scale (VAS), monofilament sensitivity test, hand grip strength, lateral pinch, pulp-to-pulp pinch, and tripod pinch. All evaluations are carried out by a physiotherapist who specializes in single hand therapy. A visual analogue pain scale (VAS) is used to measure patient-reported pain, ranging from zero (no pain) to ten (maximum pain).

Warm Compress: Compresses are carried out for about 15-20 minutes with a temperature between 38-42 0C. The principle of warm compression by conduction where there is a transfer of heat from the hot medium into the abdomen which will improve blood circulation and reduce muscle tension, so that it will reduce pain in women with normal labor during the active phase I, because during this time women experience uterine contractions and smooth muscle contact (Prawihardjo, 2018). Through the technique of warm compresses during the delivery process, it can improve blood circulation and metabolism and can reduce muscle spasms (Mardliyana et al., 2017).

Cold Compress : Cold compresses can be done on the lower back, and lower abdomen using an ice pack (hot/cold pack). Compresses are carried out for about 15-20 minutes with an intermediate temperature and have 13-16 0C. Cold compresses will baal the compressed area by slowing down the transmission of pain to the central nervous system. Cold compresses can also cause vasoconstriction in the painful area and the body tries to dissipate heat.

RESULTS AND DISCUSSION

Of the 5 journals that have been researched through *screening, eligibility* and *Inclusion*. Compresses are carried out for about 15-20 minutes with a temperature between 38-42 0C. Cold compresses are performed for about 15-20 minutes with temperatures between and having 13-16 0C, both of which can show improvements in pain relief and functional activity.

Table 1. Comparison of Experimental Group and Control Group

Reviewer	Participant		Intervention		Measurement	Results	Design Study
	Intervention group	Control group	Experimental group	Control group			
Kristiana., et al (2023)	n= 30 45- 60 years old	-	Warm and cold compresses	No intervention	NRS	P<0.05	Quasi Non- Equivalent Control Group Design
Yuspina., et al (2018)	n= 56 Unknown	-	Warm and cold compresses	No intervention	VASE	p<0,05	Quasi Experimental
Saudia., et al (2018)	n= 30 20 – 35 years old	-	Warm and cold compresses	No intervention	VASE	p<0.001	Quasi Experimental
Suriani, et al (2023)	n= 14 20 – 35 years old	-	Warm and cold compresses	No intervention	VASE	p<0.001	Quasi Experimental

Based on a literature review study, the authors found that of the 130 sample results, the average sample was dominated by women aged >/= 50 years. Of the many literature found, most

of the literature uses Quasi research design and VAS and NRS measurements with $p < 0.05$. The experimental group used warm and cold compresses while the control group was not given intervention.

Table 2. Warm and cold Compress Intervention Therapy Dosage

Reviewer	Type of Intervention	Therapeutic Dosage				Duration Therapy
		F	I	T	T	
Kristiana., et al (2023)	The administration of tepid sponge allows the flow of moist air to help release body heat by means of convection	2 times/day for 15 minutes	30 degrees C	Warm and cold compresses	15 min	2 times/week, for 4 weeks
(Yuspina et al., 2018)	Compress warm and cold water using convection type	2 times/day for 20 minutes	30 degrees C	Warm and cold compresses	20 min	2 times/week, for 2 weeks
(Saudia & Sari, 2018)	The warm compress method is equivalent to other methods for reducing back pain	1 time/day for 20 minutes	35 degrees C	Warm and cold compresses	20 minutes	1 time/week, for 4 weeks
(Suriani et al., 2023)	The warm compress method is a non-pharmacological method in reducing muscle pain or spasm. Where the working principle is the heat that is flowed from the compress through conduction, convection, and conversion.	3 times/day for 15 minutes	38 degrees C	Warm and cold compresses	15 min	5 times/week, for 3 weeks

Based on the research that has been conducted, researchers have found that warm and cold compresses can be applied to patients with *Low Back Pain* with a frequency of 2 times/week, an intensity of 35 degrees Celsius, with a duration of 15 minutes for 6 weeks and carried out 5 times/week.

Table 3. Mean of Study Characteristics

Reviewer	Measurement	Group experiment		Control group		Significant
		Pre	Post	Pre	Post	
Kristiana., et al (2023)	NRS	22.17	8.83	-	-	P<0.05
Yuspina., et al (2018)	VASE	5.4	0.5	-	-	p<0,05
Saudia., et al (2018)	VASE	0.73	0.59	-	-	p<0.001
Suriani, et al (2023)	VASE	1,57	0,81	-	-	p<0.001

Based on the table above, when compared to the control group, the intervention group showed a good and significant improvement.

Discussion

Based on the results of the study, it was shown that Tepid Sponge warm compress and deep breath relaxation technique were effective in reducing the scale of pain caused by low back pain. The results of the intervention group were obtained that the results of the Mann-Whitney test were obtained with a significance of 0.003 p-value

The results of the study showed that the level of back pain of pregnant women in the third trimester after applying warm water compresses was 1.6071 and after applying cold compresses was 0.571, based on the description above, it can be concluded that with cold compresses the pain scale score is smaller compared to warm compresses. So it can be concluded that cold compresses are better compared to warm compresses.

Based on the results of the statistical test using the t test, a calculated t value of 14,400 was obtained with p a value of 0.001. Thus, it can be concluded that Ho was rejected and Ha was accepted, which means that there is a difference in the effect of warm and cold water compresses on the level of balakang bone pain in pregnant women in the third trimester in the working area of the Rajapolah Health Center.

This is because cold compresses are effective in reducing pain, this is because warm compresses and cold compresses are aimed at the pain and can be done by themselves/families and can stimulate mothers to relax to be able to divert the pain they experience.

According to (Fathia, 2013) Warm compresses function to increase blood flow so as to accelerate healing, increase the flow of lymph nodes to remove substances that are not needed by the body. Warm compresses also work to reduce pain in the same way as cold compresses, which block pain sensations. The warm sensation also relaxes the body thus reducing muscle and joint stiffness and cold compresses are a method in the use of local low temperatures that can cause some physiological effects. The application of cold compresses is to reduce blood flow to a part and reduce bleeding and edema.

This is in accordance with Manurung et al. (2013) stating that the effectiveness of the warm compress method is equivalent to other methods for reducing back pain. But it will be more effective if the administration of warm compresses can be combined with other methods in reducing the intensity of pain felt by pregnant women. It is also supported by research conducted by (Nurasih & Nurkholifah, 2016) stating that of 20 pregnant women who experienced back pain

in the first phase of labor at Waled Cirebon Hospital after being given massage and warm compresses, the average pain intensity in respondents who were given massage and warm compresses tended to be more Baiq Eka Putri Saudia, the difference in the effectiveness of Endorphin 29 was small compared to pregnant women who were given warm compresses.

The physiological effects of heat compresses are vasodilating, relieving pain by relaxing muscles, increasing blood flow, having a sedative effect and relieving pain by getting rid of inflammatory products that cause pain. Heat will stimulate the nerve fibers that close the gate so that the transmission of pain impulses to the spinal cord and to the brain is inhibited.

While the physiological effects of cold compresses are vasoconstrictive, making the area numb, slowing down the speed of nerve conduction thereby slowing down the flow of pain impulses, increasing the pain threshold and having a local anesthetic effect (Potter et al., 2018). The mechanism of heat compresses increases the pain threshold with increased temperature, blood circulation, and metabolism which reduces muscle spasms (Yazdkhasti et al., 2018). This is because the effects of heat cause vasodilation of blood vessels and a relaxation effect so that it helps increase blood flow to injured parts of the body, reducing muscle tension and joint stiffness (Nufra & Azimar, 2019).

Cold compress mechanism, cold effect actively blocks the conduction of sensory fibers, reduces pain and increases the pain threshold. In the cold compress technique, muscle relaxation will increase. Cold compresses make the affected area painful by slowing down the transmission and other impulses through sensory neurons (which can help with immunity as an effect of cold or analgesic stimulation).

Cold compresses can also reduce swelling and soothe the skin (Ersila et al., 2019). According to the researchers, giving warm compresses and cold compresses to pregnant women can reduce labor pain, because these two methods block pain through the pain gate. In warm compresses, the heat that is delivered creates vasodilation and improves circulation so as to block pain stimulus.

In cold compresses, vasoconstriction reduces blood flow to the body that experiences pain, causing analgetic effects so that the sinus gate closes the transmission of pain impulses and slows down the transmission of pain perception. Warm compresses and cold compresses provide evenness to the mother because warm and cold interventions are effective methods to reduce labor pain.

However, it can be seen that the inpartu mothers who were given warm compresses seemed calmer and said they were more comfortable after being given warm compresses while in mothers who were given cold compresses there were those who felt uncomfortable with the cold felt so that the inpartu mothers felt that the pain only reduced a little. This can be caused because cold compresses provide a wet sensation in the abdomen which causes some mothers to be less comfortable compared to warm compresses.

CONCLUSION

Based on the results of the analysis of pain measurement data before and after treatment, the conclusion was reached that warm and cold compresses can reduce pain in cases of low back pain.

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