



Effectiveness of contrast hydrotherapy on knee pain among osteoarthritis patients

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Article History:

Received on: 02.04.2019

Revised on: 10.07.2019

Accepted on: 15.07.2019

Keywords:

Osteoarthritis,
hydrotherapy,
contrast hydrotherapy,
knee pain,
Heat application,
cold application

ABSTRACT

Many patients with osteoarthritis experiences knee pain, but if untreated, it may lead to chronic knee pain. This may quietly limit the functional abilities and impairs the quality of life. Thus the study was conducted with the aim to determine the effect of contrast hydrotherapy on knee pain. Quasi-experimental research design was adopted with 30 samples who met the inclusion criteria. Samples were assigned into experimental and control group by convenience sampling technique. A pre-test was conducted by using Numerical pain rating scale in both experimental and control group. Contrast hydrotherapy was administered to the experimental group, and the control group was continued with the routine practice. Post-test was conducted after 7 days with the same tool for both the group. Data were analyzed using SPSS. The study findings revealed that contrast hydrotherapy was effective in reducing the level of knee pain at the level of $p < 0.05$ in the experimental group. Contrast hydrotherapy is inexpensive, safer method, does not cost the time, reduce the risk pharmacological intervention and can be affordable by all the participants. This therapy may be recommended in both clinical and community setting to reduce the pain, thereby improves the quality of life.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v10i4.1625>

Production and Hosted by

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INTRODUCTION

Osteoarthritis is the absolute cause for disability in elderly people (Laupattarakasem *et al.*, 2008). Osteoarthritis (OA) is a long haul ceaseless illness portrayed by the weakening of ligament in joints which results in bones scouring together and making firmness, torment, and impeded development.

The malady most ordinarily influences the joints in the knees, hands, feet, and spine and is moderately basic in the shoulder and hip joints (Silman and Pearson, 2002; Akinpelu *et al.*, 2009). Osteoarthritis is a degenerative issue of multifactorial etiology of both modifiable and non-modifiable hazard factors, including heftiness, absence of activity, hereditary inclination, bone thickness, word related damage, injury, and sex (Haq *et al.*, 2003). Patients experiencing osteoarthritis regularly whine of dull hurt agony on development, normally happening when development is started. As osteoarthritis advances, the torment ends up nonstop, and the usefulness of the joint is seriously impaired (Michael *et al.*, 2010). In the world, it is assessed that 10%–15% of all grown-ups matured more than 60 have some level of OA, with higher commonness among ladies than men (World Health Organization, 2017). It is estimated that in Asian countries of India, Pakistan, and Bangladesh showed a higher prevalence of OA knee in rural areas was 13.7% as compared

to 6.9% in urban areas (Fransen *et al.*, 2011). Many patients with osteoarthritis experiences knee pain, but if untreated, it may lead to chronic knee pain. This may quietly limits the functional activities such as walking, climbing or descending stairs and stiffness after a rest period and more dependent on others to meet their daily self-care activities that is brought about by flimsiness or clasping of the joints together with a shortcoming of thigh muscles (Tsaou *et al.*, 2008a; Chen, 2007).

Osteoarthritis is generally analyzed by physical assessment and, where important, with x-ray, MRI and arthroscopy. The treatment of OA includes: treating related agony; visco supplementation with intra-articular hyaluronate infusions; intra-articular corticosteroid infusions; joint substitution medical procedure; and, in uncommon conditions, autologous chondrocyte implantation into the harmed areas (Blagojevic *et al.*, 2010; Hunter and Felson, 2006; Bellamy *et al.*, 2006). All these treatments are more expensive, require hospitalization and a repeated hospital visit. However, there are more risks, and side effects associated with medications and surgery further, all treatment options are not applicable to all patients and will not yield the same results.

The other alternative treatment option for patients with OA of the knees with less risk including obesity management, exercises, short-wave diathermy, TENS, PENS and the use of superficial heat or cold application (Zhang *et al.*, 2007; Cetin *et al.*, 2008). Contrast hydrotherapy is another method of alternative treatment that includes alternate application heat and cold for the treatment of musculoskeletal pain, including osteoarthritis pain. The goal of this treatment is the slow the progress of the diseases, thereby reduce the signs and symptoms. The advantageous impacts of this treatment might be interceded by changing bloodstream, diminishing aggravation, and acceptance of compression and unwinding of veins, diminishing edema, or diminishing solidness of the muscle. Though cold may numb the agony, decline swelling, and tighten veins and square nerve driving forces to the joint (Brosseau *et al.*, 2003). Warmth application detoxifies the metabolic waste, incendiary side-effects and different poisons at the connected part site (Taylor and Lillis, 2001). The physiological impacts of warmth are vaso dilatation, expanded slim penetrability, increasing the speed of cell digestion, muscle unwinding, a quickening of aggravation, torment decrease by loosening up muscles, narcotic impact, and lessening the consistency of the synovial liquid to diminish joint firmness. The physiological impacts of the virus are commonly some-

thing contrary to warm impacts. The impacts of the virus are vasoconstriction, a lull in cell digestion, local anesthesia, a decline in the bloodstream, a decrease of the landing of oxygen and metabolites to the zone and the decrease of residuum evacuation (Berman *et al.*, 2002; and, 2009; Rakek and Barr, 2003; Hanada, 2003). Notwithstanding, the premise of logical information that supports warmth and cold applications could be viable on interminable agonies, for example, the knee OA is frail (Tsaou *et al.*, 2008b) with the nearness of not very many reactions, simplicity of execution, and their non-intrusiveness (Sarzi-Puttini *et al.*, 2005). Investigators also found that many people suffering from knee pain due to osteoarthritis during their community posting. Hence the study was conducted with the hypothesis of a significant reduction in knee pain after the implementation contrast hydrotherapy.

MATERIALS AND METHODS

The research approach used in the study was a quantitative approach by using a quasi-experimental research design. The quasi-experimental research design was conducted with the aim to determine the effectiveness of contrast hydrotherapy on the reduction of pain among patients with osteoarthritis at Gundumedu village in Thiruvallur District. The investigator explained the study and obtained the informed consent from the participants. Samples who met the inclusion criteria were selected by using a convenience sampling technique. The total number of sample was 30 and were assigned into the Experimental group (n=15) and control group (n=15).

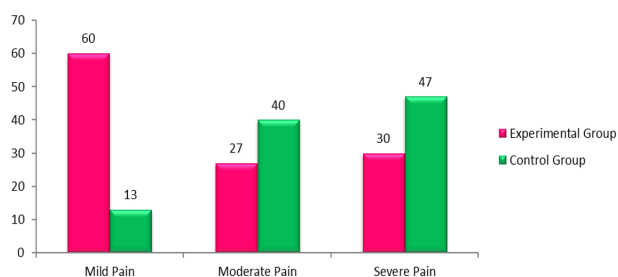


Figure 1: Shows the comparison of the post-test level of pain between the experimental and control group

Osteoarthritis patients with a fracture in the lower limb, peripheral neurovascular problems, lower limb paralysis and restricted movement and severe knee pain, and who are on the other alternative treatment for knee pain were excluded from the study. Demographic variables were collected by using a structured questionnaire. The pre-test

Table 1: Frequency and percentage distribution of demographic variables of patients with Osteoarthritis in the experimental and control group

S.No	Demographic Variables	Experimental Group		Control Group	
		Frequency	Percentage	Frequency	Percentage
1.	Age in years	2	13	1	7
	a. 50-55yrs	5	33	4	27
	b. 55-60yrs	4	27	8	52
	c. 60-65yrs	4	27	2	14
	d. 65-70yrs				
2.	Gender	3	20	4	27
	a. Male	12	80	11	73
	b. Female				
3.	Dietary Pattern	4	27	3	20
	a. Vegetarian	11	73	12	80
	b. Non-vegetarian				
4.	Body Built	4	27	2	13
	a. Underweight	5	33	7	47
	b. Obese	6	40	6	40
	c. Normal				
5.	Occupation	9	60	6	40
	a. Daily wages	3	20	4	27
	b. Home maker	3	20	5	33
	c. Others				
6.	Duration of Pain	4	27	5	34
	a. Less than 1 month	5	33	6	40
	b. 2 - 3 months	3	20	2	13
	c. 4 - 6 months	3	20	2	13
	d. More than 6 months				
7.	Aggravating Factor	6	40	5	33
	a. Mild work	7	47	7	47
	b. Sedentary work	2	13	3	20
	c. Heavy work				
8.	Relieving Factor	6	40	5	33
	a. Rest	8	53	8	54
	b. Analgesics	1	7	2	13
	c. Fomentation				

Table 2: Frequency and percentage distribution of pre-test level of pain in the experimental group and control group

Level of pain	Experimental group		Control group	
	Frequency	Percentage	Frequency	Percentage
Mild	2	13	3	20
Moderate	8	53	5	33
Severe	5	34	7	47

Table 3: Mean and standard deviation of pre-test level of pain in the experimental and control group

Group	Mean	Standard Deviation
Experimental Group	5.93	2.35
Control Group	6.7	1.98

Table 4: Frequency and percentage distribution of post-test level of pain in experimental and control group

Level of pain	Experimental group		Control group	
	Frequency	Percentage	Frequency	Percentage
Mild	9	60	2	13
Moderate	4	27	6	40
Severe	2	13	7	47

Table 5: Mean and standard deviation of post-test level of pain in the experimental and control group

Group	Mean	Standard Deviation
Experimental Group	3.56	1.83
Control Group	5.7	1.48

Table 6: Determine the effectiveness of contrast hydrotherapy on the reduction of knee pain among patients with osteoarthritis

Experimental group	Mean	Standard deviation	Paired 't' test
Pre test	5.93	2.35	18.8
Post test	3.56	1.83	df= 14 P< 0.05

Table 7: Association between the post-test level of knee pain on with the selected demographic variables

Demographic Variables	Mild		Moderate		Severe		Chi-square
	Frequency	%	Frequency	%	Frequency	%	
Gender	1	7	-	-	2	13	X ² =25
a. Male	5	33	6	40	1	7	df=3
b.Female							p=0.001

assessment was done by using the Numerical pain rating scale for both the groups. The experimental group was received the contrast hydrotherapy. It was administered for 30 minutes twice a day for 7 days. Contrast hydrotherapy consists of the alternative external superficial application of heat and cold in both the knees. First applied the moist heat application for 10 minutes followed by a moist cold application for 5 minutes and the same procedure is continued for 30 minutes for both the knees simultaneously. The tolerance and side effects of heat and a cold application was monitored throughout the study. The control group remains in the same treatment. The post-test assessment was done at the end of the seventh day by using the same assessment tool for both experimental and control groups. Data were analyzed by descriptive and inferential statistics using SPSS statistical package.

RESULTS AND DISCUSSION

The present study observed that that majority 5(337%) of the patients were in the age group of 55 – 60 years and 12(80%) were male and non-vegetarian. More than 50% of them are having mild to moderate pain while doing normal physical activity which is aggravated while doing sedentary work and had the habits of taking analgesics for pain in both experimental and control group (Table 1).

The above table reveals that out of 15 samples in experimental group 2(13%) had mild pain, 8(53%) had moderate pain, and 5(34%) had severe pain. Whereas in control group 3(20%) had mild pain, 5(33%) had moderate pain, and 7(47%) had severe pain (Table 2).

Table 3 shows that the pre-test means a score of pain in the experimental group was 5.93 with a standard deviation of 2.35 and the control group; the mean score was 6.7with 1.98 standard deviations.

The above table portrays that out of 15 samples in experimental group 9(60%) had mild pain, 4(27%) had moderate pain, and only 2(13%) had severe pain. Whereas in control group 2(13%) had mild pain, 6(40%) had moderate pain, and 7(47%) had severe pain (Table 4 & Figure 1).

The above Table 5 reveals the post-test mean score and standard deviation in of experimental control group was 3.56 ± 1.83 and 5.7 ± 1.48 .

Within the experimental, the effectiveness of contrast hydrotherapy was analyzed by paired t-test which revealed that there was a difference in the pre-test (5.93 ± 2.35), and post-test (3.56 ± 1.83) mean value in the experimental group and found statistically significant at the level of $p < 0.05$ revealing that the intervention is beneficial in reducing the knee pain (Table 6).

Chi-square test reveals that the post-test level of pain is significantly associated with the gender in demographic variables of the experimental group at the level of $p < 0.001$. It shows that gender is highly associated with knee pain (Table 7). Osteoarthritis is a degenerative sickness brought about by aggravation, breakdown, and the inevitable loss of joint ligament and underlying bone. The primary aim of osteoarthritis treatment is to control symptoms, slow progression of the disease and improve joint function. Treatment plans often involve lifestyle modifications (e.g., weight loss, exercise), physical therapy, medication and alternative and complementary interventions. The main focus of the current study is to determine the effectiveness of contrast hydrotherapy on osteoarthritis knee pain. The demographic variables of the present study findings reveal that the majority of them were in older adult and female. Obesity also is in the highest percentage. This finding is closely in line with another study, who detailed that the occurrence of osteoarthritis ascends with age and the predominance increments generously after the age 50 years in ladies and 55 years in men (Davis et al., 1988; Archanah et al., 2018) and also OA is more common in women than men (Shehata and Fareed, 2013). The present study intensively analyzed with contrast hydrotherapy and observed that there is a significant reduction in pain in the experimental group who had received the contrast hydrotherapy whereas in the control group who had routine practice had no reduction in the level of pain. This finding is consistent with another study who also found that an alternate hot and cold compress was effective in the management of pain and improved the range of motion in case of OA of knees (Denegar et al., 2010). But the present study is limited to assess the range of

motion. In another study who conducted a comparative study on effect cold, warm or Contrast Therapy on controlling of osteoarthritis which observed that all of the three methods of therapy resulted in improvement in all knee side effects and torment however the most proper convention of treatment to remember side effects and torment was contrast therapy. Similarly, Jain Raj and Shiny Mol found that revulsive compress had a significant reduction in knee arthritis symptoms and pain. However, the current study analyzed only pain and other symptoms related to osteoarthritis. The finding is also confirmed by the study conducted by Dengar et al., who reported that contrast therapy gave the best improvement altogether KOOS and torment scores than cold or warm treatment (Denegar et al., 2010). These investigation discoveries are upheld the outcomes and speculation of the present examination.

CONCLUSION

The finding of the present study concludes that contrast hydrotherapy is significantly effective in reducing the knee pain without side effects among patients with osteoarthritis, thereby improve the functional ability, health status and quality of life. Moreover, both hot and cold application is inexpensive, safer method, does not cost the time, reduce the risk pharmacological intervention and can be affordable by all the participants. This therapy may be recommended in both clinical and community setting.

ACKNOWLEDGEMENT

The authors would like to thank all the participants for their active participation to complete the study successfully.

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