

The Effect Of Commercial Hot Pack Therapy And Isometric Exercise On Pain Reduction In Knee Joints Osteoarthritis In Elderlyposyandu Incepokokuning, Batang District

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Abstract

Background: Osteoarthritis is a non-inflammatory degenerative joint disease that characterized by degeneration of joint cartilage, bone hypertrophy at the edges, and changes in the synovial membrane, accompanied by pain and inflexibility (Novak, 1998). This disease causes pain and disability in patients and that's disrupt patients daily activities and inhibit the function to do functional tasks. So in order to reduce pain in the condition of knee osteoarthritis, the physiotherapy actions that will be carried out in this study are training in a combination of commercial hot pack therapy and isometric exercise. The purpose of this study was to determine the differences in the effects of commercial hot packs and isometric exercise for decreasing knee joint pain in the elderly with osteoarthritis. **Research Methods:** This study uses an experimental method with randomized pre and post test control group design that compares the treatment of two groups. A total of 14 samples were determined using purposive sampling technique. The sample was divided into 2 groups, group 1 with the treatment of commercial hot pack therapy and group 2 with the treatment of training combination of commercial hot pack therapy and isometric exercise. Exercise is carried out for 6 weeks with a frequency of interventions 1 time a week for both commercial hot pack therapy and a combination of commercial hot pack therapy and isometric exercise training. The measuring instrument used is the VRS (Verbal Rating Scale) pain scale. **Results:** Hypothesis I test results using the Wilcoxon sign rank test obtained p value = 0.011 ($p < 0.05$) and the results of the hypothesis II test using Wilcoxon sign rank test obtained p value = 0.015 ($p < 0.05$) which means that both treatments has an influence on decreasing elderly knee pain with osteoarthritis in each group. The results of hypothesis III using the Mann-Whitney U test obtained p value = 0.128 ($p > 0.05$) which means there is no difference in the effect of commercial hot pack therapy and combination training of commercial hot pack therapy with isometric matrix on decreasing knee pain in elderly with osteoarthritis. **Conclusions:** There is no difference in the effect of commercial hot pack therapy and training in a combination of commercial hot pack therapy with isometric exercise on pain relief in osteoarthritis of the knee joint. **Suggestion:** For further research, you can control samples from a variety of activities.

Keywords: Commercial Hot Pack Therapy, Isometric Exercise, Knee Pain, Osteoarthritis, VRS Scale.

Introduction

Elderly is the final stage of development in the human life cycle and is characterized by the failure of a person to maintain a balance of health and physiological stress conditions. At the age of 45-50 years (pre-elderly) a lot of older people who experience the pain of the knee joint is often called with osteoarthritis. Even that complaints also often disrupt all activities they do in their daily lives.

The elderly Posyandu is an integrated service post for the elderly in a certain agreed area, driven by the community where they can get health services. One area that has developed elderly Posyandu activities in Batang is Cepokokuning Village under the management of Batang III Health Center located on Jalan Pemuda No. 184, Kelurahan Cepokokuning Batang, Batang, Central Java. In 2009,

Puskesmas Batang III began to form a fostered village and established the elderly posyandu, which was later given the name Cepokokuning Elderly Posyadu. The number of elderly who participated in the Cepokokuning Elderly Posyandu activity consisted of 55 elderly people, 10 men and 45 women. The daily activities of the elderly who are in the Cepokokuning posyandu are work as farmers. Musculoskeletal problem that are often experienced by the elderly during check-up or health consultations at the health staff at the Batang III Community Health Center in the elderly Cepokokuning are knee joint pain with osteoarthritis and its about 60-70% of the total. Through the implementation of the Posyandu, it is hoped that the elderly can increase the health services, which in turn can contribute to efforts to reduce the limitations of

functional activity in the elderly with osteoarthritis.

Osteoarthritis is a joint degenerative disorder that is most commonly found in the community, especially in the elderly. More than 80% of people over 75 years of age suffer from Osteoarthritis. In Indonesia the prevalence of knee OA that appears radiologically reaches 15.5% in men and 12.7% in women aged between 40-60 years. Osteoarthritis (OA) is a degenerative joint disease associated with joint cartilage damage, where there is a complex interactive degradation process of the joint, consisting of repair processes in the cartilage, bones and synovium followed by secondary components of the inflammatory process (Felson, 2009).

Degenerative joint disease can cause physical disability in several levels, that is the level of impairment (joint damage, especially those that cause joint problem), the level of disability (physical disability resulting in disruption of activity of daily living), and handicap (unable to adjust to the environment due to obstacles psychological, social, and vocational because of the physical disabilities he suffered) (Brandt, 2000).

Problems in the elderly with osteoarthritis include pain, limited scope of joint motion, decreased of muscle strength, stiffness in the morning, limited daily activities. Physiotherapy interventions that can be given in osteoarthritis conditions are commercial hot pack therapy and isometric exercise.

Commercial hot pack therapy is a conductive way of delivering moist heat to clients / sufferers. Some commercial hot packs are generally made of canvas and filled with silica gel. Commercial hot packs are available in various shapes and sizes and can be reused. Commercial hot packs are immersed in water at temperatures around 77 ° C (170 ° F) in thermostat-controlled heat. Commercial hot packs can store heat for about 10 to 20 minutes. The results of this study are consistent with research conducted by Rasyidah (2011) about the effect of warm compress techniques on changes in joint pain in gout patients, which

in this study states that there are differences in the average pain scale before giving warm compresses and after giving warm compresses and can be concluded that there is an effect of warm compresses on changes in joint pain in gout patients. This is due to the stimulation used to reduce joint pain by using warm compresses. Place the commercial hot pack on the knee joint. Set a timer for 10-20 minutes. Check client reports and check the skin for 5 minutes preheating. At the end of the intervention, remove the commercial hot pack and dry the client's skin from sweat after application. Check skin condition and general physiological response to heating. Return the commercial hot pack to the heating unit and reheat it for at least an hour and a half before using it again.

Muscle weakness, especially quadriceps muscles, has been known to be strongly associated with knee OA. Quadriceps weakness in knee OA is caused by neuromuscular inhibition that occurs due to pain and effusion, and disuse atrophy due to inactivity. Research shows that quadriceps muscle weakness can also occur before OA and is a risk factor for knee OA (Brand KD, 2003). Therefore, strengthening the quadriceps muscles become the focus of strengthening exercises for knee OA patients. Isometric exercise techniques consist of: (1) Quadriceps setting exercises; the patient is in a supine or seated position and the knee is in extension position and the ankles are flexed. The patient is given the command "press your knees down, and tighten your thigh muscles". The contraction is held for 6 seconds, rest 4 seconds, and then the contraction again. Training is performed 8-12 repetitions, (2) Straight leg rising exercises; the patient is supine. The patient is instructed to contract the quadriceps, then the leg is raised about 45 ° flexed hip while the knee remains extended. The limb is held in that position for a count of 10 then the leg is lowered and rested for 5 seconds. Repeat the movement until at least 10 times for each leg. In accordance with the patient's ability, the legs can be lowered 30 ° or 15 ° hip flexion to increase the burden on quadriceps, or by adding a weight to the ankle,

(3) Addometric isometric exercises ; position the patient lying supine in position. A small pillow is inserted between the knees. The patient is ordered to do hip exercises. sometime adduction while pressing pillows between the knees and maintaining adduction by contraction for 5 seconds, 10 repetitions, 2-3 sets. This exercise is done at least 3 times a week for 4 weeks .

Discussion

1. Characteristics of Respondents

Based on Table 1. The majority of group-1 respondents were women (100%), elderly aged 56-60 years (42.9%) and aged 61-65 years (42.9%), with a BMI at risk (42.9%) , and farmer activities (42.9%).

Table 1 .Characteristics of Group-1
Respondents (n = 7)

Characteristics of Group-1 Respondents	Frequency	Percent (%)
Age		
50 - 55 years old	0	0.0
56 - 60 years old	3	42.9
61 - 65 years old	3	42.9
66 - 70 years old	1	14.3
Gender		
Man	0	0.0
Woman	7	100.0
BMI		
Normal	2	28.6
Risky	3	42.9
Obesity I	1	14.3
Obesity II	1	14.3
Activity		
Farmers	3	42.9
Trade	2	28.6
Housewife	2	28.6

Source: (Primary data, 2019)

Based on Table 2 . The majority of group-2 respondents were women (85.7%), elderly aged 56-60 years (42.9%) and aged 61-65 years (28.6%), with obesity BMI I (42.9%), and the activities of farmers (42.9%) and housewives (42.9%).

Table 2 . Characteristics of Group 2
Respondents (n = 7)

Characteristics of Group-2 Respondents	Frequency	Percent (%)
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Age		
50 - 55 years old	1	14.3
56 - 60 years old	3	42.9
61 - 65 years old	2	28.6
66 - 70 years old	1	14.3
Gender		
Man	1	14.3
Woman	6	85.7
BMI		
Normal	1	14.3
Risky	2	28.6
Obesity I	3	42.9
Obesity II	1	14.3
Activity		
Farmers	3	42.9
Trade	1	14.3
Housewife	3	42.9

Source: (Primary data, 2019)

The selected population is the elderly in the Cepokokuning Elderly Posyandu Batang District, which amounted to 14 elderly with an age range between 55-70 years. Respondents characteristic by gender, percentage of women in the population and in samples taken predominantly by women, it is in accordance with Maini, (2007) that osteoarthritis in men before the age of 50 years higher than women, but after the age of 50 years the prevalence is higher of women suffering from osteoarthritis than men. This is expected because at the age of 50-80 years women experience a significant reduction in theestrogen hormone. Osteoarthritis is more common in women, this indicates a hormonal role (Soeroso et al., 2007). The incidence of OA in women increases sharply along with menopause (Jordan, 2006). At the time of menopause there is a decrease in estrogen secretion (Jones, 2002) . At the age of 45-55 years osteoarthritis is more common in women (Stitik, 2006).

Respondents characteristic by activity is in treatment with commercial hot pack therapy had the most respondents with activity as a farmer is 3 respondents. Likewise in the treatment group with a combination of training in commercial hot pack therapy and isometric exercise , most respondents had activities as farmers and

housewives, each with 3 respondents. Osteoarthritis is found in heavy physical workers, especially those who use a lot of strength that is resting on the knee. A higher prevalence of knee osteoarthritis is found in porters, farmers and miners compared to workers who do not use knee strength much like administrative workers. There is a significant relationship between work that uses knee strength and the incidence of knee osteoarthritis (Maini, 2007).

Characteristics of the sample by age is in group-1 has a sample aged 56-60 years there are 3 respondents and aged 61-65 years there are 3 respondents. Whereas in group-2 it has the most samples at the age of 56-60 years, that is 3 respondents. This shows that the incidence of knee osteoarthritis is influenced by age. Age is the biggest risk factor for OA (Markenson, 2004). OA almost never occurs in children and rarely occurs under 40 years and often occurs above the age of 40 to 60 years (Soeroso, 2007). The aging process is thought to be a cause of increased weakness around the joints, decreased joint flexibility, cartilage calcification and decreased chondrocyte function, all of which support the occurrence of OA. The Framingham study showed that 27% of people aged 63-70 years had radiographic evidence of suffering from knee OA, which increased to 40% at age 80 or older. Another study proves that the risk of someone experiencing symptoms of knee OA is starting at the age of 50 years. Studies of spasticity in OA have found that there is a decrease in flexibility in elderly patients with knee OA.

Characteristic respondents by IMT are in group 1 had the most respondents with criteria I obesity (BMI = 25 to 29.9), ie 1 respondent and risk (BMI = 23 to 24.9), there are 3 respondents. Likewise in group-2 the most respondents with criteria with obesity criteria I (BMI = 25-29.9) are 3 respondents and at risk (BMI = 23-24.9) there are 2 respondents. Obesity is one of the risk factors that influence genu osteoarthritis. This happens because when walking half the weight will rest on the knee joint so that when obese, the knee joint will receive excessive weight. That is what

causes osteoarthritis. Based on research conducted in the Internal Medicine Poly Hospital of Jambi Province Raden Mather showed that most patients with osteoarthritis genu is obesity which is 55.4% (Khairani, 2012). According to research from Grotle (2008), in addition to age, excess body weight, especially obesity also plays a role in the pathogenesis and pathophysiology of OA, especially in the development of knee disease to a higher degree. The role of metabolic and hormonal factors in the relationship between OA and obesity is also supported by the link between OA and coronary heart disease, diabetes mellitus and hypertension (Soeroso, 2006). This illustrates that age and BMI have a relationship to the incidence of osteoarthritis, where osteoarthritis tends to occur in the elderly and obesity.

The respondent characteristic by activity is in group 1 had the most respondents with activity as a farmer is 3 respondents. Likewise in group-2, the respondents with the most activities were farmers and housewives, each with 3 respondents. Osteoarthritis is found in heavy physical workers, especially those who use a lot of strength that is resting on the knee. A higher prevalence of knee osteoarthritis is found in porters, farmers and miners compared to workers who do not use knee strength much like administrative workers. There is a significant relationship between work that uses knee strength and the incidence of knee osteoarthritis (Maini, 2007).

2. Descriptive data analysis of knee pain with VRS Scale in elderly with osteoarthritis in group-1 and group-2

Pain assessment was carried out to determine the level of pain in elderly knee pain with osteoarthritis using the VRS scale, where respondents were examined for pain before and after treatment then the researchers filled out the form provided in accordance with the subject's complaints. VRS score assessment is done before and after the training, the results of which can be seen in Table 4.

Table 3 . Descriptive of the Knee Pain Scale
with Group-1 and Group-2 VRS Scales

VRS scale	Group 1 (n = 7)		Group 2 (n = 7)	
	Before	After	Before	After
Minimum	3	0	3	0
Value	4	2	4	1
Maximum	1	1	1	1
Value	3,714	.857	3,571	0.142
Range	.487	0.690	0.534	.377
Average				
Standard				
intersection				

Source: (Primary data, 2019)

Based on the results of Table 3 . above, shows that the mean decrease in VRS Pain Scale after 6 weeks in group-1 (commercial hot pack therapy) is 0.857 with standard deviation of 0.690, while the mean reduction in knee pain after 6 weeks in group-2 (combination training of commercial hot pack therapy and isometric exercise) is 0.142 with a standard intersection of 0.377. Thus, the mean decrease in VRS scale after 6 weeks in group-2 is greater than group-1.

3. Normality Test

As a prerequisite to determine the statistical test that will be used, normality and homogeneity of data from the test results before and after the training is conducted . Test for normality using the Saphiro Wilk test for all independent and dependent variables, the results of which are listed in Table 4.

Table 4 . VRS Scale Pain Normality Test
Results Before and After Group-1 and
Group-2 Treatment

Data Group	Saphiro Wilk - Test p-value	Distribution Information
Group-1 Pre	0,000	Abnormal
Group-1 Post	0.099	Normal
Group-2 Pre	.001	Abnormal
Group-2 Post	0,000	Abnormal

From Table 4 . above shows that the results of the distribution normality test obtained data in group-1 before the intervention obtained $p = 0,000$ ($p < 0.05$) which means that the data is not normally distributed and after the intervention

obtained $p = 0.099$ ($p < 0.05$) which means that the data have a normal distribution. In group-2 before the intervention $p = 0.001$ ($p < 0.05$) which means the data is not normally distributed, after the intervention $p = 0,000$ ($p < 0.05$) which means the data is not normally distributed.

4. To determine the effect of commercial hot pack therapy on decreasing knee pain in the elderly with osteoarthritis, the Wilcoxon sign rank test is used because it has data distribution before the intervention is abnormal and after the intervention is normally distributed .

Table 5 . VRS Scale Pain Value in Group-1

Group 1	The mean	Elementary school	P.	Conclusions
Pre	3,714	.488	0.011	Ho refused
Post	.857	0.690		

From the test results obtained with a value of $p = 0.011$, meaning that $p < 0.05$ so that H_a is accepted and H_o is rejected. So it can be concluded that there is an effect of giving commercial hot pack therapy to decrease knee pain in the elderly with osteoarthritis between before and after the intervention.

This pain reduction shows the effect produced from commercial hot pack therapy which affects the circulation of pain. Biological effects produced by vasodilation of blood vessels will increase blood circulation, increase permeability and tissue regeneration, cause muscle relaxation thereby reducing pain (MOH RI, 2009). With the vasodilation of blood vessels, pain will decrease. This is due to the presence of a sedative effect on the sensory nerves in painful tissue that will release the substance "P" where the substance "P" is, removing the remnants of metabolism and increasing blood circulation that can penetrate the area of pain so that pain can be reduced. With reduced pain, the tissue will relax and decrease muscle spasm (Sujono, 2001).

5. Hypothesis II Test (Testing for decreasing knee pain with VRS scale on a combination

of commercial hot pack therapy and isometric exercise training)

To determine the effect of a combination of commercial hot pack therapy and isometric exercise training on the reduction of knee pain in the elderly with osteoarthritis, the Wilcoxon Sign rank test was used because it has data distribution before the intervention is abnormal and after the intervention is not normally distributed.

Table 6 . VRS Scale Pain Value in Group-2

Group 2	The mean	Elementary school	P.	Conclusions
Pre	3,571	0.535		
Post	.143	.378	0.015	Ho refused

From the test results obtained with a value of $p = 0.015$, meaning that $p < 0.05$ so that H_a is accepted and H_o is rejected. So it can be concluded that there is an effect of providing a combination of commercial hot pack therapy and isometric exercise training on the reduction of knee pain in the elderly with osteoarthritis between before and after the intervention.

The physiological effect of muscle strengthening is hypertrophy in which the size of the muscles increases due to the increase in the size of the muscle fibers which are mainly muscle type II and myofibril , the total amount of contractile protein, capillary density and the amount of connective tissue, tendons and ligaments. With the increase in the size of muscle fibers, it is expected that there will be an increase in strength and endurance in the muscles (Tuhulele, 2016).

6. Hypothesis III Test (Test the difference in the decrease in the VRS scale between the provision of commercial hot pack therapy with a combination training of commercial hot pack therapy and isometric exercise to reduce pain in osteoarthritis of the knee joint)

Table 7 . Mann-whitney U Test Results
in Group-1 and Group-2

Group	The mean	Std. Deviation	P.	Information
Decreased Group-1 Pain	-2,857	.378	0.128	There is no significant difference
Decreased Group-2 Pain	-3,429	0.535		

In this compatibility test using the Mann-Whitney U test , because the distribution of data both in group-1 and group-2, the data is not normally distributed, both the value of the VRS pain scale before and after treatment. This test aims to compare the value of the VRS pain scale after group-1 intervention with group-2. From the test results obtained p value = 0.128, which means $p > 0.05$ which means that H_o is accepted which means there is no significant difference in the value of the VRS pain scale between group-1 and group-2 after the intervention was given.

The limitation faced by the author in conducting this research is that the researcher cannot control the activities carried out by respondents who can influence functional activities, and the researcher must convey the objectives and give instructions slowly so that the respondent understands the purpose of this intervention, because of the age factor.

Conclusion

There is an effect of commercial hot pack therapy with a combination of commercial hot pack therapy training and isometric exercise on pain relief in osteoarthritis of the knee joint .the mean decrease in VRS Pain Scale after 6 weeks in group-1 (commercial hot pack therapy) was 0.857 with a standard deviation of 0.690, while the mean reduction in knee pain after 6 weeks in group-2 (combined training of commercial hot pack therapy and isometric exercise) was 0.142 with a standard intersection of 0.377. Thus, the mean decrease in VRS scale after 6 weeks in group-2 is greater than group-1 .

Hypothesis I test results; value of $p = 0.011$, meaning that $p < 0.05$ so that H_a is accepted and H_o is rejected. So it can be concluded that there is an effect of giving commercial hot pack therapy to decrease knee pain in the elderly with

osteoarthritis between before and after the intervention. And the results of hypothesis testing II; value of $p = 0.015$, meaning that $p < 0.05$ so that H_a is accepted and H_o is rejected. So it can be concluded that there is an effect of providing a combination of commercial hot pack therapy and isometric exercise training on the reduction of knee pain in the elderly with osteoarthritis between before and after the intervention.

Acknowledgement

Acknowledgments researchers convey to all parties involved in this study, especially to all respondents, Posyandu Elderly Cepokokuning and Head of Puskesmas Batang III Batang Regency has given the opportunity for researchers to assist in the entire research process conducted at the location. Acknowledgments The researchers also convey to all those who have helped in the implementation of this research .

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