

Original Research

# The Effect of Ginger Compress Therapy and Kinesiotaping on Pain and Stiffness in the Joints and Functional Ability in Elderly with Osteoarthritis



Achmad Syukkur<sup>1\*</sup>, Maria Astrid<sup>1</sup>, & Sutanto Priyo Hastono<sup>2</sup>

<sup>1</sup>STIK Sint Carolus, Jakarta, Indonesia

<sup>2</sup>Universitas Indonesia, Depok, Indonesia

Article Info	Abstract
Article history: Received: 4 September 2020 Accepted: 13 November 2020	<i>Introduction:</i> Osteoarthritis is a slowly progressive non-inflammation in diarthrodial (synovial) joints which increasingly occurs as one ages, showing such initial symptom as pain in the joints during activities. The pain gets worse over time, causing the obstruction of joint movements and affects the patient's functional ability. The aim of the study was to identify the effect of red ginger compress therapy and kinesio tapping on pain and stiffness in the joints and functional ability.
Keywords: Osteoarthritis, pain, joint stiffness, functional ability	<i>Methods:</i> This research used the Quasi Experiment pre and post test design with control group. A simple random technique to collect 112 respondents who were divided into intervention group receiving red ginger compress therapy, kinesiotaping group, combination of red ginger compress therapy and kinesiotaping group, and control group, each of which consisted of 28 respondents in Pangesti Elderly Home Lawang and Pangesti Tresno Mukti Elderly Home Turen. <i>Results:</i> Evaluation based on WOMAC index was applied on day one, three, five and seven. The result of ANCOVA showed the red ginger compress intervention with $p = 0.005$ , kinesiotaping with $p = 0.005$ and red ginger compress + kinesiotaping with $p = 0.005$ in reducing pain, joint stiffness and difficulty functional ability. <i>Conclusion:</i> This research findings are expected to be one of non-pharmacological therapies recommended to patients with OA.

\*Corresponding Author:

e-mail: [syukkur.achmad@gmail.com](mailto:syukkur.achmad@gmail.com)



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## INTRODUCTION

Osteoarthritis (OA) is a slowly progressive non-inflammatory disease of diarthrodial (synovial) joints. This disease affects the components of the joints, resulting in the thinning and damage of joint cartilage, and growth of bony lumps around the joints (osteofitosis), subchondral bone changes, low level of synovitis at various degrees, and joint capsule thickening. OA starts to affect people at their 40 years of age. According to some patients' experiences, the sign and symptoms are experienced at the age of either 50s or 60s and rarely develop at age 40s. Hence the prevalence of incidence of OA rises with increasing age [1], [2].

OA is considered one of the ten most degenerative diseases in developing countries. Being a farmer for 1 -9 years increases the risk of osteoarthritis as much as 4.5 times more likely, while being a farmer for 10 years or more increases the risk of the disease 9.3 times more likely. It is estimated that 9,6% of men and 18,0% of women above 60 years of age around the world develop symptomatic Osteoarthritis. 80% of the sufferers experience lack of mobility, and 25% of them are unable to perform their normal daily activities [3]. 14 millions of people in America are presumed to develop symptomatic Knee Osteoarthritis (KOA) including more than 3 million races or ethnic minority, more than half of whom suffer from KOA at the age younger than 65 [4].

In Indonesia 7.3% of 12 million people had arthritis at their old age in 2018 and suffered from disability due to OA [5], [6]. The number of elderly suffering from OA in Pangesti Elderly Home Lawang and Tresno

Mukti Elderly Home Turen was 70 and 60 respectively in Mei 2020.

Chronically progressive prevalence of OA can have significant impacts on the socio-economic state of both developing and developed countries. Patients with OA feel pain when doing their activities or feel pressure in the joints. It gradually gets worse and causes obstructed joint mobility and the change in walking tasks. The disruption can threaten patients' independence [5]. The phenomenon found in Pangesti Elderly Home Lawang and Pangesti Tresno Mukti Elderly Home Turen suggested that almost all of the elderly patients complained of knee pain, and more than 20 of them had undergone knee injections for osteoarthritis. All of them complained of the pain, 80% of the sufferers experienced stiffness in the joints while 20% of the patients had their daily activities, both light and vigorous, disturbed. Unfortunately there was no specifically designed program for *osteoarthritis* management. One of the instruments to assess level of pain, stiffness in the joints and functional ability of patients with OA would be Western Ontario And McMaster Universities Osteoarthritis Index (WOMAC) [7].

Pain is the common problem experienced by patients with OA, which accounts for their efforts to look for medications. Certain movements and lack of sleep worsen the pain. There are management therapies; pharmacological therapy, surgery therapy, non-pharmacological therapy, and non-surgical therapy, in order to reduce the symptoms of OA. Pharmacological therapy includes the administration of analgesics and Non Steroid Anti Inflammation Drugs (NSAID),

which have to be carefully prescribed due to their greater adverse effect on old people, who experience degenerative organ functions [5].

Non-pharmacological therapy for OA involves procedures that increase local blood circulation, reduce inflammation and improve the absorption of synovitis to relieve muscle spasms, and lower intraosseous hypertension. Treatments include magnetic physical therapy, electrotherapy, thermotherapy, cold therapy, traction, laser, ultrasound, Transcutaneous electrical nerve stimulation [8]. Some findings pertaining to OA managements show that non-pharmacological and non-surgical therapies apply red ginger compress therapy and kinesiotaping method.

Ginger compress therapy is a herbal compress therapy using herbal ingredients to relieve pain. Red ginger has essential oil containing chemical compounds including Gingerol, Shogaol and Zingeron, which have pharmacological and physiological properties such as antioxidants, anti-inflammation, analgesic, anticarcinogenic, and cardiogenic [9], [10]. Kinesiotaping was first developed and introduced in 1979 by Dr. Kenzo Kase, a Japanese chiropractor and moxibustion practitioner [11]. This method is designed to improve muscle performance, prevent from further secondary damage and increase blood circulation and lymphatic tissues, reduce pain or induce comfort, correct dislocated joints. Kinesiotaping gives a great influence on muscle strength [12], [13].

Based on the background, researchers were tempted to conduct research on patients with OA to find out an effective method to reduce pain, stiffness in the joint and promote

functional ability titled "The Effect of Red Ginger Compress Therapy and Kinesiotaping on the joint pain, joint stiffness and Functional Ability in elderly with Osteoarthritis".

## **METHODS**

### ***Study Design***

Quasi Experiment quantitative research design and *Pretest-Posttest with Control Group Design* approached were used. *Time Series Design* was used to collect the data. The researchers did intervention in three groups and observed the dependent variables after the intervention [14], [15]. The intervention is the application of combination of red ginger compress therapy and kinesiotaping in the intervention group for 7 days; during which red ginger compress therapy was delivered once a day for 7 days, and kinesio tapping method by changing the plaster on day 3 and day 5 was applied for 7 days. WOMAC was used on day 3, day 5 and day 7 to evaluate the score.

### ***Study Population***

Study population consisted of all elderly people with *osteoarthritis* in Werdha Pangesti Elderly Home Lawang and Tresno Mukti Elderly Home Turen, 60 and 70 respondents respectively.

### ***Sample and Sampling Technique***

Sample is defined as part of the study population that represents the characteristics of the population [16]. The sample consisted of patients with Osteoarthritis in Werdha Pangesti Elderly Home Lawang and Tresno Mukti Elderly Home Turen that met the

inclusive and exclusive criteria set up by the researchers.

Inclusive criteria refer to respondents who were diagnosed Knee Osteoarthritis, had clinical complaint of osteoarthritic signs and symptoms, and were diagnosed Osteoarthritis by the local health provider including knee pain and at least three of the six criteria; crepitus when actively moving, the occurrence of stiff joint lasting less than 30 minutes, aged over 50, enlargement of knee joint, pain around the bone when pressed, no warm sensation in synovial joint in the knee, level of composentis CGS = 15. Scores of Osteoarthritic respondents with minimum WOMAC scale of each domain are 5 for pain, 2 for stiff joint, and 17 for functional ability. Respondents with or without medication for Osteoarthritis were cooperative and willing to participate in the intervention for 7 days.

#### **Data Analysis**

Paired sample T-test was used to find out the discrepancy before and after intervention. One Way ANOVA was used to compare the results of the evaluated intervention and control groups. Pearsons Product Moment, independent T-test dan One Way ANOVA were used to measure the correlation between confounding variable and independent variable. ANCOVA was used for multivariate analysis, and repeated ANOVA was applied to find out the effectiveness of intervention during the evaluation 1, 2 and 3.

#### **Ethical Considerations**

This study has been put through a feasibility assessment approved by ethics commission of Health Research and Development Saint Carolus College of Health Science no 029.A/KEPPKSTIKSC/V/2020. Principles of research ethics are respects for persons, beneficence, and justice [17]. Hence, when people are selected to be the participants of a research, proper treatment must be provided to make sure their rights are preserved [18].

#### **RESULTS**

Simple random sampling was used to select 112 respondents who meet the inclusive and exclusive criteria. The respondents were then divided into four groups. Group I (red ginger compress therapy), group II (kinesio tapping method), group III (combination of red ginger compress therapy and kinesiotaping) and group IV (control group), each of which consisted of 28 respondents.

Based on table 1 and table 2 Characteristics of the respondents indicate that as many as 60 respondents (53%) are mostly female with average age of 68.8 years old or belonging to elderly category; 65 respondents (58%) have normal BMI status; 90 respondents (80.4%) experience partial pain on either right or left side; 63 respondents (56.3%) do regular exercise once a week and 74 respondents (66.1%) are not given any massage therapy for the past year.

**Table 1**

Characteristics of respondents: sex, BMI, area of pain, weekly exercise, massage habit

Variable	Red Ginger Compress Therapy Group		Kinesiotaping Group		Combined Methods Group		Control Group		Total	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Sex										
Male	12	42.9	8	28.6	16	57.1	16	57.1	52	46.4
Female	16	57.2	20	71.4	12	42.9	12	42.9	60	53.6
BMI										
Underweight	0	0	0	0	0	0	0	0	0	0
Healthy weight	17	60.7	15	53.6	13	46.4	20	71.4	65	58.0
Overweight	5	17.9	7	25.0	11	39.3	6	21.4	29	25.9
Obesity	6	21.4	6	21.4	4	14.3	2	7.1	18	16.1
Area of Pain										
Right /Left	24	85.7	20	71.4	23	82.1	23	82.1	90	80.4
Right & Left	4	14.3	8	28.6	5	17.9	5	17.9	22	19.6
Weekly exercise										
Never	7	25.0	9	32.1	9	32.1	13	46.4	38	33.9
Once a week	19	67.9	14	50.0	16	57.1	14	50.0	63	56.3
More than once a week	2	7.1	5	17.9	3	10.7	1	3.6	11	9.8
Massage Habit										
Never	13	46.4	13	46.4	9	32.1	14	50.0	74	66.1
2-4 times a year	6	21.4	6	21.4	9	32.1	14	50.0	29	25.9
Regular (monthly)	9	32.1	9	32.1	10	35.7	0	0	9	8.0

**Table 2**

Characteristics of respondents: age

Characteristics of Respondents	Red Ginger compress Therapy Group		Kinesiotaping Group		Combined methods Group		Control Group		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	66.6	11.49	71.67	9.38	68.42	10.42	68.67	10.06	68.8	10.39

**Table 3**

Discrepancy between intervention group and control group

	Variable	Mean	Std. Deviation	Sig.
Evaluation 1	Red Ginger Compress Therapy	53.4643	22.72643	.005
	Kinesiotaping	37.2500	16.52940	
	Combined methods	32.8929	16.18719	
	Control	67.1071	13.96647	
Evaluation 2	Red Ginger Compress Therapy	44.7857	22.46723	.005
	Kinesiotaping	23.9643	18.59183	
	Combined methods	16.9643	10.61265	
	Control	68.0714	14.20988	
Evaluation 3	Red Ginger Compress Therapy	41.3214	19.52027	.005
	Kinesiotaping	18.8214	17.06427	
	Combined methods	11.0714	7.08116	
	Control	67.3929	14.11419	

**Table 4**

Multivariate analysis of independent variables towards joint pain, joint stiffness, functional ability and WOMAC total score

Variables	Joint Pain		Joint Stiffness		Functional Ability		WOMAC Total Score	
	F	Sig.	F	Sig.	F	Sig.	F	Sig.
Red Ginger compress therapy	53.012	.005	47.386	.005	22.588	.005	30.813	.005
Kinesiotaping	121.878	.005	151.385	.005	89.667	.005	104.418	.005
Combined Red Ginger Compress therapy and Kinesiotaping	351.098	.005	251.714	.005	254.172	.005	305.718	.005

**Table 5**

Comparison of Effectiveness of Red ginger Compress Therapy, Kinesiotaping, and Combined Red Ginger Compress Therapy and Kinesiotaping towards joint pain, joint stiffness, Functional Ability and WOMAC Total Score

Intervention	Joint pain	Joint Stiffness	Functional Ability	WOMAC Total Score	Sig.
<b>Day 3 (evaluation 1)</b>					
Red Ginger compress therapy	1.857	0.929	5.857	8.679	0.005
Kinesiotaping	3.143	1.286	8.857	13.286	0.005
Combined Red Ginger Compress therapy and Kinesiotaping	3.571	1.429	11.250	15.929	0.005
<b>Day 7 (evaluation 3)</b>					
Red Ginger compress therapy	2.679	1.286	8.179	12.143	0.005
Kinesiotaping	4.143	1.964	12.357	18.429	0.005
Combined Red Ginger Compress therapy and Kinesiotaping	4.179	1.964	15.643	21.821	0.005

## DISCUSSION

Using ANCOVA, simultaneous intervention of red ginger compress therapy, kinesio tapping method and the combination of red ginger compress therapy and kinesio tapping method has significant effects on the joint pain, joint stiffness, functional ability and WOMAC total score controlled by confounding variables each of which had the value of <0.05. The difference between control group and intervention group is

illustrated in table 3, p-value <0.05 is obtained by using ANOVA (Analysis of Variance). Thus, it is concluded that intervention group and control group differ. Data indicate the outcome of each intervention and control group differs in level of pain, stiffness in the joint, functional ability and WOMAC total score.

Results of ANOVA on ginger compress show mean value of evaluation 1 (53.4643), evaluation 2 (44.7857), and evaluation 3

(41.3214). The mean results of the three evaluations show the decrease in mean values, meaning that the lower the WOMAC score is the lower the level of pain, stiffness in the joint and the functional ability of the respondents with OA. The decrease in WOMAC score is due to the analgesic and anti-inflammatory property of red ginger containing such Oleoresin as Zingerone, Gingerol, and Shogaol. Oleoresin has strong anti-inflammatory, analgesic and anti-oxidant properties. When warm red ginger compress is applied, oleoresin penetrates the skin layers causing no irritation nor damage to the peripheral circulation [19], [20]. In addition, such constituent in oleoresin as zingerone obstructs prostaglandin synthesis and therefore relieves the pain. Red ginger has the same medicinal effects as ibuprofen in the treatment of OA symptoms, which is supported by studies proving that red ginger significantly reduces pain caused by OA [20].

The result of study conducted by Rahayu et al., shows the administration of red ginger compress resulted in the decrease in pain scale from average 6.5 down to 2.5. Sig value of 0,037 ( $p < 0,05$ ) obtained from independent T-test assessment of red ginger compress and warm compress shows statistically significant difference in effective reduction in level of pain in elderly [21]. The difference in decreasing joint stiffness in the intervention group after eight weeks was also found in a study result conducted by Lee & Lee in 2016; intervention group had  $p = 0,000$  while control group had  $p = 0,161$ . Moreover, the deviation of control group and intervention group after eight weeks was  $p = 0,000$ . Furthermore, in terms of the decrease in

functional disability, intervention control had  $p = 0,000$  while control group had  $p = 0,000$  after eight weeks. The difference between control group and intervention group after eight weeks was  $p = 0,004$  [22].

Obtained mean from ANOVA test on kinesiotaping administration in evaluation 1 is 37.2500, 23.9643 in evaluation 2, and 18.8214 in evaluation 3. This indicates decreasing mean in WOMAC score, in which WOMAC score difference is going further to the left and is constantly decreasing on the seventh day. This result is also supported by the deviation between pre and post intervention as illustrated in table 3 mean score WOMAC. The deviation of pre test and evaluation 1 is 21.21429, evaluation 1 and 3 is 13.28571, evaluation 2 and 3 is 5.14286. It can be concluded that there is a difference in mean value in each administration of kinesiotaping ranging from 5.14286 to 21.21429. The change is due to the effect of local circulation of kinesiotaping administration. Direct effect from the plaster applied on to the skin alleviate the heat, redness, and obstruction in the blood flow in the local circulation. Reduced edema and decompression properties of this elastic plaster releases mechanical receptors to control the pain [11].

Results of the article review prove there is a significant evidence showing that the tape applied medially on the patella generates clinically significant difference in cronical knee pain [23]. Some articles of physiotherapy also recommend kinesiotaping technique in OA management to alleviate pain, improve ROM, increase muscle strength, reduce inflammation, provide mechanical

support, improve walking tasks, and increase functional results [24].

Study result of Mutlu et al. 2016 indicates that the application of kinesiotaping shows a decrease in the scale of Visual Analog Scale (VAS) and Walking Task Score (WTS) compared with the control group. Nevertheless, there is no increase in muscle strength found in both groups [25].

Means obtained from the application of combined red ginger compress therapy and kinesiotaping were 32.8929 in evaluation 1, 16.9643 in evaluation 2, and 11.0714 in evaluation 3. In other words, evaluation result decreases by day. The results as illustrated in table 3, show the difference between pre-test and post-test. The difference between pre test and evaluation is 23.82143; between evaluation 1 and 2 is 15.92857, and 2 and 3 is 5.89286. In other words, there is a change in every evaluation.

The decreasing WOMAC score is due to the effectiveness of the administration of combined techniques, red ginger compress and kinesiotaping. Warm red ginger compress application reduces the WOMAC score in OA. The red ginger compress applied on the affected area generates active constituents in the red ginger which are absorbed through the skin and block the leukotriene and prostaglandin that serve as the inflammatory mediators. Those active constituents are called zingerone, gingerol, and shogaol that function as anti-inflammation [26]. Kinesiotaping improves muscle function and prevent further secondary damage, increase blood circulation and lymphatic tissues, reduce pain or induce comfort and correct dislocated joints [12].

Table 5 illustrates the comparison of the effectiveness of Red Ginger Compress, Kinesiotapping, and combination of red ginger compress and kinesiotaping on joint pain, joint stiffness, functional ability and WOMAC total score. Combined intervention is proved to effectively alleviate the pain, joint stiffness, functional ability and WOMAC total score in the evaluation on day 3 and day 7, followed by Kinesiotaping intervention based on the scores of pain, joint stiffness, functional ability and WOMAC total score. Of all the three techniques, red ginger compress has the lowest score of pain, joint stiffness, functional ability and WOMAC total score.

## CONCLUSION

The result of this study indicates that the administration of red ginger compress and kinesiotaping is proved to effectively reduce joint pain, joint stiffness and disrupted functional ability experienced by patients with Osteoarthritis. It is expected that the intervention will become a recommended non-pharmacological therapy to reduce pain, stiffness in the joints, and functional ability in elderly. In addition, this therapy is safe for elderly patients due to its minimum adverse effect.

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