

## Conference Paper

# Effect of Red Ginger (*Zingiber Officinale* Linn Var. *Rubrum*) Compress Therapy on pain intensity among elderly with Osteoarthritis

Tria Firza Kumala and Neni Nur'Aeni

STIKes Jenderal Achmad Yani Cimahi

## Abstract

**Background:** Osteoarthritis is a degenerative disease that affects joint-prone joints. Ginger is an herbal plant that can be used to warm compresses, gingerol content found in ginger can reduce osteoarthritis pain. **Objectives:** The study aimed to determine the influence of red ginger compress on the intensity of osteoarthritis pain in elderly with age 60 years and over. **Methods:** This study was conducted using Quasi time series design experiment. The total sample included in this study was 16 subjects that selected using purposive sampling techniques. The inclusion criteria were elderly aged 60 years and over had osteoarthritis pain and not under medication analgetic for 4 hour last. The red ginger compress is intervention was done 30 minutes and carried out as many as 3 times in 3 days, interval 1 day. Data were analyzed using Friedman test. **Results:** Of total subjects joined in this study, the median scale of pain on the 1st day before was given red ginger compress that is 5.00 (SD = 5.00), on day 3 is 4.00 (SD = 0.793), on the 5th day that is 3.00 (SD = 0.885) and on day 7 that is 2.00 (SD = 0.845). The results of the Friedman test found significant difference of intensity of osteoarthritis pain before and after intervention ( $p < 0.001$ ). **Conclusion:** Therapy of red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) was useful to reduce intensity of osteoarthritis pain among patients with osteoarthritis. A promotion such of intervention to all people in the community is essential.

**Keywords:** osteoarthritis, pain intensity, red ginger compress

Corresponding Author:

Tria Firza Kumala  
tiafirza@yahoo.com

Received: 22 September 2019

Accepted: 4 October 2019

Published: 10 October 2019

Publishing services provided by  
Knowledge E

© Tria Firza Kumala and Neni

Nur'Aeni. This article is  
distributed under the terms of  
the Creative CommonsAttribution License, which  
permits unrestricted use and  
redistribution provided that the  
original author and source are  
credited.Selection and Peer-review under  
the responsibility of the ICHT  
2019 Conference Committee.

## 1. Introduction

The increase in the elderly population in Indonesia in 2014 reached 18,781 million people and it will be estimated that the number will increase to 36 million by 2025 (Abikusno, 2013).

The increasing prevalence of the elderly raises the problems related to aging, especially in health problems due to the deterioration of body cells, decreased endurance and decreased function of the organ systems. One of the most common problems that occurs in the elderly is osteoarthritis, in which the decline of organ function. Affect mobility and activities which are vital rights for the total health of the elderly.

## OPEN ACCESS

The number of osteoarthritis sufferers worldwide is around 151 million people (WHO, 2011). Based on the prevalence of diagnosis in joint disease, the rate in diagnosis of joint disease in West Java (17.5%) (Riskasdas, 2013). Osteoarthritis is a disorder that develops slowly, asymmetrically, and non-inflammatory which occurs in movable joints, especially joints that hold weight (Stanley, 2012). One of the signs and symptoms of osteoarthritis is joint pain, because osteoarthritis can affect all joints, and the most common is in joints that bear weight such as hip, knee and lower lumbar spine joints. The most common location of osteoarthritis is at the location of the knee (Arissa, 2013).

The impact of osteoarthritis pain not only causes movement disorders, but also causes systemic effects such as a decrease in quality of life such as severe fatigue, decreases range of motion and pain in movement so the systemic effects due to OA is result in organ failure and death. To overcome these systemic effects, we can reduce or relieve osteoarthritis pain by managing pain. (Masyhurrosyidi, 2014).

Previous studies have been conduct to explore non-pharmacological techniques in pain management such as physical therapy, spinting, application of cold and hot packages, paraffin wax dips (Putri, Dewi Rahmayanti, & Noor Diani, Pengaruh Pemberian Kompres Jahe terhadap Intensitas Nyeri Gout Atrtis pada Lnsia di PATW Budi Sejahtera Kalimantan Selatan, 2017). Recent study have been mentioned that one of the proper pain management used to reduce knee joint pain in osteoarthritis is heat therapy using warm compresses. As non-pharmacological technique these compresses can provide physiological effects by increasing muscle relaxation in joint movement, and increasing vasodilation of blood vessels, and then can be combined with pharmacological therapy to optimizing the medication effect to reduce joint pain (Harmilah, 2012). Warm compresses are palliative measures that must be taken first before using drugs. Warm compresses will be given to the area of the joint that has pain for 20 minutes, carried out in the morning or evening. According to Indah (2013) states that the application of warm compresses that have often been done can be collaborated with several herbal plants, one of them with ginger. West Java is the second largest producer of ginger after Central Java, which is equal to (20.82%), so that ginger can be easily found on the market at an affordable price compared to other medicinal plants. (Billah, 2013).

Ginger (*Zingiber Officinale Rosc*) is a rhizome plant that is very popular as a spice and medicinal ingredient. Ginger has been identified as having an antiarthritic, anti-thrombotic and anti-inflammatory effect (Therkleson, 2010). The content of ginger has benefits for reducing osteoarthritis pain because ginger has the spicy, bitter and aromatic properties of oleoresin such as zingaron, gingerol and shogaol. Oleoresin has strong anti-inflammatory and antioxidant potential. The content of water and oil does

not evaporate in ginger serves as an enhancer that can increase the permeability of oleoresin to penetrate the skin without causing irritation or damage to peripheral circulation (Halvania, 2015).

The purpose of this study was to identify the effect of Red Ginger Compress therapy on OA pain among elderly in Cimahi Primary Health Center.

In this study, researchers show differences with previous studies are the effect of warm ginger stew compresses on 20 elderly people with knee osteoarthritis in Arjuna Public Health Center Malang East Java for 4 days on pain scale shows that there is a significant difference in pain levels before and after giving ginger stew warm compresses with p-value 0,000 (Masyhurrosyidi, 2014). The research design used by the researchers at the moment is a quasi-time series design experiment, with intervention 3 times a week. The advantage of research with this design is to make observations (repeated measurements) each before and after treatment. So that researchers can find out the effect of red ginger compresses on pain intensity in osteoarthritis patients periodically. The results of this study are significant, this is because the content contained in ginger has benefits to reduce pain, such as gingerol, shogaol, and zingeron. Gingerol has a phenol group which is thermolabile, so that when exposed to heat and air it will turn into shogaol and zingerol. The content can increase the permeability of oleoresin to penetrate the skin without irritation. The effect of heat given by ginger compresses can reduce pain in osteoarthritis by inhibiting the formation of prostaglandins as a pain mediator with a mild to moderate pain scale resulting in decreased pain. the warmth found in the gingerol content can reduce pain through the process of blood vasodilation which can renew damage to the cartilage, so that cartilage is able to produce cartilage. Cartilage has many nutrients and oxygen, which can produce synovial fluid. One function of synovial fluid is to form a cushion between the knee joints that can avoid friction between bones so that pain is reduced

## 2. Methods

### 2.1. Study design

This study was conducted using Quasi time series design experiment. The intervention of red ginger compress (*Zingiber officinale* Linn var. *rubrum*) in joint pain in the elderly with osteoarthritis that has been dissolved with 100°C water, then the water mixture is cooled to reach a temperature of 40°C to be compressed for 30 minutes and carried out 3x intervention in 3 days, intervals of 1 day.

Measurement of pain scale before and after intervention using Descriptor Scale (VDS).

## 2.2. Sample

The target population of this study was elderly with osteoarthritis lived in Cimahi district, West Java. The inclusion criteria were elderly aged 60 years and over had osteoarthritis pain and not under medication analgetic for 4 hour last. The sample wa selected using purposive sampling techniques. The sample in this study used the following formula large numerical analytic samples in pairs (Dahlan, 2014).

$$n = \left[ \frac{(Z\alpha + Z\beta)S}{(X_1 - X_2)} \right]^2$$

$$n = \left[ \frac{(1.96 + 2.57) 2.319}{(2.6)} \right]^2$$

$$n = \left[ \frac{10,50507}{2.6} \right]^2$$

$$n = 16,32$$

$$n = 16 \text{ subjects}$$

The total sample included in this study was 16 subjects In this sutdy used one group.

## 2.3. Intervention

Initial data collection by measuring the intensity of osteoarthritis pain by using the Verbal Descriptor scale (VDS) instrument guideline to determine the pain scale felt by the respondent for the first time before the intervention (pre-test). The next intervention, the researcher observed the pain scale 2 on day 3, day 5 and day 7 using the instrument guidelines Verbal Descriptor scale (VDS) after the intervention as data (post test).

The intervention protocol: The compress procedure is carried out for 30 minutes using red ginger which has been crushed as much as 20 grams mixed with 100°C boiling water and then compressed after the water reaches a temperature of 40 °c.

This study selected respondents according to inclusion criteria were patients who were not using topical analgesic drugs in the past 4 hours.

## 2.4. Measurement

Baseline variables included pain scale in OA patients before and after the intervention of warm red ginger compresses (*Zingiber Officinale* Linn Var. *Rubrum*) in joint pain in the elderly with osteoarthritis, using the verbal descriptor scale (*Verbal Descriptor scale*,

VDS) 0 = no pain, 1-3 = mild pain, 4-6 = moderate pain, 7-9 controlled severe pain, 10 uncontrolled severe pain. (Andarmoyo, 2013).

#### 2.4.1. Data Collection Procedure

- Prior to the data collection, permission was obtained from the concerned Cimahi City Health Service authorities for conducting the study.
- Subjects were selected according to the selected criteria. Also written consent was obtained from the subjects and confidentiality was assured
- Thus study was carried out of the subjects (16 respondents) elderly with OA who were not using topical analgesic drugs in the past 4 hours
- The researcher started the data collection and implementation of the program from the April 2018 to Mey 2018.
- The researcher started the data collection for first day to measure pain scale from subjects.
- Intevention program, Subjects were given a red ginger compress which was done at 7am and at 15pm for 30 minutes and carried out 3 times as many interventions in 3 days, interval of 1 day.
- Post intervention researchers measured the pain scale on the third, fifth and seventh day.

#### 2.5. Data Analysis

Statistical analysis was carried out using the SPSS statistical program) version 20. Data were analyzed using univariate analysis to describe variable pain intensity in osteoarthritis before a red ginger compress is given and pain intensity in osteoarthritis after a red ginger compress is given. The normality of data was evaluated using Shapiro Wilk because of the number of respondents less than 50. The result of the normality test showed that the data not normally distributed.

The bivariate analysis used was the Anova repetead test. At the time of the data normality test it was found that the data were not normally distributed. To test the effect red ginger compress on intensity pain osteoarthritis was used a Friedman test.

## Acknowledgments

This study was supported by a grant from STIKes Jenderal Achmad Yani Cimahi Special thanks to Neni Nur'aeni for her help with data collection procedure and take care of research permits in this study.

## 3. Results

### 3.1. Start with demographic or characteristic of respondent (univariate analysis)

Pain intensity score in osteoarthritis before being given a red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) in the elderly in the work area of the southern cimahi puskesmas

TABLE 1: Pain intensity score among elderly with osteoarthritis before intervention (N=16).

Variabel	Median	SD	Min-Max	95% CI
Pain	5.00	5.00	3-6	4.42- 5.58

Based on table 1 the research results obtained that the pain scale score before given a red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) is 5.00 with a minimum value of 3 and a maximum value of 6 (SD = 5.00)

TABLE 2: Pain intensity score among elderly with osteoarthritis after intervention.

Variabel	Median	SD	Min-Max	95% CI
Pain				
Day -3	4.00	0.793	2-5	3.26-4.11
Day -5	3.00	0.885	1-4	2.40-3.35
Day -7	2.00	0.854	1-3	1.48-2.39

Based on table 2, the results of the study show that the pain scale score on the 3rd day after the red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) is 4.00 (SD = 0.793) with a minimum value of 2 and a maximum of 5, while the pain scale score of the 5th day after being given a red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) which is 3.00 (SD = 0.885) with a minimum value of 1 and a maximum of 4, and a pain scale score of the 7th day after being given a red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) namely 2.00 (SD = 0.854) with a minimum value of 1 and a maximum of 3.

Pain scale score on osteoarthritis before and after the red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) in the elderly in the working area of the southern cimahi puskesmas

TABLE 3: Friedman Test Results pain scale scores in osteoarthritis before and after the intervention.

Pain	Measurement	Median	SD	<i>P Value</i>
Day -1	<i>Pre test</i>	5.00	5.00	0.001
Day -3	<i>Post test</i>	4.00	0.793	
Day -5	<i>Post test</i>	3.00	0.885	
Day -7	<i>Post test</i>	2.00	0.845	

Based on Table 3, the results of the study show that the pain scale score before and after the red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) on the 1st day before being given a red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) is 5.00 (SD = 5.00), while the pain scale score after being given a red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) on day 3 is 4.00 (SD = 0.793), the pain scale score after being given a red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) on the day the 5th is 3.00 (SD = 0.885) and the pain scale score after being given compresses of red ginger (*Zingiber Officinale* Linn Var. *Rubrum*) on the 7th day is 2.00 (SD = 0.845). Based on the statistical test results obtained P value of 0.001, it can be concluded that there is an effect of red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) on the intensity of osteoarthritis pain in the elderly in the Work Area of Cimahi Selatan Health Center.

## 4. Discussion

The results of this study shows the moderate pain that have been experienced by elderly with OA before intervention The moderate pain is caused by changes in the synovial membrane of the knee joint which result inthe formation of osteophytes that we appears on the x-rays results -, The formation of osteophytes causes an increase of articular pressure in the knee joints, causing nerve compression, which induces moderate pain (Muttaqin 2012).

The location of pain that is often felt is in the knee joint, as for one of the factors causing it is frequent heavy activities that cause the knee to have to work extra than other joints (Arisa, 2013). This is in accordance with the theory said by Isselbacher (2000) which states that the causes of pain felt in osteoarthritis are aggravated by joint wear and disappear at rest.

There is a reduction in pain intensity before and after intervention of red ginger compress therapy start from three days of interventions. This result similar with previous study that mention on the third, fifth and seventh days there was a decrease in the moderate pain scale to a mild pain scale. The results showed that there was a decrease in the intensity of osteoarthritis pain from the moderate pain scale to the mild pain scale. This is because respondents were given compresses of red ginger (*Zingiber officinale* linn var. *rubrum*). ginger compresses can be given in the morning or evening (Nyoman, 2013), with a temperature tolerance of 40'-60'c (Asmadi, 2008).

Researchers set 40'c for water tolerance to be compressed in the knee joint area of the respondent's pain in accordance with previous studies conducted by Masyhurrosyidi, H. (2014) entitled "The Effect of Ginger Decompression Warm Compresses on the Level of Sub-acute and Chronic Pain in Advanced Age with Knee Osteoarthritis in Arjuna Health Center, Klojen Malang District, East Java ". Compress is carried out 3 times a week ie on the 3rd day, the 5th day and on the 7th day, compresses are done 2x a day, ie in the morning at 08.00 WIB maximum of the respondent has not done strenuous activity and in the afternoon at 16.00 WIB where the respondent finished heavy activities both inside and outside the house so that at 16.00 WIB is the time for the respondent to rest, so that the analgesic effect given by ginger content can be felt maximally by the respondent and can rest comfortably in the afternoon until the morning for the respondent to return carry out activities as usual.

The decrease in pain intensity apart from being given a red ginger compress is also caused because there are several other factors that influence the perception of the respondent's pain. This is in accordance with the concept proposed by Andarmoyo (2013) that there are several factors that can affect pain, including age, the older a person is, the less painful the perceived effect of pain. In addition, factors that can affect pain are attention, protection, and previous experience. **(Andarmoyo, 2013).**

There is a significant different of pain intensity score before and after intervention. The use of hot compresses is usually done only locally on certain body parts. With the administration of heat, blood vessels will dilate thereby improving blood circulation in the tissue. In this way the distribution of acidic substances and foodstuffs to cells is enlarged and the removal of the substances removed will be improved. Increased cell activity will reduce pain and will support the healing process of wounds and inflammation (Andarmoyo, 2013).

The content contained in ginger has benefits to reduce pain, such as gingerol, shogaol, and zingeron. Gingerol has a phenol group which is thermolabile, so that when exposed to heat and air it will turn into shogaol and zingerol. The content is

abundant in ginger which has become powder, on the contrary the small amount in ginger is still fresh. The content can increase the permeability of oleoresin to penetrate the skin without irritation. The effect of heat given by ginger compresses can reduce pain in osteoarthritis by inhibiting the formation of prostaglandins as a mediator of pain with a mild to moderate pain scale so that there is a decrease in pain, but on the scale of severe pain can not be done ginger compresses, but must be with further medical action, such as synovial fluid injection by a doctor (Puspaningtyas, 2013).

This research was conducted for 4 consecutive days, the results of the post-test stated that there was a significant decrease in pain scale after compressing the ginger stew to 16 respondents, had decreased levels of pain from moderate pain to low pain. It is also very closely related to the factors that influence the pain brought by respondents both from themselves and from the outside environment. Factors affecting pain in the external environment, overall, as many as 16 respondents we studied were not currently taking either oral or topical drugs that could affect the pain scale reduction in the red ginger compress (*Zingiber Officinale* Linn Var. *Rubrum*) study. So, seen from the changes that occur in red ginger compress therapy (*Zingiber Officinale* Linn Var. *Rubrum*) shows the results of changes that are quite effective, as many as 16 respondents showed changes in the criteria for moderate pain intensity to mild pain intensity scale.

## 5. Conclusion

The results of this study obtained the value of the osteoarthritis pain scale is being reached range of pain scale value 5 before given intervention and pain reduced after the intervention reached the pain scale value of 2 on the seventh day. After one week the intervention gave a significant result on the change in pain scale in osteoarthritis.

Recommendation studies are suggested using a control group to be able to see the difference in effectiveness of ginger compresses on changes in the pain scale of patients with OA better.

## References

- [1] Abikusno, Y. T. (2013). Gambaran Kesehatan Lanjut Usia Di Indonesia. Buletin Jendela, 1.
- [2] Riskesdas. (2013). Riset Kesehatan Dasar. Riskesdas 2013, 99.
- [3] Stanley, M. (2012). Buku Ajar Keperawatan Gerontik. Jakarta: Egc.

- [4] Arissa. (2013). Dipetik 1 3, 2018, Dari Pengaruh Senam Rematik Terhadap Perubahan Skala Nyeri Pada Lanjut Usia Dengan Osteoarthritis Lutut: [Http://Www. Researchgate.Net](http://www.researchgate.net)
- [5] Masyhurrosyidi, H. (2014). Pengaruh Kompres Hangat Rebusan Jahe Terhadap Tingkat Nyeri Subakut Dan Kronis Pada Lanjut Usia Dengan Osteoarthritis Lutut Di Puskesmas Arjuna Kecamatan Klojen Malang Jawa Timur. *Majalah Kesehatan Fkub*, 40.
- [6] Putri, S. Q., Devi Rahmayanti, & Noor Diani. (2017). Pengaruh Pemberian Kompres Jahe Terhadap Intensitas Nyeri Gout Atritis Pada Lansia Di Pstw Budi Sejahtera Kalimantan Selatan. *Dunia Keperawatan*, 93.
- [7] Putri, S. Q., Dewi Rahmayanti, & Noor Diani. (2017). Pengaruh Pemberian Kompres Jahe Terhadap Intensitas Nyeri Gout Atritis Pada Lansia Di Patw Budi Sejahtera Kalimantan Selatan. *Dunia Keperawatan Volume 5 Nomor 2*, 91.
- [8] Harmilah, A. D. (2012). Pengaruh Pemberian Kompres Hangat Terhadap Nyeri Persendian Osteoarthritis Pada Lanjut Usia Di Panti Werdha Budhi Drama Ponggalan Umbulharjo. 1-2.
- [9] Indah, N. &. (2013). Terapi Kompres Jahe Dan Massage Pada Osteoarthritis Di Panti Werda St. Tresna Dharma Bhakti Kasih Surakarta. *Jurnal Dunia Kesehatan Vol 5 No 2*, 34-36.
- [10] Billah, I. M. (2013, Februari 25). Dipetik Februari 19, 2018, Dari [Pusdatin.Setjen.Pertanian.Go.Od:Https://Www.Google.Co.Id/Search?Dcr=0&Ei=Qnskws7cl8ybvgtqlxybq&Q=Jahe+Adalah+Produksi+Terbesar+Di+Jawabarat&Oq=Jahe+Adalah+Produksi+Terbesar+Di+Jawabarat&G \\_\\_L=Mobile-Gws-Serp.3...5265.13490.0.13855.45.25.0.1.1.0.0.0.0...0...1c.1j4.64.Mobile Gws-Serp](https://www.google.co.id/search?dcr=0&ei=Qnskws7cl8ybvgtqlxybq&q=jahe+adalah+produksi+terbesar+di+jawabarat&oq=jahe+adalah+produksi+terbesar+di+jawabarat&g__l=mobile-gws-serp.3...5265.13490.0.13855.45.25.0.1.1.0.0.0.0...0...1c.1j4.64.Mobile_gws-serp).
- [11] Therkluson, T. (2010). Topical Ginger Treatment With A Compress Or Patch For Osteoarthritis Symptoms. *Jurnal Of Holistic Nursing Amerikan Holistic Nurse Association*, 1-10.
- [12] Halvania, A. (2015). Perbedaan Pengaruh Kompres Jahe Emprit (Zingiber Officinale Var.Rubrum) Dan Kompres Hangat Terhadap Skala Nyeri Pada Klien Osteoarthritis Di Wilayah Kerja Puskesmas Lubuk Begalung Padang. *Rnal Keperawatan*, 8-9.
- [13] Dahlan, D. M. (2014). *Besar Sampel Dalam Penelitian Kedokteran Dan Kesehatan*. Jakarta: Arkans.
- [14] Muttaqin, A. (2012). *Gangguan Muskuloskeletal*. Jakarta: Egc.
- [15] Isselbacher, B. W. (2000). *Prinsip-Prinsip Ilmu Penyakit Dalam*. Jakarta: Egc.

- [16] Nyoman, N. &. (2011). Pengaruh Kombinasi Ekstrak Temulawak, Jahe, Kedelai Dan Kulit Udang Terhadap Fungsi Hati Dan Ginjal Dibandingkan Denga Natrium Diklofenak Pada Penderita Osteoarthritis. 52-53.
- [17] Andarmoyo, S. (2013). Konsep & Proses Nyeri. Jogjakarta: Ar-Ruzz Media.
- [18] Puspaningtyas, D. P. (2013). The Miracle Herbs. Jakarta: Pt. Agromedia Pustaka.
- [19] A. Aziz Rani, S. S. (2008). Pandan Pelayanan Medik. Jogjakarta: Diva Press.
- [20] Arifin, A. S. (2008). Ilmu Kimia Dan Kegunaan: Tumbuh - Tumbuhan Obat Indonesia. Bandung: Itb.
- [21] Azizah. (2011). Scribe. Dipetik Januari 3, 2018, Dari [Http://Idscribd.Com/Document/369092381/Laporan-Pendahuluan-Lansia](http://idscribd.com/document/369092381/Laporan-Pendahuluan-Lansia).
- [22] Fanada. (2012). Pengaruh Kompres Hangat Dalam Menurunkan Skala Nyeri Pada Lansia Yang Mengalami Nyeri Rematik Di Panti Sosial Tresna Werdha. Badan Diklat Sumatera Selatan.
- [23] Haryanto, S. (2010). Ensiklopedi Tanaman Obat Indonesia. Yogyakarta: Palmall.
- [24] Meridian L, M. (. (2014). Asuhan Keperawatan Geriatrik. Jakarta: Egc.
- [25] Muhlisah, I. F. (2012). Tanaman Obat Keluarga (Toga). Jakarta: Penebar Swadaya.
- [26] Mujahidillah, K. (2012). Keperawatan Geriatrik: Merawat Lansia Dengan Cinta & Kasih Sayang. Jogjakarta: Pustaka Pelajar.
- [27] Notoatmodjo, S. (2012). Metodologi Penelitian Kesehatan. Jakarta: Rineka Cipta.
- [28] Notoatmojo. (2012). Metodologi Penelitian Kesehatan. Jakarta: Pt.Rineka Cipta.
- [29] Nursalam. (2013). Konsep Penerapan Metode Penelitian Ilmu Keperawatan. Jakarta: Salemba Medika.
- [30] Priyoto. (2015). Nic Dalam Keperawatan Gerontik. Jakarta: Salemba Medika.
- [31] Purnamasari, A. R. (2015, Maret 9). Prosedur Pelaksanaankompres Hangat Memakai Jahe. Dipetik Februari 3, 2018, Dari Docslide.Com: [Https://Dokumen.Tips/Documents/Agustin-Sop-Kompres-Hangat-Jahe.Html](https://Dokumen.Tips/Documents/Agustin-Sop-Kompres-Hangat-Jahe.Html)
- [32] Riyanto, A. (2011). Aplikasi Metodologi Penelitian Kesehatan. Yogyakarta: Nuha Medika.
- [33] Siska, S. D. (2012). Pengaruh Kompres Jahe Hangat Terhadap Penurunan Intensitas Nyeri Artritis Rheumatoid Pada Lanjut Usia Di Panti Sosial Tresna Werdha Kasih Sayang Ibu Kanagarian Cubadak Batu Sangkar 2012. Stikes Yarsi Sumbar Bukittinggi,26136,Indonesia, 1-5.
- [34] Sugiono, P. (2017). Metode Penelitian Kuantitatif, Kualitatif, Dan Kombinasi (Mixed Methods). Bandung: Alfabeta.

- [35] Suharsaputra, D. U. (2014). *Metode Penelitian Kuantitatif, Kualitatif, Dan Tindakan*. Bandung: Pt. Refika Aditama.
- [36] Sukandar, P. E. (2013). *Iso Farmakoterapi*. Jakarta Barat: Ikatan Apoteker Indonesia.
- [37] Utami & Puspaningtyas, D. (2013). *The Miracle Of Herbs: Daun, Umbi, Buah Dan Batang Tanaman Ajaib Penakluk Aneka Penyakit*. Jakarta: Egc.
- [38] Utami, P., & Puspaningtyas, D. (2013). *The Miracle Of Herbs: Daun, Umbi, Buah Dan Batang Tanaman Ajaib Penakluk Aneka Penyakit*. Jakarta: Pt Agro Media Pustaka.
- [39] Winarti, H. &. (2013). *Kandungan Bahan Aktif Jahe Dan Pemanfaatannya Dalam Bidang Kesehatan*. Bogor: Balai Besar Penelitian Dan Pengembangan Pascapanen Pertanian.
- [40] Yunita, E. P. (2013). *Asuhan Keperawatan Stimulus Kutaneus Slow Stokr Back Massage Dengan Pendekatan Caring Terhadap Intensitas Nyeri Osteoarthritis Pada Lansia Di Panti Sosial Tresna Werdha Teratai Palembang*. *Jurnal Keperawatan Bina Husada*, Volume 1 No. 1, 18-11.