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THE EFFECTIVENESS OF TOPICAL PLANT OILS AGAINST PAIN IN KNEE OSTEOARTHRITIS PATIENT

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ABSTRACT

The prevalence of people with knee osteoarthritis (OA) will increase with increased life expectancy. Pain reduction complementary and alternative therapies in the form of topical plant oils have been implemented in some countries. However, these topical plant oils effectiveness, especially in people with knee OA in Indonesia hasn't been significantly evident . This study aims to assess the effectiveness of topical plant oils against pain in people with knee OA through literature studies. This paper uses literature study review as research method. PubMed, ScienceDirect, Emerald Insight dan Cochrane (Central) are five electronic databases used in this paper for literature study. PICO is used to probe for literatures that correspond to the topic, then reviewed using PRISMA method. Keywords such as; osteoarthritis knee, pain, plant oil dan topical have been found in 412 journals. Those journals are filtered thoroughly according to the criterion; full text, written in English and published around 2015-2020. Obtained journals then filtered again by reading it altogheter from abstract to conclusion. Seven journals have been selected as their contents in line with this research purpose. Joanna Briggs Institute (JBI) checklist for Randomized Controlled Trials has been implemented to conduct critical assessment. The results of the study reveal that topical plant oil has effectiveness in reducing joint pain without side effects. The results of this positive discovery have the potential to be implemented in Indonesia. Combination with other non-pharmacological therapies is reccommended for future research in order to boost the joint pain reduction effectiveness of topical plant oils in knee OA patients.

Keywords:
Massage, Osteoarthritis knee, Pain, Plant oil, Topical

BACKGROUND

Knee Osteoarthritis (OA) is the most commonly found disease and accounts for the largest prevalence worldwide (Nasiri et al., 2017). World Health Organization states that osteoarthritis was the 11th cause of physical disability in the world in 2010. The knee joint has the highest incidence of OA at 40% compared to the rest of the joint (AlMalty, 2013). Osteoarthritis of the knee affects 300 million people worldwide (Paultre et al., 2021). According to the results of Basic Health Research Indonesia (2018), there are 7.3% of the total population suffering from joint disease in Indonesia (Ministry of Health of the Republic of Indonesia, 2018). The study conducted by Karsten et al. (2019) OA knee still ranks at the top of the list of diseases in Indonesia. OA will increase with age and weight (Cui et al., 2020). Joint pain is a major problem found in people with osteoarthritis (Lespasio et al., 2017).

Osteoarthritis (OA) is a degenerative disease that can damage all components of the joint (AlMalty, 2013). Osteoarthritis is often found in elderly and affects the functional status of the patient (Huether et al., 2019). This disease cannot be cured. Osteoarthritis treatment is given to reduce pain, improve movement, joint function and improve quality of life. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) Acetaminophen is a first-line therapy in pharmacology. However, long-term use of pharmacological therapy can lead to increased cardiovascular, gastrointestinal, kidney, hematopoietic, and liver problems (Hasanpour et al., 2021). Teslim et al. (2014) highlighted the side effects of long-term usage of NSAID in Africa, patients complained about having musculoskeletal disorders and most of them suffer dizzyness (22,3%), stomach ache (15,9%), indigestion (12,8%), nausea (12,5%). The limitations of NSAIDs require the discovery of therapeutic approaches that have a positive effect on the body without side effects.

According to the Guidelines of the American College of Rheumatology (ACR) and Osteoarthritis Research Society International (OARSI) in 2008, 2010 and 2014 in order to reduce complaints of osteoarthritis disease can be achieved using pharmacological and nonpharmacological methods (Indonesian Rheumatology Society, 2014). Consequently, people with OA prefer Complementary and Alternative Medicine (CAM) to pharmacological medicine. This treatment has many methods, topical plant oils are one of them (Seyman & Unlu, 2021). WHO (2019) states that this treatment can provide a significant contribution to Universal Health Coverage (UHC). Indonesian Department of Health (2007) supported the application of this treatment (Siswanto, 2018).

Plant oils can be classified as nonvolatile oils and essential oils. However, this research discusses nonvolatile oils that contain triglycerides, FFA, tocopherols, sterols, stanols, phospholipids, waxes, squalene, phenolic compounds etc. Topical plant oils have been investigated in vivo and in vitro. The content of this compound when applied to the skin can affect the physiology of the skin, especially inflammation status. Plant oils topically produce anti-inflammatory metabolites that can serve as therapeutic additions. The content of compounds in plant oils works by inhibiting the activity of cyclooxygenase-2 enzymes. (COX-2) in removing prostaglandin products as a mediator of inflammatory pain-producing sensations (Lin et al., 2018; Zhang et al., 2021).

WHO defines CAM as a practice based on beliefs and experiences derived from cultures that are used for physical and mental treatment (Seyman & Unlu, 2021) Some countries have used topical plant oils as a combination therapy to lessen the pain of OA. Several plant oils such as; Peganum, Sesame, Nigella Sativa, Chickpea, rTsa-byugs, Chamomile, Red clover oil have been proven effective to reduce the pain of the disease. However, there is no current sistematic study that evaluates the effectiveness of this intervention. Therefore, this study is conducted to assess the effectiveness of topical plant oils against pain in knee OA patients.

METHOD

Descriptive literature review is utilized in this research for literature review. All selected journals are narratively reviewed in order to assess one of alternative and complementary therapies in reducing the pain in patient with knee OA; topical plant oils, with osteoarthritis knee; pain; plant oil; topical used as keywords. Four online data bases such as; PubMed, ScienceDirect, Emerald Insight and Cochrane (center). Each database is examined using MeSH which includes; Massage, Osteoarthritis Knee, Plant oil, Pain, and Topical. PRISMA flowchart method is implemented in this research from October 20 to December 1 2021 and has found 412 journals. Those journals are filtered according to the criterion; full text, written in English, published in 2015 to 2021. Ten journals have been acquired after throughful selection process know as Randomized Control Trial (RCT). Seven out of ten journals are selected after the second selection process by reading them completely. Joanna Briggs Institute (JBI) checklist is used to as-

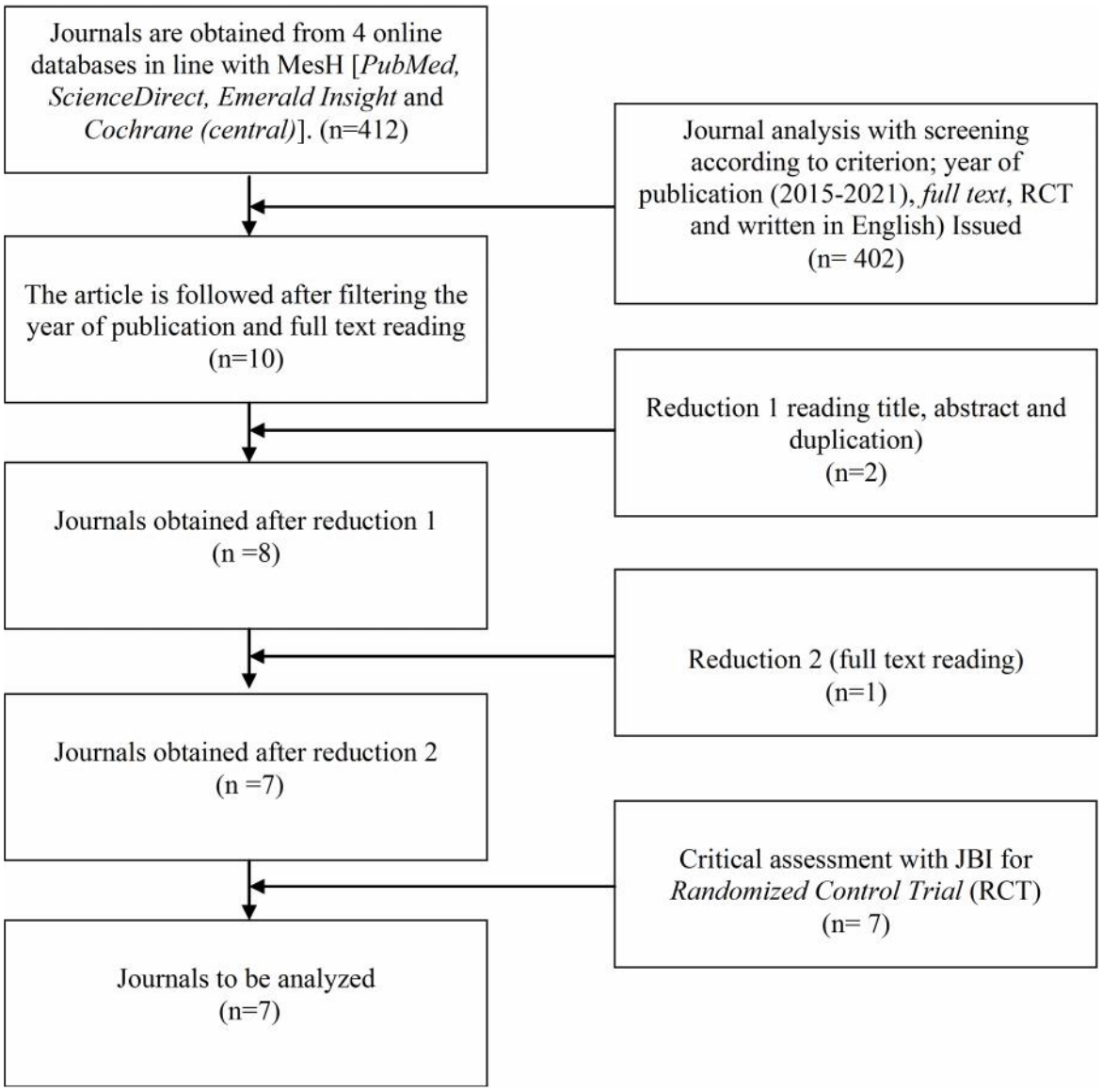

Figure 1. Literature Search Scheme

sess the quality of the journals.

RESULTS

Study Characteristics

There are seven selected journals with RCT design in this study. Based on an analysis of seven selected journals, there were 489 respondents consisting of men (23.10%) and women (76.90%). Respondents had an average age of 59.1 (SD = 7.03). There were five out of seven journals that displayed respondents' BMI results with an average BMI of 27.39 kg/m (overweight).

According to the research population of seven journals, it can be highlighted that only 1 journal or research was conducted in Thailand and the rest was conducted in Iran. The enforcement of the medical diagnosis of knee OA in 7 journals including 3 journals based on ACR assessment (2000) and radiography results with Kellgren and Lawrence assessments, 3 journals based on ACR assessment (2000) only, and 1 journal based on orthopedic doctor's diagnostic assessment. The use of topical plant oils in 2 journals is carried out without the addition of pharmacological therapy and massage. The fastest duration of the study was done in 1 week and the longest was done in 8 weeks. Those seven journals are using pain measurement options tools; four journals using VAS and WOMAC, one with KOOS and VAS, another one with WOMAC, the other one is using KOOS. Pain measurement conducted using VAS is considered as the most valid and reliable. KOOS and WOMAC are special questionnaire for OA patient that has joint paint measurement.

Table 1. Research Results

Studies	Research Design	Intervention	Comparison	Outcome & Instrument	Result
olhassanza ı et al.)15)	- A double blind controlled randomized clinical trial - T test and paired t test - Subject: patients with knee osteoarthritis - Independent: Peganum - Dependent: pain	*Peganum* oil is applied on the knee 3 x 4 drops/day for 4 weeks. All respondents were requested to halt the use of analgesic and other herbal remedy, including; anti-inflammatory drug, non-steroid, acetaminophen, opioid, and glucosamine chondroitin sulfate during the observation.	Olive oil	- The effectiveness of topical peganum oil against pain in the patient with knee osteoarthritis - Instrument: Western Ontario and McMaster Universities Arthritis Index and Visual Analogue Scale questionnaires	Topical peganum oil can significantly reduce pain after 4 weeks of use.
kari et al.)19)	- A randomized double-blinded active-controlled non-inferiority clinical trial - T-test is conducted before intervention. Comparison in the 2nd and 4th week after intervention is conducted with ANCOVA. - Subject: patients with knee osteoarthritis - Independent: Sesame oil - Dependent: pain	Sesame oil applied on the knee 3 x1.5 cc/day for 4 weeks combined with celecoxib 2 x 100 mg/day.	*Natrium diclofenac* topical gel 1% combined with celecoxib 2x100 mg/day.	- The effectiveness of sesame oil with diclofenac gel against pain in the patient with knee osteoarthritis. - Instrument: Visual analogue scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire, knee joint's flexion angle, 8-meter walk test and number of used	The effectiveness of topical sesame oil is not inferior to diclofenac gel in terms of analgesics. This is proven by a decrease in the amount of analgesic therapy consumption. However, the decline in value was not evident in the measurement of vas scores.

basifard et (2020)	- A randomized double-blind controlled clinical trial - Paired T-test - Subject: patients with knee osteoarthritis - Independent: Nigella Sativa - Dependent: pain	Chickpea oil applied on the knee 2 x 2 cc/day for 4 weeks without massaging it. The respondents were allowed to consume Acetaminophen (500mg) tablet	Piroxicam gel and placebo (paraffin oil) combined with Acetaminophen (500mg) tablet	- Evaluating the effect of topical Chickpea oil (*Cicer arietinum*) on osteoarthritis affected knee. - Visual Analogue Scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire	Pain on the WOMAC score showed a significant reduction in the topical Chickpea oil group compared to the piroxicam and placebo groups.
ɔara et al.)15)	- A three-arm, blinded, randomized, placebo-controlled clinical trial using a parallel design with the statistical analyses included Chi-square, repeated measure ANOVA, and one way ANOVA - Subject: patients with knee osteoarthritis - Independent: *chamomile* oil - Dependent: pain	Topical *chamomile* oil applied on the knee 3x1.5 cc/day for 3 weeks. Implemented without massaging and acetaminophen (500) tablet can be taken.	- Diclofenac gel 1% and paraffin. - Instrument: Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire	The effectiveness and safety of topical *chamomile* oil in the patient with knee osteoarthritis.	Topical *chamomile* oil can reduce knee pain proven by decreased use of acetaminophen therapy in the *chamomile* oil than diclofenac amd paraffin. However, there was no significant difference in the assessment of the WOMAC questionnaire on the pain component.
lup et al.)19)	- A single-blind, randomized controlled trial - ANOVA test - Subject: patients with knee osteoarthritis - Independent: *rTsa-byugs* oil	*rTsa-byugs* oil applied on the knee 2x 3 drops/day with 10 minutes of massage (every morning and	Diclofenac gel	- The benefit of *Rtsa-byugs* and diclofenac gel in reducing knee pain for patient with knee osteoarthritis. - Instrument:	Based on VAS scores in both groups there is significant pain reduction compared to the days before and

Table 2. Comparison of Mean Value Difference Before and after Intervention

No	Types of plant oils	Group A Mean ± SD	Group B Mean ± SD	Group C Mean ± SD	Remarks
1	Peganum Oil	34.26 ± 9.48 (n=27)	12,40 ± 7.77 (n=27)	-	A: Peganum oil B: Olive Oil
2	Sesame Oil	13.04 ± 1.85 (n=47)	14,66 ± 4.03 (n=47)	-	A: Sesame oil B: Diclofenac gel
3	Nigella Sativa oil	36.12 ± 11.59 (n=26)	19.47 ± 9.64 (n=26)	-	A: Nigella Sativa oil B: Diclofenac gel
4	Chickpea oil	2.06 ± 0.34 (n=25)	1.88 ± 0.12 (n=25)	0.16 ± 0.04 (n=25)	A: Chickpea oil B: Piroxicam gel C: Parrafin
5	*Chamomile* oil	19,14 ± 0.17 (n=28)	3.04 ± 0.03 (n=28)	1.64 ± 1.30 (n=28)	A: *Chamomile* oil B: Diclofenac gel C: Parrafin
6	*rTsa-byugs oil*	2.09 ± 1.98 (n=31)	3.03 ± 0.06 (n=31)	-	*A: rTsa-byugs* B: Diclofenac gel
7	Red clover oil	10.80 ± 3.1 (n=37)	6.0 ± 2.2 (n=33)	-	*A:* Red clover B: Olive Oil

Topical Plant Oil Intervention

There are several topical plant oils in seven selected journals are capable to reduce joint pain in knee OA:

Peganum Oil

Peganum harmala L is native to Iran of the family Zygophylaceae. Seeds from peganum harmala have a rich content of alkaloids with pharmacological properties as analgesics and central and peripheral antinosyptive activity. The seeds produce topical oil that nosyptive activity. The seeds produce topical oil that can be rubbed on the affected joint in OA patient. Observation of pain reduction in this journal was carried out after intervention for 4 weeks without additional pharmacological therapy. This study resulted in a significant reduction of pain compared to the usage Olive oil group, and without having any side effects (Abolhassanzadeh et al., 2015).

Sesame Oil

Sesamum indicum L. comes from the Pedalaceae family which has been used as a complementary and traditional Persian medicine for thousands of years. The study about the topical Sesame Oil is the first study conducted on humans with knee OA disease. Hypotethically, sesame oil has one of the main active ingredient substances that has a condroprote effect. Previous research on animal test subject of the OA model stated the use of sesame oil significantly inhibited the production of prostaglandins and nitric oxide induced by IL-1. . In addition, sesame oil can also lower interleukin-6 muscles, increase the activation of citrate synthase and the expression of heavy chain mRNA myosin IIa. Thus, sesame oil can help to prevent or treat knee OA. In the sesame oil group experienced a significant decrease in consuming analgesic therapy consumption at week 4. This indicates that sesame oil topically is not inferior to diclofenac gel (Askari et al., 2019).

Nigella Sativa oil

The pharmacological and biological effects of Nigella sativa are associated with Thymoquinone and oil. Thymoquinone is one of the main ingredients of Nigella sativa. Extracts are used as a complement to therapy because they have analgesic effects that can be used on pain and inflammatory disorders. Hosseini et al. (2016) highlighted that Nigella sativa has unsaturated fatty acids such as oleic acid that can relieve pain by inhibiting the activity of the cyclooxygenase enzyme (COX-2) and producing prostaglandins. The results have shown that Nigella sativa oil is more effective than diclofenac gel in osteoarthritis pain (Azizi et al., 2019).

Chickpea oil

Chickpeas or Nokhod in Persian can be found in Iran, Australia, Mexico, Myanmar, Tanzania, Turkey, etc. The content of Chickpea oil or Cicer arietinum has been proven to contain analgesic and anti-inflammatory effects. However, the analgesic properties of chickpeas can only provide an effect by penetrating the skin through the help of a mixture of sesame

oil. Statistical results show the mean value of VAS has decreased after three months of intervention. It can be summarized that Chickpea oil has the ability to reduce pain (Abbasifard et al., 2020).

rTsa-byugs Oil

The term "Rtsa" means Nerve and "Byugs" means application/massage. Topical rTsa-byugs massage oil is commonly found in Bhutan. This oil is known to cure musculoskeletal diseases. The oil ingredient contains six herbal extracts of different species from Curcuma longa, Carumcarvi, Myristicafragrans, Delphinium brunoniaum, Cautleya spicata, and sesame indicum. Some studies state that the active compounds obtained such as curcumin extract are able to inhibit molecules that cause inflammation such as phospholipase, lipooxygenase, cyclooxygenase 2, prostaglandins, and others. Some studies stated that the active compounds such as curcumin extract are able to inhibit molecules that can cause inflammation such as phospholipase, lipooxygenase, cyclooxygenase 2, prostaglandins, etc. In addition, the possible effectiveness of this oil is due to the combination of cumin oil that has anti-inflammatory akitvitas and other ingredientt.

Based on the data acquired from the statistic, it can be concluded that there is a decrease of mean value of VAS in the rTsa-byugs group and diclofenac gel before and after the intervention. This oil is considered has higher effectiveness rate than diclofenac gel after seven days of intervention (Nidup et al., 2019).

Matricaria Chamomilla L. (Chamomile) Oil

Chamomile oil is rich flavonoids and terpenoids which is believed to have anti-inflammation effect, anti-oxidant and anti-nosyepative. The working mechanism of Chamomile oil is similar to NSAID therapy, which inhibits the COX-2 pathway in removing prostaglandin E2. The polyphenol compounds in Chamomile also have an anti-inflammatory effect that is as powerful as corticosteroids by inhibiting pro-inflammatory biomarkers. Thus, this topical oil can reduce joint pain in knee OA patients and reduce the use of oral pharmacological therapy.

According to the data acquired from statistic analysis, it can be emphasized that the mean value of the pain score in the Chamomile oil group decreased in the third week. This proves that chamomile oil has the ability to reduce pain topically (Shoara et al., 2015).

Red Clover Oil

Red Clover is often known as Trifolium pratense L. This medicinal plant is known in traditional Persian medicine due to its analgesic effect on the joints. Recent studies have proven that this oil has an importance in anti-oxidant, anti-inflammatory effects and helps to inhibit articular cartilage damage. Based on the observation of in vitro studies, Red Clover Oil has been characterized by various mechanisms such as cyclooxygenase-2 inhibition. (in removing prostaglandin E2), iNOS (lipopolysaccharide-induced nitric oxide expression) and inflammatory cytokines, including factor-a necrosis tumors, IL-1, and IL-6 . The other in vivo studies have confirmed anti-inflammatory effects of this oil.

Based on the study conducted by Wu et al. (2014) it has been proven that there is a trace of biochanin A content in Red Clover which acts as the main isoflavone. This agent works in vivo by inhibiting the enzyme that can degenerate the joint cartilage and reducing the process of joint cartilage damage. The results of the study stated that topical Red Clover Oil can reduce pain better than topical olive oil as a placebo. It is assessed from the results of significant improvements in physical function in knee OA patients (Mokhtari et al., 2020).

Based on a study of seven selected literatures, it can be stated that plant oils such as; Sesame oil, Nigella sativa oil, Chickpea oil, Chamomile oil, and rTsa-byugs oil have the same effectiveness if compared with the application of diclofenac gel and piroxicam gel in pain reduction treatment. Peganum oil and Red clover oil have more effectiveness in pain reduction than olive oil. The evidence is obtained from previous studies about topical olive oil condcuted by Priyanga (2014) in India, Ghaysouri et al. (2018), and AlMalty (2013) in Iran. Topical olive oil contains effective components in reducing knee OA pain compared to ice packs and physical therapy without application.

Regarding to the effectiveness of plant oils as a therapy without a combination of pharmacology and exercise, it can be observed by inspecting the difference in the mean value before and after the intervention. In comparison, topical peganum oil and topical nigella sativa oil is superior than the other plant oils. It can be stated that rTsa-byugs oil has effectiveness in reducing pain without using pharmacological therapy. However, the application of rTsa-byugs is done by massage on the knees. On the other hand, this result tends to become biased, as the decrease in OA pain becomes perplexed between the efficacy results of topical rTsa byugs oil or the result of 10 minutes massage.

The highest VAS mean value difference in the group before and after the intervention, can be found

in topical peganum oil, topical nigella sativa oil and topical chamomile oil. The data provided in the statistical table has proven that the use of sesame oil, chickpea oil and rTsa-byugs have the same effectiveness value with piroxicam gel and diclofenac gel in knee pain reduction treatment.

The following table below contains selected journals that have been utilized for literature review (table 1).

DISCUSSION

Knee Osteoarthritis (OA) is a degenerative disease that commonly found in elderly across the globe. Risk factors of knee OA are often correlated with age, gender and being overweight or obese. Joint pain is a major problem faced by OA patients and can result in physical disability. Several Complementary and Alternative Medicine (CAM) have been studied for its effectiveness in several countries. However, there are currently no studies that discuss the effectiveness of topical plant oils in reducing the pain of knee OA.

This literature review obtained from seven selected journals that have been screened and critically assessed. As a result, it has been proven that the demographic of knee OA respondents are commonly found at the age of 59 years old, which is dominated by women and classified as overweight. This finding is in accordance with the study conducted by Chin et al. (2017) which mentioned that aging affects the function of chondrocytes in maintaining cartilage and associated with increased biomechanical pressure due to excessive weight that resulted in cartilage damage, matrix depletion, and loss of cartilage cellularity. However, obese OA patients are not only associated with increased load but also associated with metabolic disorders and reduced body activity due to pain (Georgiev et al., 2019). OA in women is generally associated with a decrease of estrogen during menopause (Shanmugam et al., 2021). Menopause is associated with an increase in interleukin-1 (IL-1) by estradiol which aggravates the development of OA (Budiman & Widjaja, 2020).

The literature review process in this research has found evidence which shows that, the application of topical plant oils is effective in reducing the knee pain in OA patients. In accordance with a study conducted by Lin et al. (2018), it can be concluded that the components from the oils contain anti-inflammatory agent. The use of topical plant oils as Complementary and Alternative Medicine (CAM) may reduce the application of pharmacological therapies in reducing pain. Based on the literature obtained, the compounds of each topical plant oils contain analgesic and anti-inflammatory therapy. Some plants contain compounds that have anti-inflammatory properties with a mechanism inhibiting the cyclooxygenase-2 pathway (COX-2) In producing its products known as, prostaglandins (PGE2), as well as lowering the levels of inducible Nitric Oxide Synthase (iNOS) expression in producing nitric oxide (NO) products. In general, the ingredient of topical plant oils has an anti-inflammatory effect that is capable to inhibit pro-inflammatory biomarkers as a producer of pain sensations (Fu et al., 2018).

Osteoarthritis pain is associated with the occurrence of synovial inflammation, oxidative stress, chondrocyte apoptosis, extracellular degradation of joint cartilage, subcondral bone sclerosis and the formation of osteophytes. OA begins with the failure of chondroocytes in keeping and maintaining balance when damage occurs to the cartilage of the joints. The failure of chondroocytes activates and produces immune responses and mediators such as cytokines and pro-inflammatory chemokines that increase collagen and aggrecan expression resulting in excessive extracellular degradation of the matrix. Pro-inflammatory cytokines can be classified as Tumor Necrosis Factor- (TNF-), Interleukin-6 (IL-6), and Interleukin-1 (IL-1 . Stimulation of chondrocytes with IL-1 stimulates increased production of Reactive Oxygen Species (ROS) resulting in oxidative stress. Increased ROS activates inflammatory mediators such as IL-6, cyclooxygenase-2 (COX-2) and prostaglandin E2 (PG E2) as well as inducible Nitric Oxide Synthase (iNOS) and its nitric oxide (NO) products (Ansari et al., 2020). In OA occurs a condition of synovitis that produces bradykinin and nerve growth factors. When all these inflammatory mediators interact with the nociceptors in the joints and resulting in a sensation of pain in the knee (Zhang et al., 2021).

The role of plant oils has gained importance for cosmetic and medical because of their advantages. Plant oils can be classified into essential oils and fixed oils. This study discusses about fixed oils that are not volatile at room temperature. There are several compounds found in fixed plant oils such as triglycerides, free fatty acids (FFAs), tocopherols, sterols, stanols, phospholipids, squalene, phenolic compounds, etc. These compounds have different effects when applied topically and capable to affect the skin physiological in different ways. Phenolic compounds, tocopherols, phospholipids have been evident to exhibit anti-inflammatory properties with the help of

monounsaturated oleic acid component which can increase skin permeability in stratum corneum. Furthermore, this component can enter the blood vessels capillaries. The interaction of the content of these compounds can inhibit inflammatory mediators such as proteases, cytokines, chemokines, prostaglandins, neurotropins, and neuropeptides (Lin et al., 2018). According to a study conducted by Lin et al. (2018), it is evident that plant oil compounds have similraties with the OAINS group in their capabilities of pain reduction.

Based on the results of the analysis of selected journals it is obvious that, peganum plant oil and Nigella sativa topical are recommended to reduce OA pain effectively without any combination of pharmacological therapy and massage. However, this kind of plant oil is not common in Indonesia and difficult to find. There are several topical plant oils that can be commonly produced in Indonesia such as; sesame oil, red clover oil, and chickpea oil. Further research is required as most of research used in the literature review have been conducted in Iran in order to enrich the evidence of the effectiveness of topical plant oils usage in Indonesia. The effectiveness of this topical oil therapy might be affected due to vast differences of region, population and climate. The result of this research can be used as the ground for future research, as the use of herbal and traditional medicine is still popular in the country. Economically, topical plant oils for OA treatment can drastically reduce the patient's expense as the use of analgesic is decreased. This study is the first literature review which evaluates several journals about the effectiveness of topical massage oil. It can be concluded that the oil has positive effect on pain reduction in knee OA patients.

CONCLUSION

It can be revealed that, plant oils are effective to reduce joint pain in OA patient if applied topically.

Topical plant oils as a combination therapy are able to reduce the use of pharmacological therapy for pain reduction. This research results are expected to increase nurse knowledge in carrying out pain management and nursing intervention. Additionaly, this research can also be utilized as reference for evidence-based practice in hospitals for knee OA patients. Therefore, this research is expected to be able to aid decision making process in the healthcare facilities in order to increase the service quality by protecting patients from drug adverse effect. This research can be used as a foundation and motivate health workers in developing CAM-based health services that are useful for people with knee OA. The effectiveness of topical plant oils is expected to be carried out with greater racial and population diversity then accompanied with more variety of plant types that are easily found in different countries.

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