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THE POTENTIAL OF AVOCADO OIL FOR TOPICAL USE: A NARRATIVE REVIEW

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INTISARI

Penuaan kulit adalah proses biologis yang dipengaruhi oleh aspek internal (genetika, hormon, dan proses metabolisme) dan eksternal (paparan jangka panjang terhadap sinar UV, polusi, radiasi bahan kimia, dan racun). Asam lemak tak jenuh terutama asam oleat dan asam palmitat, yang terdapat pada minyak alpukat bermanfaat untuk penyembuhan luka, melembabkan kulit, antioksidan dan *anti-aging*. Tujuan dari penelitian ini adalah untuk mengetahui penggunaan minyak alpukat pada kulit dalam berbagai formula. Tinjauan artikel pada penelitian ini dilakukan melalui pencarian *database* pada Pubmed, Google Scholar, Proquest, Springer Link, dan Science Direct untuk artikel yang diterbitkan antara tahun 2018 dan 2024. Publikasi penelitian yang memenuhi kriteria inklusi berjumlah 12 artikel. Hasil menunjukkan bahwa minyak alpukat paling banyak diformulasikan dalam sediaan emulgel dan krim. Minyak alpukat dapat digunakan sebagai penyembuhan luka, *anti-aging*, dan tabir surya karena adanya asam lemak tak jenuh seperti asam oleat, asam palmitate dan asam linoleat. Penggunaan minyak alpukat secara topikal menunjukkan potensi penggunaannya dalam sediaan kosmetik. Minyak alpukat berpotensi sebagai zat aktif kosmetik dengan konsentrasi 3 hingga 20%.

Kata kunci: Anti-penuaan, anti-inflamasi, minyak alpukat, kosmetik, penyembuhan luka

ABSTRACT

Skin aging is a multifaceted biological process that is impacted by both internal (genetics, hormones, cellular metabolism, and metabolic processes) and external (long-term exposure to UV light, pollution, ionizing radiation, chemicals, and toxins) aspects. Monounsaturated fatty acids, especially oleic acid, found in avocado oil are beneficial for wound healing, moisturizing, and anti-aging. Finding avocado oil's role as an active ingredient in cosmeceuticals was the aim of this investigation. The study's article review technique entails a thorough search of the Pubmed, Google Scholar, Proquest, Springer Link, and Science Direct databases for articles published between 2018 and 2024. The sample utilized in this study consisted of research publications that satisfied the inclusion criteria, resulting in a total of 12 articles. The result of this study showed that avocado oil is mostly formulated in emulgel and cream preparation. Avocado oil can be used as sunscreen due to the presence of the unsaturated fatty acid such as oleic acid and linoleic acid. All of the topical application of avocado oil showed the potential of this oil as antioxidant, anti-aging and sunscreen. Avocado oil is potential as cosmeceutical at the concentration of 3% to 20%.

Keywords: *Anti-aging; anti-inflammation; avocado oil; cosmeceutical; wound healing*

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INTRODUCTION

Skin damage are happened due to skin aging, scars or wound, photo-damage and lack of antioxidant. Skin aging is a component of the natural process of human aging, which becomes apparent and takes distinct paths in various organs, tissues, and cells over time (Guerraiche, 2022). Although the aging indications of internal organs are not easily visible, the skin is the first and most noticeable indicator of the passage of time. Skin aging is a multifaceted biological phenomenon that is affected by a mix of internal variables (such as heredity, cellular metabolism, hormones, and metabolic processes) and external factors (such as prolonged exposure to UV light, pollution, ionizing radiation, chemicals, and toxins)(Liu, 2022). These elements collectively contribute to the gradual modifications in the structure and function of each layer of the skin, as well as changes in the look of the skin, particularly in areas exposed to the sun (Bissett, 2009). Unlike thin and atrophic intrinsically aged skin, premature photo aged skin is characterized by a thicker epidermis, mottled discoloration, deep wrinkles, laxity, dullness, and roughness. The sparsity and reduction in collagen content in photo aged skin may result a skin damage such as inflammation, scars and erythema (Ganceviciene et al., 2012).

The approach regarding the use of natural cosmetic ingredients is currently associated with efforts to minimize visible signs of aging on the skin, face and body (Rosen and Yarmush, 2023). In addition, the use of cosmetics that are nourishing and contain effective sunscreens is another effective method to prevent damage caused by free radicals and, thus, combat the appearance of wrinkles (Shohag et al., 2022).

Botanically, avocados are classified as fruit, but from a nutritional standpoint, they are more closely associated with vegetables (Flores et al., 2019). Avocados contain high levels of monounsaturated fatty acids, specifically oleic acid (Risyad et al., 2016). Evidence has shown that these carotenoids and unsaturated fatty acid possess the capacity to effectively penetrate and accumulate in the skin (Cristiano et al., 2021). The use of lutein and unsaturated fatty acid through both oral and topical means led to a notable improvement in skin elasticity and moisture(Ortiz-Avila et al., 2013). Avocado oil is currently employed as a carrier oil in cosmetics products (Rachmanita and Safitri, 2020). Avocado oil is the most exported oil from Indonesia (Badan Pusat Statistik, 2021). Avocado oil is potential to be developed in cosmetics preparation. Conducting a narrative review is essential to enhance understanding of the utilization of avocado oil, both as a carrier oil and as a primary ingredient in cosmetics. A

METHOD

This study utilized a literature review methodology by conducting searches on research journal databases and the internet. The databases utilized included Pubmed, Google Scholar, Proquest, Springer Link, and Science Direct. The search terms employed to locate references to articles from many research source included avocado oil, anti-aging, antioxidant, sunscreen, wound healing, moisturizer, and formulation. The inclusion criteria were original and full articles that published from 2018 to 2024, abstract is in English or Bahasa Indonesia, and discussing the formulation of avocado oil as moisturizer, antioxidant, sunscreen and wound healing. The exclusion criteria were review articles and/ the usage of avocado as dietary supplements for anti-aging or food antioxidant.

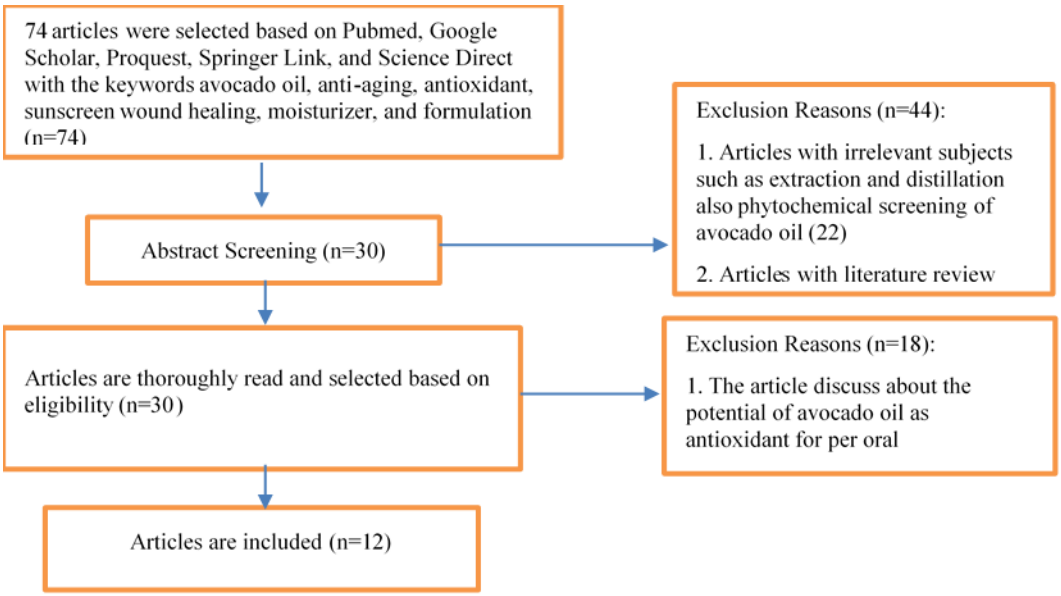

Figure 1. Flow of the literature review process

RESULT AND DISCUSSION

The result of the literature review can be seen in Table I.

Table I. Literature review result of cosmeceutical potential of avocado oil

No	Tittle	Intervention	Parameters Tested	Result
1.	Evaluation of Pulp Oil from *Persea Americana* (Avocado Fruit) in Pharmaceutical Cream Formulation (Ordu and Jaja, 2018)	There are three categories of cream preparations, specifically: Group 1 consists of avocado cream. Group 2 is referred to as olive cream. Group 3 consists of a cream combination containing both components.	Each group was tested for physical characteristics including organoleptic, pH, conductivity, alkaline tests, density, and sunscreen activity tests.	The best result obtained is from group 1, which consists of a cream preparation including avocado oil. The pH, organoleptic properties, conductivity meet the requirements, and it has a higher sunscreen activity compared to the other groups due to its high content of unsaturated fatty acids and potassium.

No	Tittle	Intervention	Parameters Tested	Result
2.	Formulation and Evaluation of Oil Peel-Off Masks from Avocado Oil (Hanifa et al., 2023)	There are a total of 5 categories, each with a different concentration of avocado oil. Group 1 does not include avocado oil. Group 2 contains 5% avocado oil. Group 3 contains avocado oil with a concentration of 7.5%. Group 4 contains 10% avocado oil. Group 5 contains avocado oil with a concentration of 12.5%.	Every group underwent physical evaluation tests, including organoleptic assessment, homogeneity analysis, pH measurement, spread ability examination, drying speed assessment, and elasticity testing	The avocado oil peel-off mask adheres to the standards for homogeneity and pH parameters in all its formulae. The F3 peel-off gel mask is formulated to have excellent spread ability, ranging between 5.03-5.60 cm. It also boasts the fastest drying time of 15.1 minutes and the maximum elasticity, with a stretch ability percentage of 133%.
3.	Formulation and Evaluation of Avocado Oil Nano-cream as an anti-aging (Sihombing, 2019)	Tween 80 (34%) and propilen glikol (8%) were used in the formulation of anti-aging nanocreams, with ratio concentration variations in the amounts of avocado oil used in 5% (F1), 7.5% (F2), and 10% (F3); the cream was formulated in the same amount of avocado oil as the chosen nanocream.	A skin analyzer was used to assess F3 for skin irritation and anti-aging efficacy.	The chosen nanocream (F3) for its anti-aging properties performed better than marketed cream. After using nanocream for four weeks, the volunteer skin's pores shrank, there were less spots, the wrinkles disappeared, and the even skin became smooth.
4.	Anti-Inflammatory and Skin Barrier Repair Effects of Topical Application of Some Plant Oils (Lin et al., 2018)	A total of 13 groups with different plant oils, namely: Group 1= Soybean oil Group 2= Peanut oil Group 3= Sesame oil Group 4= Avocado oil Group 5= Borage Oil Group 6= Jojoba oil Group 7= Wheat germ oil Group 8= Pomegranate seed oil Group 9= Almond oil Group 10= Apricot oil Group 11= Rose oil Group 12= Chamomile flower oil Group 13= Shea butter	Each study examined the therapeutic advantages of this botanical oil by assessing its anti-inflammatory and antioxidant capabilities, impact on skin health, promotion of wound healing, and efficacy in enhancing the skin's protective barrier.	Avocado oil possesses properties that promote the healing of wounds, reduce inflammation, and function as antioxidants. Avocado oil offers the highest degree of therapeutic advantages for the skin when compared to oils derived from other plants.

No	Tittle	Intervention	Parameters Tested	Result
5.	Formulation and Evaluation of Emulgel for Treatment Acne (Chauhan, 2020)	Emulgel was made into 4 groups, namely with varying concentrations of avocado oil Group 1= 5% Group 2= 4% Group 3= 3%	Each group was tested physically and in vitro anti-ance effect	The results showed that emulgel with a 5% avocado oil concentration had promising potential for treating acne.
6.	Green tannins or Avocado Oil Composites; Suncare And Skincare Materials (Fares et al., 2023)	A total of 4 groups of creams contain varying concentrations of avocado oil, namely: Group 1= 12.5% Group 2= 25% Group 3= 50% Group 4= 100%	A total of 4 groups were tested each to detect active substances using 1H NMR and ATR-FTIR spectroscopy and thermal stability using TGA and DTG. Additionally, the cream was physically evaluated and tested for SPF	The results show that the avocado oil content in the cream has an anti-aging effect and has an SPF value that can absorb UV B up to a high content.
7.	Histomorphological Examination of Skin Wound Healing Under the Effect of Avocado Oil in Wistar Rats (Ebad et al., 2021)	30 mice with the same body weight range were divided randomly into three groups, namely control, treatment with avocado oil, and treatment with phenytoin after anesthesia and a thin skin wound measuring 4 cm on the mice's backs was made. Wound healing was performed histologically and carried out on days 3, 7, and 14.	Wound healing was tested histologically and carried out on days 3, 7 and 14.	Wound healing in the group treated with avocado oil was significantly less than that in the group treated with phenytoin and the control group.
8.	The Effectiveness of Topical Avocado In The Treatment of Minor Recurrent Aphthous Ulceration: A Randomized Controlled Clinical Trial (Amer, 2023)	A total of sixty patients in the ulcerative stage of recurrent aphthous ulcers (RAU) were randomly assigned to two groups. Group I: Participants were administered a topical solution of 0.5% avocado gel, applied three times a day for a duration of seven days. Group II: Patients were administered a topical placebo gel three times daily for a duration of seven days.	The patients underwent examination during their initial visit before to receiving treatment, as well as on the fourth and seventh day after treatment.	Patients undergoing 0.5% topical avocado gel therapy had a lower level of redness, reduction in the size of ulcers, and a shorter healing time compared to patients receiving the placebo therapy.

No	Tittle	Intervention	Parameters Tested	Result
9.	Avocado Oil Cream Formulation and Its Effectiveness Against Xerosis of the Heels (Sari et al., 2022)	The cream was formulated with a composition consisting of 10%, 12.5%, 15%, 17.5%, and 20% avocado oil.	The samples were subjected to be tested on a group of 21 volunteers who had been suffering from xerosis of the heels of their feet for a duration of 4 weeks.	A cream with 20% avocado oil concentration effectively reduces xerosis on the heels within a 4-week period.
10.	Optimization of Cosmetic Serum Formulation from Avocado Oil (Persea americana Mill) As an Emollient for the Skin (Rima, 2020)	The formulation consisted of a microemulsion serum containing 2% avocado oil. The oil phase was VCO, the surfactant was Brij 35, and the cosurfactants were ethanol and PEG 400. Water was also included in the formulation.	The preparations were assessed based on transmittance, pH value, kind of oil in water preparation, stability test, viscosity, specific gravity, globule size, and moisture test.	The findings demonstrated that the serum derived from avocado oil had the capacity to enhance skin hydration over a period of 15 days.
11.	Sunscreen effectivity and physical characterization of avocado oil in nanoemulsion using isopropyl myristate variations (Shabrina et al., 2024)	1% (FI), 3% (FII), and 5% (FIII) IPM variation were used to make AVN with 5% oil.	The AVN were tested for physical characteristics such as organoleptic, pH, viscosity, rheology, particle size and polydispersity index (PI). The products were also tested for sunscreen effectivity by in vitro and Minimum Erythemal Dose (MED) method. The	In vitro SPF values were 16.43 ± 4.50 (FI), 16.27 ± 4.20 (FII) and 17.88 ± 3.20 (FIII) ($p > 0.05$), and categorized as ultra protection. MED value were 12.28 ± 1.34 (FI); 12.51 ± 1.68 (FII); and 13.22 ± 1.84 (FIII) ($p < 0.05$) and categorized as maximum protection.
12.	Polyherbal lotion preparation formulation of avocado oil (Persea americana) and celery extract (Apium graveolens L) as a skin moisturiser Formulation Wistar Rat (Bylla et al., 2023)	The lotion was added with avocado oil and celery extract respectively in several concentrations (1.5%, 2%, 2.5% and 3%).	Every composition undergoes testing to evaluate its physical qualities, antioxidant properties, moisturising capabilities, and potential for causing irritation.	A combination lotion preparation of avocado oil and celery extract with a concentration of 3% shows effectiveness as the best moisturizer and antioxidant with an IC50 of 143 ppm

According to the findings of the literature research mentioned earlier, certain articles affirm the efficacy of applying avocado oil on the skin as a moisturizer. This impact is derived from the composition of avocado oil, namely its high concentration of unsaturated fatty acids such as oleic acid, linoleic acid, and palmitic acid (De Oliveira et al., 2013)The analysis of avocado seed oil revealed that the predominant fatty acid component is linoleic acid, which makes up 47.3531% (w/w) of the oil (Risyad et al., 2016). Additionally, palmitic acid, a saturated fatty acid, accounts for

20.3439% (w/w), while oleic acid, a monounsaturated fatty acid, makes up 15.8823% (w/w) (Forero-Doria et al., 2017). Additionally, these substances have the ability to constrict, moisturize, and restore the health of the outermost layer of skin cells (Park et al., 2013). Human volunteers were used in in vivo investigations to demonstrate the biocompatibility of unsaturated fatty acid vesicles with skin tissue. These findings suggest that unsaturated fatty acid vesicles may have potential clinical applications for treating topical disorders (Ochiuz and Hortolomei, 2017). Unsaturated fatty acids have notable therapeutic properties for treating skin inflammation and are utilised in a variety of cosmetic products.

Avocado oil, either applied directly or utilised in pharmaceutical products for topical application, can enhance the production of collagen and reduce the presence of inflammatory cells in the process of healing wounds (Ranade and Thiagarajan, 2015). This suggests that avocado oil could be a promising choice for the treatment of skin wounds. The findings of the current investigation indicate that the topical application of avocado oil, either in its natural form or as part of pharmaceutical preparations, can enhance the production of collagen, decrease the presence of inflammatory cells, expedite the blood clotting process, hasten the regeneration of epithelial tissue in wound healing, and accelerate the overall skin wound healing process, thereby reducing the duration required for wound healing (Nayak, Raju and Rao, 2008; Ranade and Thiagarajan, 2015; Mawazi et al., 2022).

Applying avocado oil directly or in gel and cream formulation to a wound reduces the amount of inflammatory cells in the tissue and exhibits anti-inflammatory effects (Lin et al., 2018). The modulation of the inflammatory response can be attributed to the abundant presence of oleic acid in this oil. Oleic acid, unlike arachidonic acid, causes a lesser local inflammatory response (Rodrigues et al., 2012). Avocado oil contains phytochemical components, including vitamins A and E and fatty acids (oleic, linoleic, and palmitic acids), which may have pharmacological effects on the healing process. Since these fatty acids are the building blocks of chemicals that have pharmacological effects, including leukotrienes, prostaglandins, thromboxanes, and prosta-cyclins (Joffre et al., 2020).

Avocado oil is also effective for sunscreen. Oil-based vehicles are superior at creating a consistent and durable layer of sunscreen on the skin, and their moisturizing characteristics shield the skin from the dehydrating impact of wind and sunlight (Ahmad and Ahsan, 2020). The presence of unsaturated fatty acids in avocado oil can aid in the reduction of erythema caused by extended exposure to UV-B radiation (Larijani et al., 2014).

CONCLUSION

In conclusion, the avocado oil has the potential to be developed as cosmeceutical for anti-aging, antioxidant and sunscreen. The unsaturated fatty acid content in avocado oil can reduce the wrinkle and increase the collagen and skin elasticity. This analysis highlights the constraints found in published studies about human clinical trials using avocado oil as active components in cosmetics. The majority of avocado oil formulations undergo testing both in vitro and in vivo.

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