



A Systematic Review: Formulation of Facial Wash Containing Essential Oil

Cut Puspita Salsabila Syaharani¹, Nadia Isnaini^{1,2,7*}, Essy Harnelly^{2,3}, Vicky Prajaputra^{2,4,7}, Siti Maryam⁵,
Fadli A. Gani⁶

¹Department of Pharmacy, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

²ARC-PUIPT Nilam Aceh, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

³Department of Biology, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

⁴Department of Marine Sciences, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

⁵Department of Family Welfare Vocational Education, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

⁶Department of Veterinary Education, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

⁷Research Center for Marine Sciences and Fisheries, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

*Corresponding author email address: nadiaisnaini@usk.ac.id

Received: 2 June 2023; Accepted: 30 June 2023; Published online: 30 June 2023

Abstract

Facial wash is a major need of the community because it is very helpful in removing dirt, dust, dead skin cells, oil, residual cosmetics and provides moisture to the skin. In general, the face wash used by the community is classified as a synthetic product that can damage the skin, one alternative to avoid this by using natural ingredients such as essential oils. Essential oils have many benefits, including anti-acne, antibacterial, and antioxidant. The purpose of this literature review research is to find out the potential of essential oils and their formulations in facial wash through literature searches that can be a reference in future research. The systematic review method was carried out by collecting data from various literature sources obtained from several research journals that have been published both nationally and internationally accredited reviewing face wash cosmetics containing essential oils. Based on the systematic review, it was found that there are several face wash formulations containing essential oils of patchouli oil, tea tree oil, jasmine oil, cinnamon oil, black cumin seed oil, basil oil, ylang-ylang oil, peppermint oil, turmeric oil, lemongrass oil, lavender oil, and tangerine oil.

Keywords: facial wash, essential oils, formulation, skin

1. INTRODUCTION

Hygiene is a very important thing to consider. Outdoor activities expose the skin to sunlight, bacteria, dust, and pollution that can cause skin problems so that the skin loses elasticity. The skin is the outermost part of the human body, the skin will always be exposed to the surrounding environment, ranging from exposure to sunlight, temperature, and air humidity. Dusty environments and excessive air pollution can make the skin dull and dirty. This will disrupt the skin's balance. Healthy facial skin is everyone's dream, facial skin needs to be cared for to stay healthy. Facial skin care to keep it clean from dirt can be done by cleaning the facial skin. The face can be cleaned using clean milk or cleansing cream, washing solution or refresher, can also use facial wash. Cleaning the facial skin only with water without using soap becomes less clean and feels dirt is still attached because water cannot clean oil and dirt completely, so it takes some type of facial wash to clean the face from the dirt attached (Syahrana et al. 2022, Rohmani et al. 2022).

A washing agent is a whole set of facial wash that removes cosmetics, dead skin cells, oil, dirt, and various pollutants from the skin. Facial wash helps unclog pores and ward off skin problems such as skin inflammation (Bhavana et al. 2019). Facial wash commonly used by the public are classified as synthetic products that can damage the skin. Most facial products still use synthetic ingredients as active ingredients that have the potential to cause irritation to consumers who have sensitive skin and are harmful to the skin (Agarwal & Jindal, 2023). One alternative to avoid this is to use natural ingredients such as essential oils (Isnaini et al. 2022).

Essential oils are natural ingredients used in the cosmetic industry that have antimicrobial, antioxidant, anti-acne, anti-inflammatory, anti-aging, skin lightening, and sun protection properties. In recent years, essential oils have become a very popular ingredient for skincare. Many exploit essential oils in skincare by utilizing some of their biological properties to keep the skin youthful, healthy, and fresh and enable its protection from environmental damage. Essential oils have

lipophilic properties that can contribute to the maintenance of skin microbiota, which has a very important role in the maintenance of skin health, and the protective role of the stratum corneum (Kurniawan et al. 2020). Therefore, this literature review was conducted to find out the potential of essential oils and their formulations in facial wash through literature searches that can be a reference in further research.

1.1 Facial Wash

Facial wash is a cosmetic product for facial skin care that is routinely used every day as a wash to help facial skin problems such as removing dead skin cells, rejuvenating the skin, removing dirt, oil and providing moisture. The advantages of facial wash are considered more hygienic, easier to use, practically easy to store and carry (Marlina et al. 2022). Facial wash has a function to remove dead cells, rejuvenate skin cells, remove oil and dirt, reduce skin microbial flora, and make the skin fresh (Kumar et al. 2005). Facial wash is very effective for removing dirt and oil while moisturizing dry skin. The forms of facial wash are:

- Cream-based facial wash
- Gel-based facial wash
- Liquid-based facial wash
- Powder-based facial wash

In general, a facial is suitable for all skin types, but the various products currently available in the market are designed according to different skin types. For example, a facial for oily skin is intended for individuals with oily skin and does not contain oil in its face, and leaves a slight oily film on the skin. Based on skin type, face washes are classified into:

- Facial wash for oily skin
- Facial wash for dry skin
- Facial wash for normal skin (Solanki et al. 2020)

The advantages of facial wash products over other types of products are that facial wash can help evacuate dead skin

cells, allow new skin cells to replace old skin cells, help maintain the freshness and health of the skin, give the skin a radiant appearance, help solve the problem of dead skin cells and excess oil that clog pores, the problem of acne and blackheads, and the removal of dead skin cells will make the skin slower to wrinkle (Koli, 2016).

1.2 Essential Oils

Essential oils are highly hydrophobic natural compounds extracted from aromatic plants (including flowers, roots, bark, leaves, seeds, peels, fruits, wood, and whole plants) that are widespread in the food and pharmaceutical industries, pest control, perfumery, cosmetics, and toiletries. The bioactivity of essential oils depends on various factors, namely extraction method, drying, storage, harvest time, climatic conditions, plant species, and mode of isolation. This richness of composition presents key characteristics in the various applications of essential oils, to contribute to the improvement of health, hygiene, beauty, and freshness (Guzman and Lucia 2021).

Essential oils are known as etheric oils produced by plants. They are volatile at room temperature without decomposition, have a bitter taste, smell fragrant according to the odor of the producing plant, generally soluble in the producing plant, generally soluble in organic solvents and insoluble in water (Isnaini et al. 2022). Essential oils can dissolve in alcohol at certain comparisons and concentrations. Thus, it can be known the amount and concentration of alcohol required to completely dissolve a certain amount of oil. In addition to dissolving in alcohol, essential oils can also dissolve in other organic solvents, less soluble in dilute alcohol with in other organic solvents, less soluble in dilute alcohol with a concentration of less than 70%. Oils that contain terpen compounds in large amounts will be difficult to dissolve (Kurniawan et al. 2020).

Many plants have been reported to contain essential oils or volatile oils that are classified based on the function of their origins as well as the properties and active compounds of essential oils. Some of the plants are summarized in Table 1.

Table 1. Some examples of essential oils are classified based on the function of their origins (Raut, 2014)

Plant Family	Essential Oil	Properties	Active Compounds	References
Apiaceae	<i>Carum nigrum</i> (Black caraway), <i>Anethum graveolens</i> , <i>Apium graveolens</i> (Celery), <i>Foeniculum vulgare</i> (Fennel), <i>Pimpinella anisum</i> (Anise), <i>Cuminum cyminum</i> , <i>Corriandrum sativum</i>	Antibacterial, Antifungal, Antiviral	Citronellol, curzerene, limonene, linalool, (E)- β -ocimene, α -pinene, sabinene, terpinolene	Kamte et al. 2018, Quassinti et al. 2013, Jamalova et al. 2021
Asteraceae	<i>Artemisia Judaica</i> , <i>Artemisia annua</i> , <i>Artemisia absinthium</i> (Wormwood), <i>Artemisia dracunculoides</i> (Tarragon)	Antifungal, Antiviral	Camphor, β -carophyllene, 1,8-cineole, p-cymene, limonene, β -pinene, α -thujane, β -thujane	Rustaiyan et al. 2021, Razafiarimanga et al. 2021
Lamiaceae	<i>Origanum vulgare</i> , <i>Melissa officinalis</i> (Lemon balm), <i>Salvia officinalis</i> , <i>Mentha longifolia</i> (Wild Mint), <i>Mentha piperita</i> (Peppermint), <i>Mentha spicata</i> , <i>Ocimum basilicum</i> (Sweet Basil), <i>Rosmarinus officinalis</i> (Rosemary), <i>Lavandula officinalis</i> (Lavender), <i>Salvia sclarea</i> (Sage Clary)	Antibacterial, Antifungal, Antiviral, Anti-inflammatory, Antioxidant	Carvacrol, p-cymene, Geraniol, Germacrene, limonene, linalool, γ -terpinene, terpine-4-ol, thymol	Shanaida et al. 2021, Ghavam et al. 2021

Lauraceae	<i>Cinnamomum verum</i> (Cinnamon)	Antimicrobial, Anti-inflammatory	Netole, anisole, δ -cadinene, α -cadinol, β -caryophyllene, 1,8-cineole, α -cubebene, linalool, γ -terpinene, terpinen-4-ol	Damasceno et al. 2019, Salleh et al. 2015
Myrtaceae	<i>Syzygium aromaticum</i> (Clove), <i>Thymus vulgaris</i> (Thyme), <i>Melaleuca alternifolia</i> (Tea tree), <i>Eucalyptus globulus</i> (Blue gum), <i>Myristica fragrans</i> (Nutmeg)	Antibacterial, Antifungal, Antiviral, Anti-inflammatory	1,8-cineole, citronellol, geraniol, neral, sabinene, γ -terpinene	Caputo et al. 2020
Rutaceae	<i>Citrus medica</i> (Lemon), <i>Citrus paradisi</i> (Grape fruit)	Antibacterial, Antifungal	Citronellol, limonene, linalool, linalyl acetate, β -phellandrene	Lobine et al. 2021, Silva et al. 2017

1.2.1 Mechanism of Action of Essential Oils as Antibacterial

The mechanism of action of essential oils is directly related to the ability of hydrophobic substances to interact into cell membranes. The antimicrobial activity of essential oils has the effect of damaging the membrane to cause rupture of cell components. However, the mechanism of action through the membrane can also affect biochemical reactions (synthetic, protein, enzyme secretion) and very important processes occurring in cells (energy conversion, nutrition). Essential oils are also known to interact with DNA (Cheong et al. 2012).

1.2.2 Mechanism of Action of Essential Oils as Antioxidant

The mechanism of action of essential oils is by donating one hydrogen atom (H) to a free radical, so that a more stable compound can be formed (Pratt, 1992).

2. PLANTS USED IN THE FORMULATION OF FACIAL WASH




Many plants have been reported to be used in facial wash formulations due to the presence of essential oils or volatile oils in various plant materials such as flowers, rhizomes, bark, leaves, seeds, fruit peels, etc. Some of the plants used in facial wash formulations are summarized in Table 2.

Table 2. Plant used in the formulation of facial wash

Essensial Oils	Plant	Part of the plant	Properties	Active Compounds	References
Turmeric	<i>Curcuma longa</i>	Rhizome	Antioxidant, anti-inflammatory, antibacterial, antifungal	ar-tumerone, α -turmerone, β -tumeron, tumerol, α -atlanton, β -kariofilen, linalool, 1,8 sineoltu	Rahardjo, et al. 2005, Orellana-Paucar et al. 2022
Jasmine	<i>Jasminum officinale</i>	Flowers	Antibacterial, antioxidant	Benzyl acetate, linalyl acetate, benzyl benzoate, methyl jasmonate, methyl anthranilate, linalool, nerol, geraniol, benzyl alcohol, farnesol, terpineol, phytols, eugenol, cis-jasmone; acids, aldehydes and others	Sharmeen et al. 2021, Phuc et al. 2019
Ylang ylang	<i>Cananga odorata</i>	Flowers	Antibacterial, anti-acne, anti-wrinkle	Prenyl acetate, p-cresyl methyl ether, methyl benzoate, linalool, benzyl acetate, geraniol, geranyl acetate, (E)-cinnamyl acetate, β -caryophyllene, germacrene-D, (E, E)- α -farnesene, (E, E)-farnesol, benzyl benzoate, (E, E)-farnesyl acetate and benzyl salicylate	Sharmeen et al. 2021, Febriyenti et al. 2014
Cinnamon	<i>Cinnamomum verum</i>	Bark	Antibacterial, anti-acne	(E)-Cinnamaldehyde, eugenol, β -caryophyllene, β -phellandrene, linalool	Sharmeen et al. 2021, Pramesti 2016
Black cumin	<i>Nigella sativa</i>	Seeds	Antioxidant, anti-inflammatory, antibacterial	Terpenes, p-cymene, β -pinene, thymoquinone, terpinen-4-ol, γ -terpinene, longifolene, carvacrol	Bourgou et al. 2010
Basil	<i>Ocimum basilicum</i>	Flowering herb	Antibacterial, anti-acne	Linalool, citronellol, geraniol, terpinen-4-ol, α -terpineol, methyl chavicol, eugenol, ethyl eugenol, limonene, camphene, α -pinene, β -pinene, γ -terpinene, p-cymene, cis-ocimene, 1,8-cineole, linalyl acetate, fenchyl acetate, methyl cinnamate, β -caryophyllene	Sharmeen et al. 2021, Ichani 2016

Peppermint	<i>Mentha piperita</i>	Aerial parts	Antibacterial, antioxidant	Carveone, 1,8 cineole, limonene, menthol, menthone, menthyl acetate, neomenthol, isomenthone, methofuran	Guzman & Lucia, 2021
Lemongrass	<i>Cymbopogon citratus</i>	Grass leaf	Anti-inflammatory, antifungal, antibacterial, antiallergic, antistress	Citral, myrcene, dipentene, linalool, geraniol, nerol, citronellol, and farnesol, sesquiterpenes, methyl heptenone, esters, acids and others	Sharmeen et al. 2021, Mamillapalli et al. 2020
Lavender	<i>Lavandula officinalis</i>	Flowering tops	Antibacterial, antioxidant	Borneol, caryophyllene, lavandulol, lavandulol acetate, linalool, linalyl acetate, α -terpineol, terpinene-4-ol	Guzman & Lucia, 2021
Tangerine	<i>Citrus reticulata</i>	Fruit peel	Antibacterial, anti-acne	Limonene, γ -terpinene, terpinolene, myrcene, α -pinene, p-cymene, α -thujene	Sharmeen et al. 2021, Prapanta, 2014
Patchouli	<i>Pogostemon cablin</i>	Leaves	Antibacterial, antiseptic, antifungal, anti-inflammatory, antiviral	Patchoulena, quaiene, seychellena, patchoulol, α -patchouli, caryophyllene, pogostol, α -, β -, γ and δ -patchoulena, seychellena, cycloseychellena, α - and β -bulnesene, α - and β -guaiena, anorpatchoulenol	Donelian et al. 2009, Ramya et al. 2013, Akhila et al. 1984, Akhila et al. 1988
Tea Tree	<i>Melaleuca alternifolia</i>	Leaves	Antiseptic, anti-inflammatory, antimicrobial	Terpinen-4-ol, γ -terpinene; α -Terpinene; 1,8-Cineole; Terpinolene; α -Terpineol	Carson et al. 2006
Geranium	<i>Pelargonium graveolens</i>	Stems, leaves, and flowers	Antibacterial, antioxidant, anti-inflammatory	Citronellol, geraniol, caryophyllene oxide, menthone, linalool, β -bourbonene, iso-menthone, geranyl formate	Sharopov et al. 2014

Table 3. Facial wash products available in market globally

Products	Essensial Oils
 Biona Ceudah Rupa Facial Foam	Patchouli
 ST. Ives Acne Control Tea Tree Daily Cleanser	Tea Tree
 The Art of Shaving Facial Wash	Peppermint



Olay Hydrating Cream Face Wash

Lavender



Kama Ayurveda Rose and Jasmine Face Cleanser

Rose and Jasmine



Kosmatology Lemongrass Foaming Face Wash

Lemongrass



Naturallythinking Lavender and Geranium Face Wash

Lavender and Geranium

3. FACIAL WASH PRODUCTS AVAILABLE IN MARKET GLOBALLY

Facial wash is becoming more famous among buyers as these products are getting recognized. The demand for facial wash is on the rise due to this pattern across the globe. In the facial wash market worldwide, there are now many facial wash products available that contain essential oils. Some examples of facial wash products available in the global market are summarized in Table 3.

4. CONCLUSIONS

Based on the journal review above, we can conclude that essential oils are not only useful as a scent, but can also be formulated into a facial wash that has various benefits. The development of essential oil-based formulations is mainly

focused on creating safe and elegant products that can be accepted by many individuals. Essential oils are also considered safe and provide a wide range of medicinal properties that are important in facial wash formulations, such as antibacterial, antioxidant, and anti-acne capabilities. In recent years, many products have been marketed in the global market, which is evidenced by the development of essential oil-containing facial wash in the cosmetic industry.

REFERENCES

Agarwal N., Jindal A. 2023. Herbal Components as an Advantageous Remedy for Pimple and Acne in Face-Wash: A Systemic Review. *Current Research in Pharmaceutical Sciences*. 1-20.

- Akhila A.K, Nigam M.C. 1984. Gas Chromatography-Mass Spectroscopy Analysis of the Essential Oil of *Pogostemon cablin* (Patchouli oil). *Fitothérapie*. 55: 363–365.
- Akhila A.K., Sharma P.K., Thakur R.S. 1988. Biosynthetic Relationships of Patchouli Alcohol, Seychellene and Cycloseychellene in *Pogostemon cablin*. *Phytochemistry*. 27: 2105–2108.
- Bhavana P., Neelima S., Sanjidha S., Prathyusha S. 2019. Preparation and evaluation of fruit face wash. *International Journal of Research in Phytochemistry and Pharmacology*. 9(1): 1-5.
- Bourgou S., Pichette A., Marzouk B., Legault J. 2010. Bioactivities of black cumin essential oil and its main terpenes from Tunisia. *South African Journal of Botany*. 76(2): 210-216.
- Caputo L., Smeriglio A., Trombetta D., Cornara L., Trevena G., Valussi M., Fratianni F., De Feo V., Nazzaro F. 2020. Chemical composition and biological activities of the essential oils of *Leptospermum petersonii* and *Eucalyptus gunnii*. *Frontiers in microbiology*. 11: 409.
- Carson C.F., Hammer K.A., Riley T.V. 2006. Melaleuca alternifolia (tea tree) oil: a review of antimicrobial and other medicinal properties. *Clinical microbiology reviews*. 19(1): 50-62.
- Cheong M.W., Chong Z.S., Liu S.Q., Zhou W., Curran P., Yu B. 2012. Characterisation of calamansi (*Citrus microcarpa*). Part I: Volatiles, aromatic profiles and phenolic acids in the peel. *Food chemistry*. 134(2): 686-695.
- Damasceno C.S.B., Higaki N.T.F., Dias J.D.F.G., Miguel M.D., Miguel O.G. 2019. Chemical composition and biological activities of essential oils in the family Lauraceae: A systematic review of the literature. *Planta Medica*. 85(13): 1054-1072.
- Donelian A., Carlson L.H.C., Lopes T.J., Machado R.A.F. 2009. Comparison of extraction of patchouli (*Pogostemon cablin*) essential oil with supercritical CO₂ and by steam distillation. *J. Supercrit. Fluids*. 48: 15–20.
- Febriyenti F., Sari L.I., Nofita, R. 2014. Formulasi Sabun Transparan Minyak Ylang-Ylang dan Uji Efektivitas terhadap Bakteri Penyebab Jerawat. *Jurnal Sains Farmasi & Klinis*. 1(1): 61-71.
- Ghavam M., Manconi M., Manca M.L., Bacchetta G. 2021. Extraction of essential oil from *Dracocephalum kotschy* Boiss. (Lamiaceae), identification of two active compounds and evaluation of the antimicrobial properties. *Journal of Ethnopharmacology*. 267: 113513.
- Guzman E., Lucia A. 2021. Essential Oils and Their Individual Components in Cosmetic Products. *Cosmetics*. 8(114): 1-28.
- Ichsani N.N. 2016. Formulasi Sediaan Sabun Wajah Minyak Atsiri Kemangi (*Ocimum basilicum* L.) dengan Kombinasi Sodium Lauril Sulfat Dan Gliserin Serta Uji Antibakteri Terhadap *Staphylococcus epidermidis*. *Publikasi Ilmiah Universitas Muhammadiyah Surakarta*.
- Isnaini N., Khairan K., Faradhilla M., Sufriadi E., Ginting B., Prajaputra V., Erwan F., Lufika R.D., Muhammad S. 2022. Evaluation of Physical Quality of Patchouli Oil (*Pogostemon cablin* Benth.) Body Butter Formulation. *Journal of Patchouli and Essential Oil Products*. 1(1): 22-25.
- Isnaini N., Khairan K., Faradhilla M., Sufriadi E., Prajaputra V., Ginting B., Muhammad S., Lufika R.D. 2022. A Study of Essential Oils from Patchouli (*Pogostemon cablin* Benth.) and Its Potential as an Antivirus Agent to Relieve Symptoms of COVID-19. *Journal of Patchouli and Essential Oil Products*. 1(2): 26-34.
- Jamalova D.N., Gad H.A., Akramov D.K., Tojibaev K.S., Musayeb N.M.A., Ashour M.L., Mamadalieva N.Z. 2021. Discrimination of the Essential Oils Obtained from Four Apiaceae Species Using Multivariate Analysis Based on the Chemical Compositions and Their Biological Activity. *Plants*. 10(8): 1529.
- Kamte S.L.N., Ranjbarian F., Cianfaglione K., Sut S., Dall'Acqua S., Bruno M., Afshar F.H., Iannarelli R., Benelli G., Cappellacci L., Hofer A. 2018. Identification of highly effective antitrypanosomal compounds in essential oils from the Apiaceae family. *Ecotoxicology and Environmental Safety*. 156: 154-165.
- Koli D.S., Mane A.N., Kumbhar V.B., Shaha K.S. 2016. Formulation & evaluation of herbal anti-acne face wash. *World J. Pharm. Pharm. Sci*. 5(6): 2001-2200.
- Kumar S.M., Chandrasekar M.J.N., Nanjan M.J., Suresh B., 2005. Herbal remedies for acne. *Natural Product Radiancance*. 4(4): 328-334.
- Kurniawan E., Sari N., Sulhatun S. 2020. Ekstraksi Sereh Wangi Menjadi Minyak Atsiri. *Jurnal Teknologi Kimia Unimal*. 9(2): 43-53.
- Lobin D., Pairyanen B., Zengin G., Yılmaz M.A., Ouelbani R., Bensari S., Ak G., Abdallah H.H., Imran M., Mahomoodally M.F. 2021. Chemical Composition and Pharmacological Evaluation and of *Toddalia asiatica* (Rutaceae) Extracts and Essential Oil by in Vitro and in Silico Approaches. *Chemistry & Biodiversity*. 18(4): e2000999.
- Mamillapalli V., Katamaneni M., Tiyyagura V.M., Kanajam P., Namagiri A.P., Thondepu H., Appikatla B., Devangam B., Khantamneni P. 2020. Formulation, phytochemical, physical, biological evaluation of polyherbal vanishing cream, and facewash. *Research Journal of Pharmaceutical Dosage Forms and Technology*. 12(3): 139-149.
- Marlina E., Kiromah N.Z.W., Rahayu T.P. 2022. Formulasi Sediaan Antioksidan Facial Wash Ekstrak Metanol Daun Ganitri (*Elaeocarpus ganitrus* Roxb.) dengan Variasi Sodium Lauril Sulfat sebagai Surfaktan. *Jurnal Ilmiah Manuntung*. 8(1): 181-190.
- Orellana-Paucar A. M., Machado-Orellana M.G. 2022. Pharmacological Profile, Bioactivities, and Safety of Turmeric Oil. *Molecules*. 27(5055): 1-16.
- Phuc N.D., Lam T.D., Yen V.H., Lan N.T.N. 2019, June. Extraction of Jasmine Essential Oil by Hydrodistillation method and Applications on Formulation of Natural Facial Cleansers. *IOP Conference Series: Materials Science and Engineering*. 542(1): 012057.
- Pramesti A.N. 2016. Formulasi Sediaan Sabun Wajah Minyak Atsiri Kayu Manis (*Cinnamomum burmanni*)

- Dan Uji Aktivitas Antibakteri Terhadap Staphylococcus epidermidis. *Publikasi Ilmiah Universitas Muhammadiyah Surakarta*.
- Prapanta M. 2014. Uji Efektivitas Sabun Transparananti Jerawat Minyak Atsiri Kulit Buah Jeruk Pontianak (Citrus Nobilis Lour. Var. Microcarpa) Terhadap Isolat (Propionibacterium acnes). *Publikasi Ilmiah Universitas Tanjungpura*.
- Pratt D.E. 1992. Natural Antioxidants from Plant Material. In Huang. M.T., C.T Ho., C.Y. Lee. *Phenolic Compounds inhibitortripsin Food and Their Effects on Health II*. ACS: Washington DC.
- Quassinti L., Bramucci M., Lupidi G., Barboni L., Ricciutelli M., Sagratini G., Papa F., Caprioli G., Petrelli D., Vitali L.A., Vittori S. 2013. In vitro biological activity of essential oils and isolated furanosesquiterpenes from the neglected vegetable Smyrnum olusatrum L. (Apiaceae). *Food chemistry*. 138(2-3): 808-813.
- Rahardjo M., Rostiana O. 2005. *Budidaya Tanaman Kunyit*. Sirkuler. 11: 1-6.
- Ramya H.G., Palanimuthu V., Rachna S. 2013. An introduction to Patchouli (*Pogostemon cablin* Benth.) A Medicinal and Aromatic Plant: It's Importance to Man Kind. *Agric. Eng. Int. CIGR J*. 15: 243–250.
- Raut J.S. 2014. A Status Review on The Medicinal Properties of Essential Oils. *Industrial Crops and Products*. 62: 250-264.
- Razafiarimanga Z.N., Judicael L., Randrianarivo H.R., Sadam S.M.B., Rakoto D.A.D., Jeannoda V.L. 2021. Chemical composition and antimicrobial properties of the essential oil from the leaves of Helichrysum ibityense R. Vig. & Humbert (Asteraceae). *GSC Biological and Pharmaceutical Sciences*. 15(3): 143-153.
- Rohmani S., Ningrum S.K., Wardhani W.D., Kundarto W. 2022. Pengaruh Variasi Konsentrasi Surfaktan Iselux Ultra Mild pada Formulasi Hydrating Facial Wash Potassium Azeloyl Diglycinate. *Jurnal Kefarmasian Indonesia*. 58-68.
- Rustaiyan A., Faridchehr A. 2021. Constituents and biological activities of selected genera of the Iranian Asteraceae family. *Journal of Herbal Medicine*. 25: 100405.
- Salleh W.M.N.H.W., Ahmad F., Yen, K.H. 2015. Chemical compositions and biological activities of the essential oils of Beilschmiedia madang Blume (Lauraceae). *Archives of pharmacol research*. 38: 485-493.
- Shanaida M., Hudz N., Białoń M., Kryvtsowa M., Svydenko L., Filipiska A., Wieczorek P.P. 2021. Chromatographic profiles and antimicrobial activity of the essential oils obtained from some species and cultivars of the Menthae tribe (Lamiaceae). *Saudi journal of biological sciences*. 28(11): 6145-6152.
- Sharmeen J.B., Mahomoodally F.M., Zengin G., Maggi F. 2021. Essential oils as natural sources of fragrance compounds for cosmetics and cosmeceuticals. *Molecules*. 26(3): 666.
- Sharopov F.S., Zhang H., Setzer W.N. 2014. Composition of Geranium (*Pelargonium graveolens*) Essential Oil from Tajikistan. *American Journal of Essential Oils and Natural Products*. 2(2): 13-16.
- Silva F.B.D., Santos N.O.D., Pascon R.C., Vallim M.A., Figueiredo C.R., Martins R.C.C., Sartorelli P. 2017. Chemical composition and in vitro cytotoxic and antimicrobial activities of the essential oil from leaves of Zanthoxylum monogynum St. hill (Rutaceae). *Medicines*. 4(2): 31.
- Solanki D., Sagrule S.D., Unhale S.S., Ansar Q.B., Chitte M.G., Biyani K.R. 2020. Formulation, Development and Evaluation of Instant Whitening Face Wash. *World Journal of Pharmaceutical Research*. 9(5): 2541-2557.
- Syahrana N.A., Suryanita S., Asri SR M., Indah I. 2022. Formulasi Sediaan Kosmetik Facial wash Ekstrak Etanol Daun Kelor (Moringa oleifera L.) dengan Variasi Konsentrasi Sodium Lauryl Sulfat. *Journal of Pharmaceutical and Health Research*. 3(2): 36-38.
- Xian Y.F., Li Y.C., Ip S.P., Lin Z.X., Lai X.P., Su Z.R. 2011. Anti-Inflammatory Effect of Patchouli Alcohol Isolated from Pogostemonis Herba in LPS-Stimulated RAW264. 7 Macrophages. *Experimental and Therapeutic Medicine*. 2(3): 545-550.
- Yang L., Li X., Huang W., Li J., Rao X., Lai Y. 2022. The Efficacy and Safety of Acupuncture in the Treatment of Neurodermatitis: A Systematic Review and Meta-Analysis. *Evidence-Based Complementary and Alternative Medicine*.
- Yang X., Zhang X., Yang S.P., Liu W.Q. 2013. Evaluation of the Antibacterial Activity of Patchouli Oil. *Iranian Journal of Pharmaceutical Research: IJPR*. 12(3): 307.