

## A REVIEW ON HERBAL COSMETICS IN INDONESIA

NASRUL WATHONI\*, ANI HAERANI, NIA YUNIARSIH, RETNO HARYANTI

Department of Pharmaceutics, Faculty of Pharmacy, Universitas Padjadjaran, Jatinangor 45363, Indonesia

Email: nasrul@unpad.ac.id

Received: 25 Jun 2018, Revised and Accepted: 21 Jul 2018

### ABSTRACT

Nowadays, Herbal cosmetic is growing rapidly as most women prefer natural products rather than chemicals products for their personal care. Herbal cosmetic contains natural nutrients to improve and provide consumers satisfaction due to relatively fewer side effects compared to synthetic cosmetics. Indonesia is one of the biggest supplier's countries for herbal raw materials in cosmetic products. Many plants are available naturally as well as different uses that can be made as basic ingredients for cosmetic preparations, such as onion *dayak* bulb, *kemuning* leaf, *pegagan*, *kecombrang*, red betel, pecan, and sweet root. This review aimed to provide information on plants in Indonesia based on the phytochemicals contents that can be formulated into various categories of cosmetic preparations, such as skin care, hair care, anti-aging, skin whitening, and antioxidant.

**Keywords:** Herbal cosmetic, Indonesia, Phytochemicals, Natural products

© 2018 The Authors. Published by Innovare Academic Sciences Pvt Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)  
DOI: <http://dx.doi.org/10.22159/ijap.2018v10i5.28102>

### INTRODUCTION

The word cosmetic comes from the Greek word "*Kosmetikos*" which means having strength, set skill decorative [1]. Cosmetic is a very diverse product, such as cream, perfumes, lotions, skin cleansing products, and decorative cosmetics sector. Natural substances are extensively used in cosmetic preparations [2]. As there is an increasing interest in understanding cosmetic action mechanisms to achieve more sophisticated design targets, like skincare products [3]. Skincare is one of the cosmetic products grouped as Cosmeceutical. It means this product has measurable biological performance in the skin, like a drug, but is regulated as a cosmetic; and usually is used for various treatment such as wrinkles, anti-aging, hyperpigmentation and hair damage [4]. Cosmeceutical industry is growing everyday, and improving by new technology such as nanotechnology which has good opportunity to alter the Cosmeceutical market [5-7] dramatically.

Herbal cosmetic products are formulated using various cosmetic ingredients allowed to form a base from one or more herbal ingredients and provide the desired cosmetic benefits [8, 9]. To improve health and provide patient satisfaction, the usage of herbal cosmetics is suggested as it has fewer side effects compared to synthetic cosmetics.

Indonesia is the second richest country in the world in terms of biodiversity. There are about 30,000 species that have been identified. 950 species of them are known to have a biopharmaceutical function and potential as a drug, health food, nutraceutical, both for humans, animals and plants [10].

The method of writing reviews that used by literature study with techniques to analyze the contents of libraries related to herbal cosmetics in Indonesia. A fact-finding that supports written data and materials for reference authors takes material from various journals of 1979-2018.

The purpose of this review is to provide information on plants in Indonesia that can be formulated into various categories of cosmetic preparations in accordance with the phytochemicals substances contained in the plant. So it can be used as a reference in making herbal based cosmetic preparations.

#### Development of herbal cosmetics in Indonesia

Herbal medicines are traditionally used in the treatment and skin care which consists of herbs and spices from high-level plants, microbial biomass, and various extracts. Effects of certain therapeutic can be obtained from a complex of various natural compounds as a guide of ancient herbalism and medical practice [11,

12]. Traditional Chinese medicine and Ayurveda are regarded as a key element of modern herbal medicine and skin care [3]. In Indonesia, traditional herbal medicine, known as *Jamu* has been practised for many centuries in the Indonesian community to maintain good health and treat diseases. *Jamu* is a traditional herbal treatment made in the form of capsules and powders [13].

Currently, a popular trend is back to the nature and using herbs as the main ingredient of skin care formulations due to natural ingredients are more biocompatible to the body than synthetic materials. The synthetic materials in cosmetic products can cause dangerous effect especially for long-term use, including atrophy, carcinogenesis, and ochronosis [14]. Cosmetics from natural sources are considered eco-friendly, better and safer [15]. Plants as one of the natural sources of cosmetics ingredient can be used to synthesize some useful inorganic materials that is usually called as green synthesis [16].

Herbs are made from original ingredients in plants, leaves, roots, fruits and flowers which have properties for healthy and beauty [17]. The content of active chemical compounds in plants are alkaloid, flavonoid, terpenoid, steroid, tannin, and saponin which can be determined by phytochemical screening [18].

The development of herbal cosmetics in Indonesia is growing rapidly. The cosmetics industry is one of the priorities plays as a major role in the Indonesian economy. It is because Indonesia has a wealth of natural beauty materials and a population reach 260 million people and most of the women prefer natural products compared to synthetic products to improve their beauty and healthy [19]. The valid data from Ministry Industry of Indonesia showed sales of cosmetics in 2012 reached 688.7 million USD, on the year 2013 rose to 795.2 million USD which means an increase of 15 percent. Meanwhile the value of the market of cosmetics on 2014 reached 4.2 billion USD and in 2015 grew by 9% to 4.6 billion USD. In addition, Indonesia is one of the world's leading suppliers of raw herbal materials and the world's largest cosmetics products, with Indonesia's market share in the world reaching 13% or 2 billion USD in 2007 [10]. The demand of world import markets for drug and cosmetic products are increasing rapidly, 17% and 15% annually in average. Herbal cosmetics industries in Indonesia have a great opportunity to become one of the largest countries due to the considerable market opportunities [10].

#### Indonesian plants for herbal cosmetics

Some plants in Indonesia have a high potential as a raw material in the manufacture of herbal cosmetics preparations are listed in table 1.

Table 1: Cosmetic category of some plants in Indonesia with Its phytochemical content

Category	Plant	Phytochemical content	Reference
Antioxidants	Tomato ( <i>Solanum lycopersicum</i> )	Lycopene, Carotenoids	[11]
	Jamblang ( <i>Syzygium cumini</i> )	an alkaloid, flavonoids, resins, tannins, and essential oils	[22].
	Dayak onion ( <i>Eleutherine Americana Merr.</i> )	The phenolic compounds of the naphthoquinone groups such as elecanacin, eleutherin, isoeleutherin, eleutherol and eleutherinone	[23]
	Kersen ( <i>Muntingia calabura</i> )	Flavonoid, saponin, triterpene, steroid, and tannin	[24]
Skincare	Kemuning Leaf ( <i>Murraya paniculata</i> )	Essential oils, alkaloid, flavonoid, and tannin	[25]
	Kunyit ( <i>Curcuma Domestica Val.</i> )	Curcuminoid consisting of curcumin, desmetoxicumin, and bisdesmetoksikurkumin as well as volatile oils, fat, carbohydrate, protein, starch, vitamin C, iron, phosphorus, and calcium	[25]
	Kenanga flowers ( <i>Cananga odorata</i> )	Benzoic, farnesol, geraniol, linalool, benzyl acetate, eugenol, safrol, cadinene and pinene	[26]
Anti aging	Pegagan leaf ( <i>Centella asiatica</i> )	Amino acids, beta carotene, fatty acids, flavonoids, terpenoids, alkaloids, saponins	[27]
	Kelor Leaf ( <i>Moringa oleifera</i> )	Ascorbate acids, $\beta$ -carotene, tocopherol acid, flavonoids, phenolics, carotenoids, hydroxylamine acid derivatives, and flavonoids	[28]
Lip Color	Kecombrang ( <i>Etilingera elatior</i> )	Anthocyanidins	[29]
	Dayak onion ( <i>Eleutherine Americana Merr.</i> )	The red pigment of the quinone class	[30, 31]
Liquid Bath Soap	<i>Aloe vera</i> ( <i>Aloe vera</i> Linn)	Antibacterial activity against Gram (+) and Gram (-) bacteria	[32]
	Red Betel leaf ( <i>Piper crocatum</i> Ruiz and Pav)	Antibacterial Activity	[33]
	Kumis kucing leaf ( <i>Orthosiphon aristatus</i> )	Activities antibacterial against <i>Staphylococcus aureus</i>	[34]
Hair Care	Olive oil ( <i>Olea europaea L.</i> )	Triglycerides esters of oleic acid and palmitic acid and other fatty acids, such as squalene (up to 0.7%) and sterols (about 0.2% phytosterol and tocopherol)	[35]
	Coconut ( <i>Cocos nucifera</i> )	Saponin	[36]
	Celery ( <i>Apium graveolens</i> )	Vitamin A, Vitamin B, sodium, iron, and calcium	[37]
	Kemiri ( <i>Aleurites moluccana</i> )	Minerals such as phosphorus, calcium, potassium, magnesium	[38]
Skin Whitening	Akar manis ( <i>Glycyrrhiza glabra</i> )	Triterpene, saponin, and flavonoid	[40]
	Bengkuang ( <i>Pachyrhizus erosus</i> )	Vitamin C and Vitamin B	[48]
	Temulawak ( <i>Curcuma xanthorrhiza</i> )	Vitamin C	[49]

### Antioxidants

**Tomato** (*Solanum lycopersicum*): Tomato contains carotenoids and lycopenes with powerful antioxidant and anti-carcinogenic properties. Carotenoid is most effective for capturing reactive oxygen species, and lycopene is important for reducing lipid peroxidation and preventing erythema from ultraviolet radiation orders [20]. Tomatoes can be the basic ingredients of cosmetic preparations such as peel off gel mask and cream.

**Jamblang** (*Syzygium cumini*): Jamblang plant contains chemical compounds such as alkaloid, flavonoid, resin, tannin, and essential oils [21]. *Jamblang* fruit has high antioxidant activity because of its natural anthocyanin content. Anthocyanins are one of the most important flavonoid subgroups for plants. High flavonoid content makes *Jamblang* fruit beneficial to the health of the body [22]. *Jamblang* can be formulated as a mask, gel, and lotion or antioxidant cream.

**Dayak Onion** (*Eleutherine Americana Merr.*): *Dayak* onions are from Borneo and one of the Indonesian medicinal plants. *Dayak* onion is containing phenolic compounds of the naphtha quinone-like group elecanacin, eleutherin, isoeleutherin, eleutherol, and eleutherinone. Phenolic compounds have been known to have very strong antioxidant effects [23]. *Dayak* onions can be used as basic ingredients of antioxidant cosmetic preparations such as gels, masks, and antioxidant lotions.

**Kersen** (*Muntingia calabura*): *Kersen* is a plant that can be easily found all province in Indonesia. *Kersen* contains various bioactive

compounds namely flavonoid, saponin, triterpenes, steroid, and tannin. The high component phenolic compounds correlated to strong antioxidant activity. Therefore, it can be formulated as an antioxidant cosmetic preparation [24].

### Skin care

**Kemuning leaf** (*Murraya paniculata*): The yellow leaves of *Kemuning* can be used for skin beauty because of its chemical compounds, including secondary metabolites such as essential oils, alkaloid, flavonoid, and tannin. These compounds are able to moisturize and brighten the skin. *Kemuning* leaves play a role in helping to overcome rough skin so the skin will be smoother [25].

**Kunyit** (*Curcuma Domestica*. Val.): *Kunyit* is used for skin beauty and protecting the skin from the sun exposure. *Kunyit* has curcuminoid such as curcumin, desmetoxicumin, bisdesmetoxicurcumin and other beneficial agents (volatile oils, fat, carbohydrates, proteins, starch, vitamin C, iron, phosphorus, and calcium). Curcumin is a yellow dye contained by turmeric, an average of 10, 29 %, has a broad spectrum of biological activity such as antihepatotoxic, antibacterial and antioxidant. Therefore, *Kunyit* is able to be used for traditional medicine and skin care. *Kunyit* also helps to overcome the destruction of skin cells with lifting dead skin cells and overcoming skin diseases. It can be used to soften, smoothen and brighten the skin [25], therefore, *Kunyit* has the potential to be formulated too as cosmetics preparations.

**Cananga flowers** (*Cananga odorata*): *Cananga* flowers can be used for skin brightening with its chemical compounds such as benzoic,

farnesol, geraniol, linalool, benzyl acetate, eugenol, safrol, cadinene and pinene. The flowers produce lang oil and well known as 'yang-yang' oils. This oil usually used as perfumes for the cosmetic industry. It is useful as effective aromatherapy to eliminate body odors, to shrink pores, scaly skin, and keep the skin moisture. Cananga flowers can be used also as a natural material of body scrub [26].

#### Anti-aging

**Pegagan** (*Centella asiatica*): *Centella* is rich in amino acids, beta-carotene, fatty acids, flavonoid, terpenoid, alkaloid, saponin, and several other nutrients. The extraction of these vines (commonly called made cassoside) can alleviate inflammation, accelerate wound healing, stimulate the formation of new cells and increase collagen production. Therefore, *Pegagan* is very useful as an ingredient for anti-aging cosmetics [27].

**Kelor leaf** (*Moringa oleifera*): *Kelor* leaves contains vitamin C seven times greater than oranges, vitamin A is ten times larger than carrots, calcium is seventeen times larger than milk, protein is nine times larger than yogurt, potassium is fifteen times greater than bananas and iron twice larger than a bay. It is also contains ascorbic acid,  $\beta$ -carotene, tocopherol acid, flavonoids, phenolics, carotenoids, hydroxylamine acid derivatives, and flavonoid so that *kelor* leaves can be used as a natural antioxidant source. Therefore, it can be used as anti-aging agents in cosmetics preparation [28].

#### Lip color

**Kecombrang** (*Etingera elatior*): *Kecombrang* is one of the *Zingiberaceae* family that have strong antioxidant activity. The color of the flowers is caused by anthocyanin flavonoid, a pigment that can be used as a natural dye and replacing synthetic dyes for lipstick preparations [29].

**Dayak bulbs** (*Eleutherine Americana* L. Merr): *Dayak* bulbs contains secondary metabolite compounds including alkaloid, tannin, flavonoids, phenolic, steroid and glycosides such as naphtopyran, eleutherosid B, isoeleutherin, eleutherin, and eleutherinol [30]. These compounds are a potential source of biopharmaceuticals and can be developed as modern medicinal plants in human life. In addition, the red color of *Dayak* bulbs can also be used as a coloring material for cosmetics. It is derived from compounds of the quinone class. The color pigments contained in the onion bulbs can be potentially used as a natural dye for lipstick [31].

#### Liquid bath soap

**Aloe vera** (*Aloe vera* Linn): Leaves extract of *Aloe vera* in liquid soap formulations against some pathogenic bacteria. The liquid soap preparation of *Aloe vera* leaf extract has activity as antibacterial to Gram-positive bacteria (*S. Aureus*, *B. Subtilis*, and *B. Cereus*) and Gram-negative bacteria (*S. Typhi*, *P. Mirabilis*, *P. Aeruginosa*, and *E. Coli*) [32].

**Red betel leaf** (*Piper crocatum* Ruiz and Pav): Red betel leaf can be used in liquid soap due to its antibacterial activity. Liquid soap base can be prepared by reacting a fatty acid and potassium hydroxide. Red betel leaf contains the fatty acids namely crude palm oil. Crude palm oil contains carotenoid, tocopherol, and tocotrienol. Previous study showed that extracts ethanol of red betel leaf has antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* at a concentration of 2.5% [33].

**Kumis kucing Leaf** (*Orthosiphon aristatus*) from family *Lamiaceae* has an antibacterial activity because of its chemical compounds such as alkaloid, flavonoid, tannin, polyphenol, and saponin. The leaves extract of *kumis kucing* have antibacterial activity against *Staphylococcus aureus* that can be used in liquid soap preparation [34].

#### Haircare

**Olive oil** (*Olea europaea* L.): Olive oil consists of a mixture of triglycerides of oleic acid ester, palmitic acid and other fatty acids, such as squalene (up to 0, 7 %) and sterols (about 0.2% phytosterol and tocopherol). Olive oil acts as hair moisturizer hair and skin irritation reducer. In addition, vitamin E in olive oil protects a hair loss [35]. Thus, olive oil is good to be used in cosmetic hair preparations such as gel and liquid hairtonic.

**Coconut** (*Cocos nucifera*): Coconut is an important member of the *Arecaceae* (palm) family. Coconut is a large palm, growing up to 30 m, and usually used for cooking. Coconut oil has a good saponification value that can be used as shampoo for hair treatment [36].

**Celery** (*Apium graveolens*): The main content of celery is butylphthalide known as the main aroma of celery. There are also a number of flavonoids such as graveobiosid A (1-2%) and B (0, 1-0.7%) as well as fatty acids and phenol group compounds. The main content of fatty acids acid petroselin (40-60%). In addition, the leaves and stems contain steroids as stigmasterol and sitosterol [37]. Celery is also known to have tremendous benefits in hair care because of of nutrient contents in celery such as vitamin A, vitamin B, sodium, iron and calcium.

**Kemiri** (*Aleurites moluccanus*): *Kemiri* seeds are used as a source of oil and spices. It has many mineral deposits such as phosphorus, calcium, potassium, magnesium, and other minerals for stimulating healthy hair, overcoming hair loss and dullness. In Tonga, until now, the mature *kemiri* (named after "tuitui") is used as a paste, soap and shampoo [38].

#### Skin whitening

**Akar manis** (*Glycyrrhiza glabra*): *Akar manis* extract is rich in natural antioxidants [39]. The main antioxidant compound in *Glycyrrhiza glabra* extract is glycyrrhizin (glycyrrhizic acid) and flavonoid [40]. The role of plant extracts on the skin is primarily associated with antioxidant [41], skin rejuvenation [42], skin lightening [43, 44] and photoprotection [45, 46]. Previous research showed that a cream formula of plant extracts *Glycyrrhiza glabra* was chemically and physically stable during storage conditions and without induction of allergic or contact dermatitis [47].

**Bengkuang** (*Pachyrhizus erosus*): *Bengkuang* has benefits to maintain healthier skin and remove dead skin cells. *Bengkuang* contains Vitamin C which can nourish the skin and can be used as a base material for the preparation of masks to refresh the face and brighten the skin [48].

**Temulawak** (*Curcuma xanthorrhiza*): *Temulawak* is a *Zingiberaceae* species that is empirically widely used as a traditional medicine especially its rhizome. Anti-acne agents and skin bleaches are an interesting subject on natural skin care of *Temulawak* because of its vitamin C content. *Temulawak* is often used as a base ingredient in cosmetic skin lightening preparations in the facial mask, lotion and face cream [49].

#### CONCLUSION

Herbal cosmetic in Indonesia has a long history. It had been used for health, skin and hair care. Indonesia has abundant natural plants that can be used as a source of the herbal cosmetics industry.

In Indonesia, there are many native herbal plants such as *dayak* onion bulb, *kemuning* leaf, *kecombrang*, red betel, *kemiri*, *akar manis*, etc. which can be formulated into various categories of cosmetic preparations such as antioxidants, anti-aging, lip color, liquid bath soap, hair and skin care in accordance with their contents of phytochemicals substances. Thus, cosmetics industry in Indonesia has a great opportunity to become one of the largest herbal cosmetics industries in the world.

#### AUTHORS CONTRIBUTIONS

All the author have contributed equally

#### CONFLICT OF INTERESTS

Declared none

#### REFERENCES

- Sumit K, Vivek S, Sujata S, Ashish B. Herbal cosmetics: used for skin and hair. *Inventi J* 2012;3:1-7.
- Aburjai T, Natsheh FM. Plants used in cosmetics. *Phytother Res* 2003;987-1000. <https://doi.org/10.1002/ptr.1363>. [Last accessed on 20 May 2018]

3. Burlando B, Verotta L, Laura C, Botiini Massa E. Herbal Principles in Cosmetics; 2010.
4. SL Herbal Cosmetics and Cosmeceuticals: An Overview. Natural Products Chemistry and Research; 2015. Available from: <https://doi.org/10.4172/2329-6836.1000170>. [Last accessed on 20 May 2018]
5. Ssneha B. Application of nanotechnology in dentistry. Res J Pharm Technol 2014;81-3. Available from: <https://doi.org/10.1007/s11095-010-0139-1>. [Last accessed on 20 May 2018]
6. Brandt FS, Cazzaniga A, Hann M. Cosmeceuticals: current trends and market analysis. Semin Cutaneous Med Surg 2011;141-3. Available from: <https://doi.org/10.1016/j.sder.2011.05.006>. [Last accessed on 20 May 2018]
7. Duarah S, Pujari K, Durai RD, Narayanan VHB. Nanotechnology-based cosmeceuticals: a review. Int J Appl Pharm 2016;8:8-12.
8. Shivanand P, Nilam M, Viral D. Herbs play an important role in the field of cosmetics. Int J PharmTech Res 2010;2:632-9.
9. Sahu Alakh N, Jha S, Dubey SD. Formulation and evaluation of curcuminoid based herbal face cream. Indo Global J Pharm Sci 2011;1:77-84.
10. RI PLP. Study of foreign development ministry of the trade republic of Indonesia. Study of Foreign Development Ministry of Trade Republic of Indonesia; 2009.
11. Mitchell JRA. Botanical dermatology. Vancouver: Greengrass Ltd; 1979.
12. Koo JDR. Traditional Chinese medicine in dermatology. Dermatol Ther 2003;16:98-105.
13. Elfahmi Woerden, Bag HJ, Kayser O. *Jamu*: Indonesian traditional herbal medicine towards rational phytopharmacological use; 2014. p. 51-73. Available from: <https://doi.org/10.1016/j.hermed.2014.01.00>. [Last accessed on 20 May 2018]
14. Parvez S, Kang M, Chung HS, Cho C, Hong MC, Shin KBH. Survey and mechanism of skin depigmenting and lightening agents. Phytother Res 2006;20:921-34.
15. Chen Q. Evaluate the effectiveness of the natural cosmetic product compared to chemical-based products. Int J Chem 2009;1:57-9.
16. Raajshree KR, Durairaj B. Evaluation of the antityrosinase and antioxidant potential of zinc oxide nanoparticles synthesized from the brown seaweed-turbinaria conoides. Int J Appl Pharm 2017;9:116-20.
17. Heyne K. Useful plants. In: Indonesia. Vol. I. Sana Wana Jaya Foundation. Jakarta; 1987. p. 586-7.
18. Tarigan JB. Phytochemical screening of plants used by traders *Jamu Gendong* to maintain skin face in medan baru district. Sumatra Biology; 2008.
19. Tafsia CL. Survey of opinion about usage of traditional cosmetics among students faculty of Pharmacy University of sanata dharma Yogyakarta; 2017.
20. Pouillot A, Polla LL, Tacchini P, Neequaye A, Polla A, Polla B. Natural Antioxidants And Their Effects On The Skin; 2011. p. 239-57.
21. Arifin. Standardization of ethanol extract leaves *Eugenia Cumini* Merr J Tech Science Pharmacy; 2006.
22. Marliani L, Kusriani H, Sari I. Antioxidant activity leaves and fruit *Jamblang* (*Syzigium Cumini* L.) skeel; 2007. p. 201-6.
23. Kuntorini EM, Astuti. Determination of antioxidant activity ethanol extract bulbous on dayak (*Eleutherine Americana* Merr.). Sci Appl Chem 2010;15-22. <https://doi.org/10.1073/pnas.0703993104>.
24. Kuntorini EM, Fitriana S, Astuti D. Antioxide extract methanol leaf *Kersen* (*Muntingia calabura*); 2013. p. 291-6.
25. Nila N, Nuning Tilapia. Effect of using lulur seruni on skin body. Padang State University. Indonesia; 2015.
26. Marliati N. The effect of hazardous aha source of natural basis and percentage to the result of body scrub cosmetics. Surabaya State University; 2013.
27. Agustin S. Isolation and Identification class active compound free-radical catcher, Ultraviolet protection, and antibacterial on an extra ethanolic leaf of gotu kola (*Centella asiatica* L.). University of Sanata Dharma; 2015. p. 118.
28. Ali A, Akhtar N, Chowdhary F. Enhancement of human skin facial revitalization by moringa leaf extract cream. Postepy Dermatologii I Alergologii 2014. p. 71-6. <https://doi.org/10.5114/pdia.2014.40945>.
29. Adliani N, Nazliniwaty, Purba D. Lipstick formulation using natural dye from *Etingera elatior* Extract. J Pharm Pharmacol 2012. p. 87-94. Doi:10.31227/osf.io/wp5n3
30. Insanu M, Kusmardiyani S, Hartati R. Recent studies on phytochemicals and pharmacological effects of *Eleutherine Americana* merr. Proc Chem 2014. p. 221-8. <https://doi.org/10.1016/j.proche.2014.12.032>.
31. Mayasari D, Rusdiana T, Kania YR, Abdasah M. Stability of *Eleutherine americana* (L.) Merr. Extract as lipstick colorants as time, storage condition and the presence of oxidator stability of tiwai onion extract (*Eleutherine americana* (L.) Merr.) As a Dye; 2018.
32. Sari R, Ferdinan A. Antibacterial activity test of liquid soap from leaf aloe vera leaf extract. J Med Faculty University Tanjungpura Pontianak 2017. p. 111-20.
33. Khairunis, Utin N. Optimization formula soap of liquid antibacterium extract ethanol leaf (*Piper Crocatum* Ruiz and Pav) with crude palm oil concentration variation and hydroxide power. University Tanjungpura Pontianak 2016.
34. Rika Yulianti K. Formulation of breastfeeding of shower liquid extract cake of cucumber soul (*Orthosiphon aristatus*). Pharm J 2015. p. 1-11.
35. Beoy LA, Woei WJ, Hay YK. Effects of tocotrienol supplementation on hair growth in human volunteers. Trop Life Sci Res 2010. p. 91-9.
36. Dahan S, TU Ayurveda Revisited. Popular Prakashan. Mumbai 3rd edn; 2000.
37. Hiller KMM. Die grobe enzyklopaedie der arzneipflanzen und drogen. Elsevier Spectrum Verlag. Heidelberg; 2007.
38. Siemonsma J. Aleurites moluccana (L.) Willd. PROSEA (Plant Resources of South-East Asia) Foundation. Bogor. Indonesia; 1999.
39. Olukoga ADD. Historical perspectives on health. The history of liquorice: the plant, its extract, cultivation, and commercialization and etymology. JR Soc Health 2001;118:300-4.
40. Utsunomiya T, Kobayashi M, Pollard RBSF. Glycyrrhizin, an active component of licorice roots. Plant Physiol 2004;121:821-8.
41. Mabberley D. A portable dictionary of plants, their classification and uses. mabberley's plant-book: 3rd Edition. Cambridge University Press; 2008.
42. Kligman AM, WI. A new formula for the depigmenting human skin. Arch Dermatol 2005;111:40-8.
43. Olumide Y. Use of skin lightening creams. Br Med J; 2010.
44. Hearing V. The regulation of melanin production. Drug discovery approaches for developing cosmeceuticals, advanced skin care and cosmetic products; 1997.
45. Benchikhi H, Razoli HLH. Sunscreens: use in pregnant women in Casablanca. Ann Dermatol Venereol 2002;129:387-90.
46. Kochevar I. Molecular and cellular effects of UV radiation are relevant to chronic photodamage. Gilchrest BA. eds. Photodamage. Blackwell Science Cambridge, Massachusetts; 2001. p. 51-67.
47. Alobaidi AH, Hamad ES, Kudair KA, Alsamarai AM. Formulation of hypopigmentation cream and evaluation of its effect on skin pigment. part i: formulation of the product. Our Dermatol Online 2014. p. 9-13. <https://doi.org/10.7241/ourd.20141.02>.
48. H SF, Lintong PM, Loho LL. The influence of giving *Bengkuang* (*Pachyrrhizus erosus* L urban) on total pigment melanin skin (*Mus musculus*) which is exposed sunlight. E-Biomed J 2015. p. 216-20.
49. Coal I, Darusman LK, Mitsunaga T, Rahminiwati MDE. The potency of Indonesian medicinal plants as tyrosinase inhibitor and antioxidant agent. J Biol Sci 2010;10:138-44.