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AN OVERVIEW OF IMPORTANT NATURAL PRODUCTS AND PHYTOMEDICINES USED FOR MANAGEMENT OF MELASMA

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ABSTRACT

Melasma is a common acquired disorder of symmetric hyperpigmentation that usually affects the face, with females and darker skin types having a higher prevalence. Melasma has an uncertain aetiology, but it is thought to be caused by an increase in melanocyte biological activity rather than an increase in melanocyte amount. Excess or over-pigmentation of the skin causes pigmentary disorders. The amount of collagen, elastin, and melanin in the skin are all factors that contribute to hyper pigmentation. Hypermelanosis may result from an increase in epidermal melanin or a combination of increased epidermal melanin and melanin deposition in the dermis.

KEYWORD: Melasma, Melanin, Pigment, Melanocyte.

List of abbreviate

EDTA	Ethylenediaminetetraacetic Acid
DOPA	Dihydroxyphenylalanine
HQ	Hydroquinone

INTRODUCTION

In melanosomes, melanin is formed by melanocytes and stored by keratinocytes. The colour of the skin is determined by the number, melanin content, and position of these melanized cells (along with oxygenated and deoxygenated hemoglobin). Tyrosinase, a copper-containing enzyme present in melanosomes, catalyses the conversion of L-tyrosine to L-dopa and L-dopa to L-dopa-quinone in the melanin synthesis pathway(Nordlund, Boissy et al. 2008).

Melasma is a pigmentary system failure that produces an irregular brown or grayish-brown hypermelanosis on the face. It can affect together sexes and any skin type, but it is more common in women (Goh and Dlova 1999) and Hispanics/Latinos, Asians, and African Americans, for example, have darker complexions (Fitzpatrick skin types IV to VI) and reside in areas of high UV radiation (Sanchez, Pathak et al. 1981, Grimes 1995, Pandya and Guevara 2000, Taylor 2003). The condition typically improves steadily and symmetrically over time, and it can last for years, deteriorating in the summer and improving in the winter (Urabe 1998).

Melasma is often confused with chloasma, a form of hyperpigmentation induced by pregnancy or changes in uterine and ovarian hormones; melasma, on the other hand, may be caused by a variety of factors. Some of the most important contributing factors are genetic predisposition,(Sanchez, Pathak et al. 1981, Vázquez, Maldonado et al. 1988) pregnancy, (Sodhi and Sausker 1988) use of oral contraceptives, (Resnik 1967) endocrine dysfunction or hormone treatments,(Pérez, Sánchez et al. 1983, LUTFI, FRIDMANIS et al. 1985) and exposure to UV light (Sanchez, Pathak et al. 1981, Vázquez, Maldonado et al. 1988, Kang, Yoon et al. 2002).

While melasma forms during pregnancy, it's known as "the mask of pregnancy," and it typically goes away within a few months of delivery, so treatment isn't needed. However, in a significant number of cases, the condition continues indefinitely (Gano and Garcia 1979). An increase in placental, ovarian, and pituitary hormones can cause pregnancy-related melasma (Maeda, Naganuma et al. 1996). Melasma has also been linked to increased melanogenesis due to a raise in melanocyte-stimulating hormone, oestrogen, and progesterone levels (Resnik 1967). Melasma in men has similar clinicohistologic features to melasma in women, along the exception that hormonal factors do not cooperate a significant role. Sun-induced aggravation and a strong family history of the disorder tend to be the main associated factors

in men (Vázquez, Maldonado et al. 1988). Sun exposure and cosmetic use, including topical mustard oil, were related to melasma in Indian men, according to a report (Sarkar, Jain et al. 2003).

Ingredients that affect the melanin formation process

Derivatives of Ascorbic Acid

Since ascorbic acid, or vitamin C, is easily oxidised, particularly in aqueous media, more stab le derivativeslike ascorbyl palmitate and magnesium L-ascorbyl-2 phosphate are preferred (MAP)(Gallarate, Carlotti et al. 1999). Vitamin C and its derivatives serve as reducers, stopping tyrosine from being converted to melanin at various points along the oxidation chain (Jutley, Rajaratnam et al. 2014). The in vitro tyrosine inhibitor effect is also explained by the interaction of ascorbic acid with, an essential cofactor in tyrosinase activity. Although less effective than hydroquinone, ascorbic acid doesnot have the same negative side effects(Katsambas and Stratigos 2001). This active ingredient isn't taken by itself. It's almost always paired with another ingredient. Vitamin C is present in cosmetics in amounts ranging from 4% to 20%, and its use is uncontrolled.

Divalent Ion Chelators

Metal ion chelators including Diethyl trioxopimelate and EDTA can be used to lighten the complexion.

By chelating Cu2+ ions, these sequestering agents block the tyrosinase cofactor and thus inter fere with the melanogenesis process. They have yet to be subjected to any form of scientifical ly documented study.

Retinol and Retinaldehyde

In the 1990s, retinol was widely used in anti-aging cosmetics. The retinol equivalent concentrations used ranged from 0.04 percent to 0.07 percent(Bowe and Shalita 2008). Retinol is converted to retinaldehyde, which is then converted to retinoic acid, in keratinocytes (Słoczyńska, Gunia-Krzyżak et al. 2015), In Europe, this molecule is forbidden in cosmetics. It is also worth nothing that tests with radio labeled molecules reveled that 7% of the dose applied to the skin was detectable at the systemic level (Yourick, Jung et al. 2008).

Kalaf management with unani medicinal plants (Chloasma)

1. Tukhm-e-Turb (Rhaphanus sativum)

Caffeic acid, vitamin C, and pelargodinin-3-sophoroside-5-glucoside are all present. These components have "antioxidant" properties (Gutiérrez and Perez 2004). It is commonly defined in Unani literature as an important and potent medicine for treating chloasma, either alone or in combination with other medications. It has a Jali (detergent) action that aids in the lightening of hyperpigmentation (Aquil, Khalid et al, Gutiérrez and Perez 2004, Thappa 2004, Dar, Shabir et al. 2012).

2. Maghz-e-BadamTalkh (Prunus amygdalus)

Vitamins, minerals, fatty acids, starch, proteins, and antioxidants abound throughout this fruit. It has the ability to lighten melasma lesion due to its high protein content. Almonds also contain vitamine E, which not only enhance the complexion but also nourishes the skin, giving it Mughazzi (nutritive) properties. As a result, it is widely recommended in the treatment of chloasma (Thappa 2004, Dar, Shabir et al. 2012).

3. Sandal Sufaid (Santalum album)

It may be used as a mufrad or in conjunction with other compounds to treat chloasma (Gutiérrez and Perez 2004, Dar, Shabir et al. 2012). Sandalwood contains a compound called –santalol, which inhibits the enzyme tyrosinase, which is needed for the synthesis of the pigment melanin.

4. Aab-e-Lemun (Citrus lemon)

Vitamin C, citric acid, polyphenols, trapenes, and tannins all help with melasma pigmentation reduction and removal (Moy and Levenson 2017). Citric acid in lemons serves as a jaali (detergent) and helps to dissolve the outer skin layer. It is particularly useful in the treatment of chloasma (Gutiérrez and Perez 2004, Thappa 2004, Dar, Shabir et al. 2012).

5. Gul-e-Surkh (Rosa damascena)

Roses are rich in vitamin C, a strong antioxidant, as well as phenolic compounds that help to prevent and treat chloasma (Kausar, Jahan et al. 2014). Rose water will help you stop getting sunburned. It is mentioned in various Unani books as a highly effective treatment for chloasma and other diseases (Aquil, Khalid et al. , Diez Roux and Mair 2010).

6. Arad-e-Baqla (Vicia feba)

Proteins, magnesium, potassium, calcium, and vitamin C can all be found in this product (Aquil, Khalid et al., Baitar 1999). To treat chloasma, it works as a Jali (detergent) (Gutiérrez and Perez 2004, Thappa 2004, Dar, Shabir et al. 2012).

7. Kaf-e-Dariya (Cuttlefish bone)

Chitin is a substance used in many cosmetics. It has the Qshir property, so it is used in Kalaf (Aquil, Khalid et al. , Mufradat 2010).

8. Husn-e-Yusuf (Laminaria hyperborea)

It's an effective skin hydrator, conditioner, and Mughazzi (nutritive) medicine. It also contains minerals and vitamins, which help to detoxify the skin. It has been identified in various Unani Medicine texts as being very successful in the treatment of chloasma (Mufradat 2010).

9. Khayar (Cucumis sativus)

Cucumber is rich in antioxidants and silica, which assists in the progressive lightening of chloasma dark spots (Baitar 1999, Moy and Levenson 2017).

10. Maweez (Vitis vinifera)

According to Unani literature, Maweez also has Musaffi (blood purifier)11 and Jali practises, which help lighten the dark spots of Kalaf (Dar, Shabir et al. 2012).

11. Yasmeen (Jasminum officinalis)

According to Unani literature, Maweez also has Musaffi (blood purifier) and Jali practises, w hich helplighten the dark spoor. Yasmeen's cicatrizant and collagen-boosting properties make it an outstanding treatment for Kalaf. The diseasets of Kalaf can be permanently cured by adding Yasmeen paste to chloasma (Gutiérrez and Perez 2004, Moy and Levenson 2017).

12. A'sl (Honey)

Honey contains antioxidants, enzymes, and other nutrients that hydrate, cleanse, and nourish t he skin.It has Jali properties, making it very effective in the treatment of Kalaf (Gutiérrez and Perez 2004, Kausar, Jahan et al. 2014).

13. Zafrān (Crocus sativa)

Zafrn is a great Unani Medicine drug that can help with a range of ailments. On the chloasma, a paste of Zafrn and Kaddu Kuhna (old bottle gourd) is added (Moy and Levenson 2017). It also contains kaempferol, a natural flavanol with potent anti-oxidant properties (Aquil, Khalid et al., Diez Roux and Mair 2010, Kausar, Jahan et al. 2014).

Melasma therapy by naturally occurring remedies

Effective aim of melasma treatment is to minimise hypermelanosis while preventing hypopigmentation and inflammation of the adjoining skin. There are various modalities accessible to the market; however, they all have serious side effects. Kojic acid, vitamin C, soybean, licorice, arbutin, mequinol, niacinamide, glucosamine, aloesin, mulberry, hesperidin, ginseng, azelaic acid, umbelliferone (UMB), and grape seed extract are examples of naturally occurring depigmenting ingredients (Bowe and Shalita 2008).

Vitamin C (ascorbic acid)

Green leafy vegetables and citrus fruits are healthy sources of vitamin C. It's a water soluble vitamin with a lot of strength (Zhu and Gao 2008). It has the potential to transform dopaquinone to DOPA, rendering it an antioxidant that is abundant over human skin (Katsube, Imawaka et al. 2006, Bowe and Shalita 2008, Ebanks, Wickett et al. 2009). Vitamin C also has photoprotective properties, precluding the immersion of UVA and UVB harmful radiation while also facilitating collagen synthesis (Balevi, Ustuner et al. 2017). There is evidence in the literature that vitamin C in the manifestation of a solution is unstable. It oxidises easily and decomposes in solution, according to several reports (Gupta, Gover et al. 2006, Lee 2008). Vitamin C from vegetables and fruits has a low stability and permeability, which can cause inflammation and allergies on the skin (Lee, Chang et al. 2015). To stabilise any Vitamin C solution, ascorbate esters namely magnesium ascorbyl-2-phosphate are often put in (Gupta, Gover et al. 2006, Bowe and Shalita 2008, Zhou, Hu et al. 2016).

The success of topical vitamin C is based on combination therapy, according to recent research. Iontophoresis has been combined with vitamin C. (Espinal-Perez, Moncada et al. 2004, Ebanks, Wickett et al. 2009, Lee, Chang et al. 2015), along mesotherapy, along laser Q-Switched ND:YAG laser (Espinal-Perez, Moncada et al. 2004), or fractional Q Switched Ruby Laser (Deo, Dash et al. 2013). Since vitamin C has a poor permeability as a charged molecule, combination therapies are used to help it penetrate more effectively (Zhou, Hu et

al. 2016). Clinical trials investigating efficacy of vitamin C along iontophoresis (Zhu and Gao 2008) Whether comparing it to HQ or comparing it to a placebo, both have yielded magnificent results with limited tolerable offshoot (Leyden, Shergill et al. 2011).

Kojic acid: 5-Hydroxy-2-(hydroxymethyl)-4-pyrone

Kojic acid 5-Hydroxy-2-(hydroxymethyl)-4-pyrone is a tyrosinase inhibitor and antioxidant that comes from a naturally occurring hydrophilic fungus. (Leyden, Shergill et al. 2011). To alleviate discomfort, it works better when combined along corticosteroids. It is widely used in Asia and Japan, along concentrations ranging from 1% to 4%. Kojic acid creams are typically administered bis and di (Iraji, Mehrpour et al. 2009). The effectiveness of local kojic acid on melasma has been examined in recent studies by contrasting it to HQ, which has been used as monotherapy, as well as its separate different combinations (Iraji, Mehrpour et al. 2009).

Soybean

Other properties of soybean include tonic of collagen synthesis, defence in case of UVB-convince photodamage, antioxidant, anti-inflammatory, and moisturising impact. Bowman–Birk inhibitor and soybean trypsin are two serine protease inhibitors found naturally in soybeans. Obstructing along the protease activated receptor 2 pathway is how the two proteases function (keratinocyte phagocytosis of melanosomes and melanosome transfer). The pigment lightening effect of this action has a therapeutic effect (Zhu and Gao 2008).

Niacinamide

Yeasts and root vegetables contain niacinamide, the active form of vitamin B3.Nicotinamide adenine dinucleotide and nicotinamide adenine dinucleotide phosphate are made from it. In a recent clinical trial, the efficacy of topical niacinamide was demonstrated in both subjective and quantitative studies. (Iraji, Mehrpour et al. 2009).

Glucosamine

Glucosamine is an aminomonosaccharide found in all human tissues.When glucose is combin ed with an amino acid group,sugar is formed.When glucose is combined with an amino acid g roup, sugar is formed. After that, the molecule product is acetylated to form N-acetyl glucosamine (Jones, Hughes et al. 2002). Since it inhibits tyrosinase glycosylation, N-acetyl glucosamine has been found to lighten hypermelanosis by lowering melanin levels in melanocytes (Jones, Hughes et al. 2002).

Licorice

Licorice extract inhibits tyrosinase activity, preventing melagonesis(Ingber 2009). Liquiritin and isoliquirtin are two other well-known licorice active ingredients, both of which serve as melanin dispersers or removers from the epidermis (Espinal-Perez, Moncada et al. 2004).

Arbutin

Cranberries, pears, barley, and blueberries all contain arbutin, an HQ derivative. Its mechanism of action is based on binding tyrosinase and inhibiting melanogenesis without affecting tyrosinase messenger RNA transcription (Deo, Dash et al. 2013).

Aloesin

In an in vitro analysis, aloesin, a compound derived from aloe extracts, was found to have anti inflammatory properties, Aloesin was found to be capable of inhibiting the synthesis of melanin in both mushroom and murine sources (Choi, Park et al. 2002).

The effects of aloesin pigmentary inhibition on UV induced pigmentation in human skin were investigated. The study involved applying aloesin to the human forearm four times daily for 15 days after it had been exposed to UV radiation. Aloesin was found to have a 34 percent pigmentation suppressing effect. This finding indicated that aloesin could be used to treat UV induced hypermelanosis. Melasma can also benefit, as sun exposure has been related to the production of melasma in the past. There is a lack of data on its effectiveness against melasma (Iraji, Mehrpour et al. 2009).

Azelaic acid

Azelaic acid is a naturally occurring nontoxic saturated nonphenolic dicarboxyl acid with nin e carbons.The first use of azelaic acid was to treat acne.Because of its effects on tyrosinase, it has been used to treat hypermelanosis of the skin.Azelaic acid prevents DNA synthesis and acts on mitochondrial enzymes, giving it a direct cytotoxic effect on melanocytes. It also helps to reduce the development of free radicals (Lee, Chang et al. 2015).

CONCLUSION

Excess or over-pigmentation of the skin causes pigmentary disorder. The amount of collagen, elastin, and melanin found in the skin are all factors that lead to hyperpigmentation. Melanin, a pigment, is responsible for the skin's hue. As such factors induce the melanocyte to generate more melanin than normal, the amount of melanin produced on the skin increases

dramatically. Excess or hyperpigmentation of the affected areas occurs as a result of these factors.

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