PHARMACEUTICAL VALUE OF *SUNTHI*(ZINGIBEROFFICINALE) FOR COSMETIC PRODUCT WITH SPECIAL REFERENCE TO *VARNYA KARMA*.

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INTRODUCTION:

Natural products are still proving to be resources that most consistently lead to the successful development of new drugs, and are expected to continue to play a major role as active substances, and as model molecules for the discovery and validation of drug targets.

Ginger, the edible rhizome of the Zingiber officinale Roscoe plant in the family Zingiberaceae, has long been widely used as a spice for cooking and as a traditional medicinal herb.[1,2 ,3] In 1807, William Roscoe, an English botanist, named the ginger plant "Zingiber" after the Sanskrit word for "horn-shaped." In Ayurveda it is grouped under Haridrakula. In Ayurveda ginger has been used in the name of Naagara, Srngavera, Visvaa, Visvabhesaja, Katubhadraa, Mahosadha since the period of Rigveda.[4] The ginger family of plants comprises more than 1,200 species in 53 different genera.[5] Ginger is commonly available (Nagaram) and used by the public because of its quantity and easy availability. Its rhizome causes burning sensation (Ushnam). It is considered as efficacious drug because of its strong actions.

It parts used is fresh rhizome (*adraka*) and dried rhizome (*Shunthi*) The fresh ginger *(Adraka)* contain *Katu rasa, TikshnaRuksa Guru - Guna, Madhuravipaaka and Usnavirya(Hot potency)*. The *sunthi*contain *Katu rasa, Laghusnigdhaguna, madhuravipaaka and usnavirya*. The drug is vaatahara because of usnavirya and madhuravipaaka, kaphahara because of usnavirya and katu rasa. The regular dose of 1-2gm powdered.[6]

India is one of the chief ginger producing countries. A considerable quantity of fresh as well as dry ginger is exported to West Asian countries, USA, Japan, UK, Germany, Newzealand and several other countries, Indi also exported ginger oil to several countries, like France, Japan, UK etc. Its retail market price dried is Rs 80 per kg.[7] In India its cultivation is done at Assam, Karnataka, Kerala, Meghalaya, Mizoram, Tamil Nadu and Tropical countries.

The rhizome of the plant has a wide range of prophylactic and therapeutic properties.[8] So, it (4 percent) is the *top-10 List of Herbal and Supplemental Medicines* used by Cosmetic Patients of USA.[9] It is marketed both in the peeled and in the unpeeled condition. In scraped (peeled) the epidermal layer of the rhizome is scraped off with the help of a sharpened bamboo sphincter and then washed in

water and dried in the sunlight for 7-10 days.

Ginger is reported to have antioxidative, anti-inflammatory, antimicrobial, and anticarcinogenicproperties.[10,11] Ingredients make to possess some pharmacological functions such as anti-cancer, anti-inflammatory and antibacterial properties. It contains 1.0–3.0% volatile oils and a number of pungent compounds. Gingerols are the most abundant pungent compounds in the fresh roots, and ginger contains several gingerols of various chain lengths, with 6-gingerol the most abundant[14] Its roosts and extracts contain many active ingredients, including volatile oils and pungent phenol compounds known as gingerols, sesquiterpenoids and shogaols.[12]Shogaol is the major compound found in Indian ginger. As a natural compound, 6- shogaol is a promising ingredient for the development of new drugs because of its strengths in structural simplicity and natural abundance.

In the Eastern world, however, a century's long tradition exists whereby a light complexion is regarded as equivalent to youth and beauty. But, It is feared that many cosmetic patients did not reveal their use of these agents because more than 70 percent of all medical patients do not reveal their usage to treating physicians.[13 ,14]

Melanogenesis is a biosynthetic process to produce melanin, which leads to the production of skin color and plays a necessary role in protecting skin against the damages from ultraviolet rays.[15]Overproduction and accumulation of melanin is responsible for several skin disorders, including melasma, freckles, agespots and other hyperpigmentation syndromes. Hyperpigmentation could be caused by over-exposure to solar radiation, ageing, hormone disorders, genetic predisposition, etc. [16]

Skin-whitening agents, such as arbutin, retinoic acid and kojic acid (from aspergillusniger), are commonly used nowdays which effective in the treatment of hyperpigmentation disorders with many side effects like dermatitis and melanocyte damage.[17] Previously, kojic acid was added to cosmetics by means of its dipalmitic ester, that is, as kojicdipalmitate (KDP). But, a lots of adverse drug reaction is observed.

Ginger are uncommonly utilized for clinical treatment of pigmentary disorders such as melasma or post inflammatory hyperpigmentation. Its adverse effects is rare, but may include heartburn, diarrhea, and mouth irritation,[18] may increase risk of fibrinolysis. It is also connected with mutagenicity and the increased incidence of ochronosis. Ardraka (green ginger) causes burning sensation due to its *usnavirya, triksna-rukshaguna*, Sunthi has got its *usnavirya.*

Several studies is performed for emergency condition on the use of ginger as an anti-emetic for use even with post-operative nausea and vomiting, motion sickness and vertigo and chemotherapy-induced nausea and vomiting. Ginger is fail behind to be commercially used for skin beautification. Here, drugs Company are not focused with its skin potentiality. Scientific dermatology articles noted *excessive handling of macerated ginger is likely to cause dermatitis of the hands in sensitive persons*".[19]

This study aims to collect relevant information of ginger in relation to potentiality and safety on skin protection as a skin whitening. The quality of ginger determines their mode of action. This study expects relevance of Ayurveda literature.

METHODS

An electronic bibliographic database search was carried out. Searched directory was done with keywords *skin and Zinger officinale* from Pubmed. Google scholar, research gate, dharaonline. Ayush portal, Database of medicinal plants in Ayurveda and other research portal, database. The articles related to Ayurveda, skin toxicity, whitening was reviewed.

RESULT:

The scientific literature on tyrosinase inhibition shows that a large majority of the work has been conducted since 2000 A.D.mostly been devoted to the search for new depigmenting agents. Natural tyrosine inhibitors without negative side effects is of utmost importance in this field of research.

DISCUSSION:

Zingiber officinale (Ginger)was found to have dual use, both as curative and cosmetic. The herbal cosmetic products used for skin colour, hair care, removal of ugly spots, colouring of nails, palms, and teeth. Its remedies were also available for skin burns, prickly heat and pimples, managing dry skin. Locally, the method of preparation was juice extracted from the root mixed with old molases and orally taken for urticaria.[20] It is used in even skin diseases in veterinary practices too.[21]

Its rhizome contain many active ingredients, including volatile oils major biological constituents of ginger (ranging from highest to lowest amounts by weight) are: 6-gingerol, 6-paradol, 6-shogaol, and zingerone.[22] Volatile oil from ginger is alkene substances including zingiberene and iso-horn tea ene.

Different scientific literatures was published with its utility from kitchen purpose to extensively anticancer property. In vitro and in vivo study was done for antitumor activities on cancer cells. It inhibits the growth of cancer cells and suppresses the generation of reactive oxygen species (ROS).[23] Clinical uses was introduced for its efficacy property for treatment purpose on different ailments of disease. Instead, research articles published for skin property was done in less number. The drugs company doesn't get relevance fact for production of skin cosmetics drugs with its ingredients.

Ayurveda has focused to contraindication of Aadraka (fresh ginger) to skin disease.[24] It is due to its *Guru* (heavy) and *TiksnaGuna* (physical property), *Usna* (hot) *Virya* (potency). There is difference between the *Aadraka*and *Sunthi* in terms of oil content. Although it has been cleared mentioned of contraindication of *Aadraka*in Ayurveda literature, Sunthi was avoided. *Sunthi* contain *Laghu* (light) and *snigdhaguna* (physical property) with *Usna* (hot) virya. *Sunthi* is focused for review in this study.

Melanogenesis - Melanin synthesis is directly related to the activity of tyrosinase and the protein levels of tyrosinase.[25]Scavenging the free radicals and improving the cellular antioxidant ability play an important role in the regulation of melanogenesis i.e. Increase

ROS and DNA residue have the ability to stimulate melanogenesis.[26]

Previously, a lots of scientific works was carried out for significance of alkaloids. Skin mucus of G8 exhibited significantly higher inhibition zones when tested against pathogenic bacterial strains.[27] Immune histochemistry showed topical application of [6]-gingerol prior to UVB irradiation (5 kJ/m) of hairless mice inhibited the induction of COX-2 mRNA and protein and NF-Êb translocation.[28] [6]-Shogaol possesses a desirable ability to inhibit melanin synthesis by activation of the ERK pathway and by inhibition of tyrosinase production.[29] 8-gingerol inhibited melanogenesis through down-regulation of the MAPK and PKA signal pathways in melanoma cells.

Recently, scholar are extensively working related to volatile oil property. The wide scientific actively provides evidence for formulating new drugs. Research articles confined to new alkaloid discovery and efficacy, later on the concept of validation of the activities with the use of volatile oil. Volatile oil from ginger has inhibitory effects on melanosome transportation, intracellular tyrosinase activity suppressing melanogenesis through the inhibitory effects on melanin 498 content, tyrosinase, tyrosinase-related proteins (TRP-1 and TRP-2), MITF and p38 4 MAPK.The quantity (20 µg/mL, 40 µg/mL, 60 µg/mL, 80 438 µg/mL and 100 µg/mL) showed an inhibitory effect on cell viability. The inhibition rates were not sufficient to show an effect on cell apoptosis in B16 melanoma cells. But, this result is sufficient for the approach of skin whitening.

Skin penetration and toxicological impact of nanoparticles is unclear and issue for safety. There is a potential for a range of local, chronic, metabolic, and photo-induced toxicities.[30] Many modern cosmetic or sunscreen products contain nano-sized components. Nanoemulsions are transparent and have unique tactile and texture properties; nanocapsule, nanosome, noisome, or liposome formulations contain small vesicles (range: 50 to 5000 nm) consisting of traditional cosmetic materials that protect light-or oxygen-sensitive cosmetic ingredients. Transdermal delivery and cosmetic research suggests that vesicle materials maypenetrate the stratum corneum (SC) of the human skin, but not into living skin. Depending on the physical/chemical properties of the ingredient and the formulation, nano-sized formulations has increase chance of enhance or reduce skin penetration, albeit at a limited rate. There is little evidence supporting the principle that smaller particles have greater effects on the skin or other tissues or produce novel toxicities relative to micro-sized materials. Overall, the current weight of evidence suggests that nano-materials such as nano-sized vesicles or nanoparticles currently used in cosmetic preparations or sunscreens pose less risk to human skin or human health. Although nanoparticles concept has minimized the risk of adverse drug reaction, different unlikely signals are reported.

Sunscreen products containing mineral UV filters protect consumers from the harmful effects of UV exposure, including skin aging, skin and lip cancers, and herpes labials[31,32] Micro- or Nano sized particles

remain on the skin surface or the outer layers of the SC and do not penetrate into or through the living skin. [33] There is chance to produce a possible uptake of particles by human skin: if nanoparticles penetrate the skin, they can join the bloodstream and circulate around the body with uptake by cells, tissues and organs.[34]

Reduction of the particles on ginger study was done. The study suggest reduction in particle size could enhance the extraction of antioxidants from ginger; a critical particle size is reached whereby a further reduction in particle size could impair the extraction of antioxidants[35]lowest particle size of 0.425 mm, all the antioxidant properties investigated were maximized (maximize four of the six (66.67%) antioxidant properties), a critical particle size is reached whereby a further reduction in particle size could impair the extraction of antioxidants.

The optimum particle size (size that maximizes antioxidant property) is solvent dependent.

- The optimum particle size is also dependent on the antioxidant properties being measured.
- The lowest particle size may not always give the highest antioxidant property.[36]

Enhancing heating potency is mentioned in Ayurveda textbook. Articles has tried to deal to the fact. Studies suggests, ginger administration had no effects on the evaporative or nonevaporative heat loss systems, thermal perceptions (even with oral medication). Oral ingestion of ginger components has no significant impact nonmetabolic heat production in humans. Dose influenced is evaluated. Morning ginger intake significantly reduced respiratory exchange ratios and elevated fat oxidation. This was not the case in the afternoon.[37] One time dose can be dose of administration.

Quality control is mandatory to enhance the potency. High performance thin layer chromatography (HPTLC) densitometric method is available for the analysis of 8-gingerol in commercial ginger.[38] The mobile phase n-hexane: ethyl acetate 60: 40 (%, v/v) resulted in a sharp, symmetrical, and well resolved peak at Rf value of 0.39.[39] So, determination of the ginger alkoloids can be done with simple, accurate HPTLC method.

Total ash, acid-insoluble ash and water-soluble extract of the two ginger processed products had no obvious difference in batch-to-batch, but the contents of 6-gingerol closely related to their growth places.[40]The recovery of the essential oils of ginger depend on variety and origin of the plant as well as the cultivation, humidity at the time of harvest, the methods of extraction and to some extent on the age of the plant.[41]Although ginger essential oils is yellow, the intensity of colour, aroma and taste varies according to the originated place of cultivation. The chemical composition of essential oils of ginger has been identified and quantified by means of GC-MS or GC with flame ionization detector applications[42].Cinnamomumzeylanicum (cinnamon) and Thymus vulgaris (thyme), Cinnamon oil, cinnamon oil fumigation combined with medium storage at 12 °C minimizes microorganism's contamination. Phytochemical quality can be easily monitored by GC-MS and HPLC methods.

Physical and morphological quality can be monitored by WHO guideline. Unpeeled gingers were found to have highest yield of oil/oleoresin[43]. Peeling or removal of skin may remove thick fibrous tissue of ginger suggesting loss of oil cells that may also reside at the cell parenchymal wall. Upon using fresh ginger in opposition to dried, it was found the chemical composition in fresh ginger are more than dried ginger due to drying process. Most monoterpene and sequiterpene alcohol compounds are decrease in ginger oil from dried ginger compared to fresh ginger.[44]Gingerol becomes shogaol upon dehydration of fresh ginger.[45] This property suggests drying process valid for *Aadraka and Shunthi*, its hot potency and tikshna property decreased significantly on drying. *Shunthi* can be referred as model for skin use with least contraindicated property to be used on skin.

The biosynthesis of the secondary metabolites of the plants are determined by genetic and environmental factors as well as their interaction.[46] A variety of environmental factors such as season, altitude and soil nutrition etc. significantly modify the secondary metabolite profile in plants. [47,48] Altitude is one of the abiotic stresses and broad range of environmental factors such as precipitation, mean temperature, soil characteristics and atmospheric pressure etc. change with altitude.[49]

Ginger oil on application with curcuma longa rhizome to the skin it prevents skin eruptions. Aleosin (aloevera),[50]arbutin (carthamustinctorius/mushroom)[51], vitamin C (ascorbic acid), [52]garlic.[53] This shows the synergetic value, this can be enhanced more with the zinger.

CONCLUSION:

Ginger has natural tyrosinase inhibitors without negative side effects is of utmost importance in this field of research. Even oral ingestion of ginger components has no significant impact onmetabolic heat production in humans. This validate that *Usna karma* of *sunthi*will be acting for increasing the physiological heating capacity, and can be used safely for the skin purpose.

Skin whitening containing mineral UV filters protect consumers from the harmful effects of UV exposure, including skin aging, skin and lip cancers, and herpes labials. Ginger has got promising therapeutic agent against UVB 21 induced skin disorders.

This study recommends to develop analytical methods for accurate and precise determination of this cosmetic ingredient, thus assuring the efficacy of this type of cosmetic products, to find several natural compounds without side effects, which can exhibit an apparent inhibitory effect on melanogenesis.

CONFLICT OF INTEREST: None

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