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THE ROLE OF GOTU KOLA IN COSMECEUTICAL: A REVIEW

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ABSTRACT

Gotu kola is a tiny herbaceous eternal plant. It is member of the Apiaceae family, which is characterized by its growing roots, long copper colored stolon's with the long internodes and roots at the base of each node. Gotu Kola is a perennial creeping plant native to India, North Africa, China, and Sri Lanka. Gotu Kola is ideal for skin care formulations and hair care products. Gotu Kola is rich in fatty acids and has moisturizing property that helps to improve the skin hydration. It is primarily found in anti-ageing because it promotes the production of collagen, repairs scars and increases the levels of antioxidants in newly formed tissues. Gotu Kola have moisturizing, anti-inflammatory, antiaging, antioxidant properties. It is used in haircare products to promotes healthy scalp condition and prevent hair loss. Gotu Kola used in nutricosmetics to improve the beauty of the skin. Gotu Kola is naturally derived ingredient which is mainly used as skin conditioning agents in cosmetic products.

KEYWORDS: Gotu Kola, Moisturizing, Antioxidant, Antiaging, Extraction techniques.

INTRODUCTION

Gotu Kola is an herbaceous plant known as *Centella asiatica(L)* and belonging to family Apiaceae.[1] It is also known as 'Indian Pennywort' or Mandukparni. In India, it grows up to an altitude of 600-1800 meters above the sea level on moist, clayey or sandy soils forming a dense green carpet.[2] Gotu Kola is a perennial creeping plant native to India, China, Japan, North Africa and Sri Lanka. It is growing in water- logged, damp and swampy areas, but growth also can be observed along stone walls, in rocky and sunny areas at elevations up to 2500 m above sea level. It has small fan shaped green leaves and light violet colored flowers. The word 'gotu' in the Sinhalese language stands for 'conical shape' and 'kola' stands for leaves which

commonly express this herb as a plant with 'conical shaped leaves'.[3]

Fig. 1: Gotu Kola plant.

Synonym – Mandookparni.

Biological source - It is dried or fresh whole plant of herb called *Centella asiatica*, belonging to the family *Umbelliferae (Apiaceae).*

Geographical source - It is found in Southeast Asia, Sri Lanka, in parts of China in western South Sea Islands, South Africa in the southeast of the U.S.A as well as in eastern region of South America. In tropical climates the plant can be grown and harvested throughout the year and cost-effectively dried in the sun.

BOTANICAL DESCRIPTION OF GOTU KOLA

Table no. 1: Taxonomy of the Gotu Kola plant.

Classification	Name
Kingdom	Plantae
Class	Magnolipsida
Order	Apiales
Family	*Apiaceae*
Genus	*Centella*
Species	*Centella asiatica(L.) Urban*

Description

Gotu Kola is a slender, creeping plant. The stems of the plant color are green to reddish green and it have long stalked, green leaves with rounded tip. It has small fan shaped green leaves.

The Gotu Kola leaves are borne on pericardial petioles, are flat surfaced, thin and soft with palmate nerves. Nodes spotted on the stem gives rise to long petioles which hold the leaves.

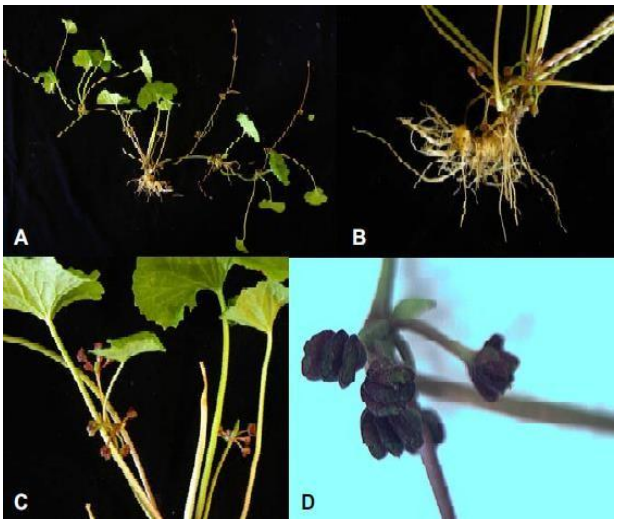

Figure 2: Parts of Gotu Kola plant.

It is identified by continuously growing roots and long copper-colored runners with wide shaped internodes that have roots at the base of each node. The roots stalk consists of rhizomes which grow vertically down and are covered with root hairs. The flowers (typically 3-6 units) from gotu kola are pinkish to red or light violet in color and grow on short pedicles.[3]

Chemical composition of gotu kola

The fatty acid composition of gotu kola leaves. The fatty acids are palmitic acid (55.70%), linoleic acid 17.50%) and lauric acid (13.73%). The highest saturated fatty acid is palmitic acid (55.70%) and linolenic acid (17.50%) is the highest unsaturated fatty acid. Myristic acid is found in trace amount of 0.50%.[1]

Table no. 2: Chemical composition.[1,4]

Chemical composition	Concentration
Asiaticoside	0.1-0.6%
Asiatic acid	0.1-0.5%
Madecassic acid	0.5- 0.18%
Myristic acid	0.50%
Palmitic acid	55.70%
Stearic acid	8.55%
Lauric acid	13.73%
Linolenic acid	4.03%
Linoleic acid	17.50%.

Extraction techniques of Gotu Kola

1. Maceration

The Gotu Kola herb obtained were cleaned and then made a powder. The powder of Gotu Kola herb was then extracted by maceration method in 96% ethanol for 7-8 days and stirring occasionally. Then the extract was filtered with filter cloth. After that concentration of the extract is carried out with a rotary evaporator at 40℃ to get the gotu kola extract.[5] Maceration of gotu kola is able to extract various types of compounds such as triterpenoids, flavonoids, phenolics, saponins, alkaloids, tannins and carotenoids mainly depends on the solvents used and time of extraction.[6]

2. Soxhlet Extraction

Soxhlet Extraction is a method used to attain the semi-volatile and non-volatile compounds from gotu kola.[6] 10 g of powdered sample was put through the soxhlet extraction with 300 mL of n-hexane for 24 hours. Then evaporated to dryness using a rotary evaporator at 40°C. The sample was prepared by dissolving 1 mL of filtered residue in 50 mL chloroform and evaporated at room temperature; followed by the addition of 1mL of reagent (benzene and methanol) and sample heated for 30 minutes at 40°C. Organic sample was extracted with hexane and taken for GC (gas chromatography) analysis.[1]

3. Distillation

Distillation is the separation of components at a particular boiling point and densation. There are two kinds of distillation used in extraction: steam distillation which is carried out by passing dry steam between the plant material and water distillation in which elevated pressure is utilized with plants whose essential oil is tough to extract at a high temperature. Steam distillation is an efficient technique for obtaining the best quality of oil, and by employing fresh leaves in extraction, many constituents can be detected. The essential oil of gotu kola obtained from steam distillation yielded more sesquiterpenoid hydrocarbons; constituents were identified, of the composition of the oil. On the other hand, water distillation is an excellent method for extracting caryophyllene and monoterpenoid hydrocarbons from gotu kola. Thus, water distillation utilizes a huge amount of water apart from consuming a lot of energy and time.[6]

Gotu Kola Extract Benefits in cosmetics

Skin care

Gotu Kola with astringent, tannins and soothing essential oils which are excellent ingredient for toning and stimulating the skin and it offers safety care.[7]

Gotu Kola is one of the plants used as a skin care product since it consists of triterpenoid, asiaticosida, madekakosida, flavonoids, which have antioxidant, anti-inflammatory activities and help in premature aging.[8]

As for a cosmetic function, gotu kola is used as an effective compound in skin care preparations because its antioxidant, anti-inflammatory, anticellulite and antiaging property.

The beneficial effect of gotu kola on improving condition of skin.[9]

Deep Healing: Gotu Kola herbs enhance deeper healing abilities in the skin. In cosmeceuticals triterpenes are used mainly for anticellulite, anti-wrinkle, and wound healing, effects therefore, they increase the synthesis of collagen.[6]

Bioactivity: Gotu Kola were examined for their triterpene composition and bioactivity like collagen enhancement, antioxidant, anticellulite and UV protection properties.[10]

Skin hydration: Gotu kola extract is an effective ingredient not only in antiaging cosmetics but also for improving skin hydration. It rich in fatty acids therefore, it can be used in moisturizing cosmetic formulations and used in the treatment of dry and sensitive skin.[9]

Firmness and elasticity: Gotu Kola contains biological compounds such as Asiatic acid, madecassic acid, asiaticoside, and madecassoside. Due to its ability to stimulate collagen synthesis it has been used in skin care products for repairs firmness and elasticity and improving its appearance.[11]

Skin protective activity; skin ageing become visible due to decrease in the level of type I collagen, asiaticoside isolated from gotu kola showed synthesis of type I collagen in human dermal fibroblast cells.[12]

Anti- ageing activity: Gotu kola is the most important herb with anti-aging effects; one of its many properties is to enhance collagen synthesis.[13]

Anti-photo aging agent: In cosmetology gotu kola has been used as effective anti-photo aging agent to enhancement of collagen. Gotu Kola is a familiar ingredient of cosmetics used in cellulite and striae.[14]

Antioxidant activity: Gotu Kola has a high antioxidant activity. Gotu kola plant contains phytochemicals. These flavonoids serve as antioxidants and defend free radical damage. It has a very good potential to be explored to as source of natural antioxidants.[15]

Anti-bacterial and anti- inflammation: Gotu Kola extract has obvious effect of eliminating facial whelk and acne. Gotu Kola extract can reduce the production of pro-inflammatory mediators. It enhances and renew the skins barrier function. So it can prevent and correct the skin immune dysfunctions. Therefore, gotu kola extract, due to its anti-inflammatory activity, can also be used in cosmetics such as after-sun repair and anti-allergic products.

Repairing scars: Gotu Kola extract can promote the synthesis of collagen I and III. At the same time, it also can promote mucoitin secretion, it increases skin moisture-reserving ability, it stimulates and regenerate the skin cells. Other studies have showed that gotu kola extract also can activate fibroblast gene. It can enhance the activity of the basal layer cells of the skin, it maintains the elasticity and tightness of skin and it soothes fine wrinkles of face. Because of its important role in promoting collagen synthesis, and granulation growth in the body, gotu kola extract is conductive to wound healing, scar repair.

Whitening: Gotu Kola extract also has strong antioxidant effect. It can prevent free radicals, and reduce melanin pigmentation. It increases blood circulation and enhance skin cell regeneration. It helps melanin metabolise out of the body smoothly. Skin may become smooth, delicate and white after using cosmetics containing gotu kola extract.[16]

HAIR CARE

The flavonoids are used in hair care products where it simulates the peripheral circulation of the scalp and promote healthy scalp condition and prevent hair loss.[7]

Gotu Kola is used as a main ingredient in the preparation of hair dyeing.[17] Gotu Kola is used for, antidandruff, cleansing and conditioning.[18]

Gotu Kola is used for the growth and maintaining hairs.[19] Gotu Kola is useful for hair nourishing.[20]

Gotu Kola has antioxidant activity, maintaining the growth of hair follicle dermal papilla cells. It is used in the development of hair care products and hair loss.[21]

Nail application

Gotu Kola contains glycoside and asiaticoside which stimulate the formation of and aid in strengthening of tissues, as for example dermis, hairs, nails, and other connective tissues. Gotu Kola rises the keratin and collagen synthesizing.

It is added to a nail application, such as nail treatment or nail lacquer, to provide a nail strengthening composition. It may be applied to nail by nail polish, nail lacquer, nail cream, nail oil, other well-known methods. When it is applied to a nail, the water is able to simultaneously increase the nails aesthetic appearance and increase keratin application for the nail.[22]

Gotu kola uses in the Nutricosmetics

Nutricosmetic is the term often used for nutritional cosmetics. It is a supplement that is ingested with the intent of enhancing the beauty of the skin. Nutricosmetics contains vitamins, phytonutrients and other natural ingredients to promote youthfulness and reverse processes associated with aging. This nutritional cosmetics or oral anti-aging products contain vitamins A, C and E, fatty acids. Also include ingredients, which promote skin health, anti-inflammatory activity, and anti-stress component.[13]

Safety and toxicity

The cosmetic ingredient review (CIR) Expert panel reviewed that the safety of 9 gotu kola-derived ingredients, which function primarily as skin conditioning agents in cosmetic products, and concluded that they are safe in present uses and concentration level in cosmetics, when formulated to be non-sensitizing.[23] Gotu kola is used at concentrations up to 0.5% in cosmetic products (leave on products [not spray]).[24] Gotu kola is not toxic and possible side effects are rare. There are few studies on the toxicity of individual constituents of gotu kola.[25]

CONCLUSION AND FUTURE PERSPECTIVE

The role of gotu kola herb is a natural resource for skin care and multiple cosmeceutical effects. Due to richness in many bioactive compounds as flavonoids, triterpenoids, saponins and its chemical composition, the gotu kola has been used in skin aging, anti-inflammatory, antioxidant, anti-bacterial, anticellulite, anti-hair loss activity and and UV protection capacity

properties. It is used in cosmetic applications such as body and hand preparations, face and neck preparations, and hair care preparations. Gotu kola is often featured as a key ingredient in serums, eye cream and beauty oils. It is a natural ingredient which can be beneficial for cosmetic industries.

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