



Potential benefits of guava leaf extracts in various cosmetic formulations: A review article

¹Dr.Ganesh Sanker S, ²Aiswariya Babu, ³Anziya Jawad, ⁴Jojomon J S, ⁵Juhina N, ⁶Nayana Prasad,

¹Associate professor, ²Scholar, ³Scholar, ⁴Scholar, ⁵Scholar, ⁶Scholar,

Department of Pharmaceutics,

Mar Dioscorus College of Pharmacy, Thiruvananthapuram, India-695017.

Abstract: Guava leaf extract, rich in bioactive compounds, offer a plethora of therapeutic benefits suitable for integration into cosmetic formulations. This review explores the multifaceted potential of guava extracts in cosmetic application. Guava leaves (*P. guajava* L.) contain many bioactive compounds that plays a major role in maintaining healthy skin. The leaves of the guava plant have been studied for their health benefits which are attributed to their plethora of phytochemicals such as quercetin, avicularia, apigenin, guaijaverin, kaempferol, hyperin, myricetin, catechin, epicatechin, chlorogenic acid, gallic acid, epigallocatechin gallate, and caffeic acid. In this review, we firstly gave an overview about the benefits of herbal ingredients in cosmetics products and also the health benefits of guava leaf extracts. We provide information about the potential effects like antioxidant, antimicrobial, treating acne, of guava leaf extracts in skin care products. Then we move to effect of guava leaf extract in oral care products for antimicrobial activity, preventing oral diseases and hair care products for eliminating dandruff, reducing hair fall etc.

Index terms – Guava leaf extract, antiacne serum, cream, lotion, hand wash, hand sanitizer, toothpaste, mouthwash, shampoo, hair gel.

I. INTRODUCTION

As per the drugs and cosmetics act 1940, cosmetic means “any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to the human body or any other part thereof for beautifying, cleansing, promoting attractiveness, or altering the appearance and also includes any article intended for use as a component of cosmetics”. According to the Food Drug Administration (FDA), cosmetics are substances or preparations intended for contact with external parts of the human body, including mucus, the oral cavity, and teeth. Cosmetics have a function, namely to clean the skin, beautify, increase attractiveness and change the appearance or maintain it in good condition. Cosmetic formulations are used for a variety of skin care needs. There are variety of cosmetic products like face cream, face wash, toothpaste, mouthwash, shampoos, lotion etc. Our study aims to describe the effect of guava leaves as herbal ingredient in cosmetic formulations.

Among cosmetic formulations, herbal cosmetics gain more popularity among population, because they do not show side effects as that of synthetic cosmetic products. Herbs have been used in cosmetics because they constitute natural ingredients that are harmless. Herbal cosmetics are products formulated using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are incorporated to provide defined cosmetic benefits. Herbal products may offer significant advantages over the chemical ones with less side effects and high antimicrobial potential. The addition of herbal extracts in cosmetics can minimize skin damage due to oxidative stress and thus aging process gets delayed. Herbal products enhancing various functions of skin by accelerating collagen growth and thus eradicating harmful effects of free radicals, maintaining the structure of keratin, and keeping skin healthy. A number of herbal plants are naturally available and are used in the preparation of herbal cosmetics. These include amla, neem, coconut,

guava, pomegranate, clove and many more. Herbal skin cosmetics have multi activities like anti-oxidant, anti-aging, anti-inflammatory, and antiseptic properties.

Herbal ingredients in skin care

Skin constitutes the largest organ that protects the body from the external environment, helps to regulate temperature and fluid balance, keeping out harmful chemicals, microbes and offering some protection against sunlight. Natural ingredients have been traditionally used for skin care needs.

Herbal ingredients in hair care

Herbal hair care products are formulated using colourful cosmetic ingredients to form the base in which one or more herbal ingredients are used to treat various hair infections. It increases the lustre of hair, gradually prevents hair breakage, reduces split ends, and enhance manageability. Its main aim is to reduce disunion between hairs, making brushing, digging easier, and used for crown treatment.

Herbal ingredients in oral care

The use of herbs-based products in oral cavity has shown an increased popularity and potential benefits due to their anti-inflammatory and antioxidant properties as well as the lack of side effects related to their use. The use of sugar diet, bakery products, and carbonated drinks increases the chance of dental caries. Lack of oral hygiene results in accumulation of plaque, which is the major reason for gingivitis and periodontitis. The use of herbal products improves dental health and promote oral hygiene.

Guava leaf as herbal ingredient



Figure 1.1. Guava leaf

Psidium guajava belong to the family Myrtaceae grows to a height of 1 to 7 meters. The leaves are typically 7-15cm long and 3-5cm wide with an oblong to oval form. Guava leaves as shown in the figure 1.1 above, are rich in antioxidants, tannins, vitamin c, and vitamin B and they have numerous anti-inflammatory activities. The primary phytochemical constituents present in guava leaves are phenolic compounds, iso-flavonoids, gallic acid, catechin, quercetin, epicatechin, kaempferol, naringenin, rutin etc. They are used to treat a wide range of illness. It is used for treating diarrhoea, reduce cholesterol level, healing acne, improving skin texture and more and more.

II. MATERIALS AND METHODS

Utilization of guava leaf extract in antiacne serum

Teens with acne face several challenges, particularly as they approach puberty. Infections with bacteria, including *acne vulgaris* sp., are among the reasons of acne that frequently affect people in this age range. When certain hormone levels increase, the oil glands in the skin may overproduces the sebum, which leads to the formation of pimples. Face serums have a wide range of effects. They can make pimples disappear quickly, and they can reduce inflammation to make breakouts less noticeable. Serums come in several varieties, like anti-aging, brightening, anti-acne, eyelash, and so on.

Currently, a serum made of natural materials is being developed; guava leaf plant is one of the plants that can be utilized to make an anti-acne serum. In this study, the guava leaves are chopped into pieces and dried. Then it is pounded into a powder. The powder is extracted using a 96% ethanol combination through a process called maceration. Then they conducted phytochemical screening test. From the test results, guava leaf extracts showed the presence of

secondary metabolites of alkaloids, flavonoids, tannins and saponins. Here they prepared four formulations F0 without extract, F1, F2, F3 of serum preparation and they are undertaken to test based on physical parameters and antibacterial activity test. Based on the result of organoleptic test, the four preparation have good and stable criteria on their shape, smell and colour. Serum preparation of ethanol extracts of guava leaves as anti- acne has good homogeneity. The pH of four formulations is within the range of 4.5 to 6.5. So, it meets the serum criteria. The four formulas have good viscosity standards. Based on the results of antibacterial activity test, F1, F2 and F3 have clear zone value of 15.0 mm, 16.0 mm and 19.0 mm. From this, it clearly suggests that the best clear zone is produced in F3 and it shows good antibacterial activity of the serum preparation as anti- acne.

Utilization of guava leaf extract in skin cream

One of the most effective ways to nurture and protect our skin is by incorporating a face cream into our daily skincare routine. Face creams are especially formulated to label various skin concerns and offer numerous benefits. Our skin needs moisture to hydrate it, so we can do it with a cream. often contain anti-aging ingredients like retinol, peptides, and antioxidants that help reduce the appearance of fine lines, wrinkles, and age spots and even improve our skin tone. It smooths the skin and reducing the skin damage. By moisturizing with cream, it increases the blood circulation. They also antimicrobial action.

In the previous study, antimicrobial herbal cream was prepared by using aqueous guava leaf extract. Guava leaf has anti-inflammatory properties and also contain vitamin C, vitamin B, anti-oxidants and tannins. The leaves of the guava (*Psidium Guajava* L) were taken and washed thoroughly with the distilled water and wind dried for 1 week. Aqueous extract of guava leaves was prepared by maceration technique by using distilled water. Phytochemical analysis is performed for determination tannins in guava leaves. Guava leaves is influenced by the concentration of tannin. The higher the level of tannin antibacterial activity will increase. Herbal cream was prepared by mixing the herbal extract with other ingredients with continuous stirring of aqueous phase with the oily phase. Then it undergoes evaluation test. The physical properties like colour, odour of the herbal cream was evaluated. pH of the herbal cream is measured and that is found to be 6.33. The stability studies were also carried out for 2 months at different temperatures like 20, 25, 40 °C. Hence no change is noticed. Other evaluation test like spreading coefficient, dye test, irritancy study, phase separation, saponification value, moisture absorption, homogeneity was also performed. The ease of removal of the creams applied to skin was evaluated by washing the applied part with tap water. Based on the results of phytochemical constituent test evaluation test, we can conclude that water extract of guava leaves (*P. guajava* L.) can be formulated in the form of cream as antimicrobial agent.

Utilization of guava leaf extract in body lotion

Body lotions are formulations meant to be used all over the body. They provide your skin with its daily cure of hydration and alimant. Body lotions are substantially designed to stop humidity from leaving your skin and/or absorb humidity from elsewhere to keep your skin moisturized, soft, and smooth. They are formulated to support the skin barrier and prevent moisture evaporation. It can also rehydrate your skin and provide the much-needed nourishment. Regular application of body lotion can help to soften and soothe your dry and rough skin and can treat or prevent dry, rough, scaly, and itchy skin. It can also deal with minor skin infections like rashes. It helps protect your skin from external microbes and keeps the skin's microbiome balanced and reduces the signs of aging.

The previous research work was about formulating and evaluating herbal lotion made up of extract of Plant *Psidium guajava*. Guava leaves were dried under Hot air oven, and then the powdered plant material was exposed to Soxhlet extraction with ethanol used as a solvent. Preliminary phytochemical screening was conducted. Lotion of Oil-in-water (O/W) emulsion based of extracts of *Psidium guajava* was formulated. Four formulation F1, F2, F3, F4 were also formulated and they were undertaken for evaluation test. The preliminary phytochemical studies showed the presence of many phytoconstituents such as alkaloids, tannins, flavonoids, glycosides, saponins and triterpenoids. There was no change in colour and slightly yellow colour was homogenous throughout the studies observed after storing at appropriate room temperature on evaluation based on physical parameters. Formulations F2 and F3 found more stable. They had constant pH and were homogenous throughout the stability studies, and it can be easily removed after application. So, this study validates the formulation and evaluation carried out on the extract of guava leaves.

Utilization of guava leaf extract in hand sanitizer

Herbal Hand Sanitizer are natural herb-based hand cleansers it is either gel or liquid like products which is used in hand to decrease the rate of microorganisms, in our skin and it includes lots of herbal extracts which helps to ensure antimicrobial properties. It helps to prevent negative consequences like dermatitis, itchiness and irritation.

The previous study was about the formulation and evaluation of herbal hand sanitizer. Here, an effort has been undertaken to create a herbal hand sanitizer by utilizing an extract of guava leaves. For that we want to collect guava leaves about 50gm and washed thoroughly under running water and kept dried for five days in shade and using electric mixer it is converted into a fine powder and it is macerated and then through filtration extract is collected and for getting the gel like consistency Carbopol is used and along with alcohol, glycerine, preservatives are added and a uniform product is obtained. The screening test for active constituents in guava leaf extract was performed and it shows the presence of glycosides and alkaloids. Then it undergoes evaluation test. From the results of physical evaluation, it has characteristic colour and opaque odour. pH is within the range of 4 to 6. It shows no irritancy in irritancy test. From the results of antibacterial test, guava leaf extract hand sanitizer had the same position of exertion as the reference standard when it was measured of the inhibitory zone. Guava leaves have the potential for controlling bacteria. The anti-microbial property of guava leaf extract in herb-based sanitizer is better than a chemical- based sanitizer.

Utilization of guava leaf extract in hand wash

Hand hygiene is the most important measure to avoid the spread of infectious germs and the spread of healthcare associated infections. Hand washing is the act of cleaning one's hand to remove dirt and pathogenic microorganisms and to prevent the transmission of transient microorganisms that cause diarrhoea and influenza. Hand washing with polyherbal hand washes and water is 25% more effective way than washing alone with water to remove bacteria.

Guava leaves have anti- inflammatory, antibacterial, antiseptic activities. They are used to prevent the growth of microorganism. Here we taken the previous study of the formulation and evaluation of herbal hand wash using *Psidium guajava*. The fresh guava leaves were collected and it is extracted by Soxhlet extraction. The extraction has been done in 500 ml ethanol for 3.5 hours. First, they prepare a gel base for the herbal handwash. Then formulate the herbal hand wash using guava leaf extract. Then formulation undergoes organoleptic evaluation, physical evaluation like pH, foaming stability and antimicrobial test. from the antimicrobial test, the formulated herbal hand wash has antimicrobial activity against bacterial species like *E. coli* and *Bacillus substali*. Three different concentration F1, F2 and F3 of the formulation was also prepared. The three formulations have same yellow colour and have a rosy smell due to the presence of rose oil. All the three concentrations have good consistency. In pH test, the F1, F2, F3 have pH of 7.7, 7.3 and 7.3. F2 has good washability when compared to F1 and F3 and also, they have good foam forming ability. So, it can be concluded that the formulated hand wash is evaluated and it gives antimicrobial activity.

Utilization of guava leaf extract in mouthwash

Mouthwash is an aqueous oral formulation which is used to control plaque, deodorize and refresh oral cavity and possess antibacterial properties. Alcohol, glycerine, artificial sweeteners, flavourings, colourings, surface active agents, and other ingredients may be present. Mouthwash freshens breath, treat oral mucositis, halitosis etc. Guava (*Psidium guajava*) mouthwash is used for treating conditions like swollen gums, mouth ulcers and bleeding gums. It contains phytochemicals such as quercetin, guaijaverin, flavonoids, terpinene and pinene show antimicrobial effects, tannins giving antibacterial effects against *S. aureus*.

In previous study, discussed about the formulation, evaluation of herbal antibacterial mouthwash. Here they prepare three mouthwashes with three different herbal extracts like *Psidium guajava*, *Azadirachta indica* and *Glycyrrhiza glabra*. For each three herbal formulations, 5 concentrations were also prepared. For the preparation, leaves were collected and sun dried. The extracts were prepared by soaking in 200 ml distilled water for 72 hours using maceration. The prepared mouthwashes undergo evaluation test. From the results, the antimicrobial potency of three formulations is G2> N2> L2. The use of aqueous extract of *P. guajava* as mouthwash and gargles against oral infections could be effective. It was concluded that the developed herbal mouthwash possesses significant effect, therapeutically efficient, suitable vehicle for drug delivery in low cost but surely with high potential.

Utilization of guava leaf extract in toothpaste

Oral care with the use of herbal toothpastes containing natural ingredients more acceptable than synthetic-based chemicals due to safety concern. Toothpaste is a dentifrice used to clean, maintain and enhance the health of teeth. Toothpaste is substantially used to promote oral cleanliness and also acts as an abrasive that helps to prevent the dental plaque and food patches from the teeth, aids in the removing and/or veiling of halitosis, and releases active components similar as fluoride to aid in preventing tooth and gum disease.

The previous study was about the formulation and evaluation of herbal tooth paste using guava leaves, for the extraction process, guava leaves were collected and sun dried for three days which improves its anti-bacterial activity extraction is done by maceration using 70% ethanol phytochemical screening is carried out for guava leaves and from the result it showed the presence of flavonoids, proteins, tannin, carbohydrates, saponin and alkaloids. Herbal tooth paste using guava leaves are formulated and evaluated. Evaluation parameter like abrasiveness, foaming ability, pH, Anti-microbial activity also carried out on herbal tooth paste using guava leaves was successful.

Utilization of guava leaf extract in shampoo

Hair plays a significant part in how attractive the body appears and serves as a health index. One of the most popular hair-cleansing beauty items is shampoo. The solid gel shampoo is also known as shampoo bar. It is a hair cleanser in solid form and it does not contain detergent that can occasionally strip hair of its natural oils, shampoo bars tend to be gentler on the hair and scalp. It contains natural ingredients such as plant-based oils, herbal extracts and natural oils.

Guava leaves are used as an anti-dandruff agent. In the previous study, it is about the formulation and evaluation of herbal solid shampoo. The guava leaves were collected and extract is prepared and it is used for the formulation of herbal solid shampoo. Then it undergoes evaluation. The clarity, colour, odour is examined. In washability test, it is found that herbal solid shampoo can be easily washable. pH of the formulation is within the range of 4.5 to 6.5. Anti-dandruff test for the formulation is performed. In conclusion, efforts have been made to develop a solid shampoo using raw powder of guava leaves due to its beneficial properties on hair and scalp. It will be a promising alternative to commercial chemical containing bars.

Utilization of guava leaf extract in hair gel

Hair gel is a styling product used to shape and hold hair in place. It provides texture, definition, and control, allowing you to create various hairstyles. Polyherbal hair gel is a unique formulation that combines the therapeutic properties of various herbal extracts to provide comprehensive solutions for hair-related concerns. The formulation incorporates multiple herbal constituents for a potent, versatile hair care product, focusing on specific properties like nutritional hair, improving scalp health, and addressing hair loss or dandruff. They also provide hair styling benefits. Guava leaves are rich in vitamins B and C, promoting hair growth and antibacterial activity against gram-positive and gram-negative bacteria.

In the previous study, it is about the formulation and evaluation of polyherbal hair gel using multiple herbal extracts like guava leaves and flax seeds. They contribute overall hair health. They are also formulated without harsh chemicals. Here the guava leaves are collected and sun dried for 3 days and extracted by immerse extraction method using 160 ml methanol and 40 ml distilled water. Three different polyherbal hair gel formulas were prepared. They are examined for various parameters. In physical evaluation, F1 exhibited a green hue, while F2 and F3 displayed a yellowish-green shade and the odour for all formulations was found to be pleasant. In homogeneity test, F1 and F3 shows good homogeneity. This study provides valuable insights into the potential benefits of combining various herbal extracts for hair care. The developed formulation exhibited promising characteristics, including desirable physical properties, stability, and compatibility with the skin and hair.

III. RESULT AND DISCUSSION

From the previous studies we can assure that guava leaf extract has a high potential as a natural cosmetic material which offers anti-oxidant, anti-bacterial, anti-inflammatory and skin enhancing functionality. The diverse benefits of guava leaf extract make them a promising ingredient in skincare, hair care as well as oral care products.

IV. CONCLUSION

In conclusion, we can conclude that guava leaf extracts offer a natural and versatile solution for enhancing skincare, haircare, oral care and overall well-being.

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