



A Concise Analysis Of The Psidium Guajava Leaves

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ABSTRACT

Guava leaves have been found to possess various physiological molecules, including flavonoids, sesquiterpenes, triterpenoids, coumarins, alkaloids, and tannins, which exhibit antioxidative and anti-inflammatory effects [1]. The study aimed to evaluate the potential of concentrated Psidium guajava leaf extract as a functional natural material.

The results showed that the extract exhibited antioxidative, antibacterial, tyrosinase activity inhibition, and collagenase activity inhibition effects, as well as trans-2-nonenal removal ability. The extract's antioxidative activity was found to increase with the concentration of ethanol used for extraction.

Additionally, the extract's antibacterial activity was confirmed against Staphylococcus aureus bacteria.

The study suggests that concentrated Psidium guajava leaf extract has high potential as a food and natural cosmetic material, particularly in terms of its whitening and wrinkle-improving functionality [1].

Keywords : Antioxidant, Antiinflammtoy, Antibacterial , Tannins,

INTRODUCTION

Guava (*Psidium guajava* L.), a tropical plant species native to Central and South America, has been widely cultivated in many parts of the world for its edible fruit. The guava plant, belonging to the Myrtaceae family, has been a staple crop in many tropical and subtropical regions, providing a rich source of essential nutrients, vitamins, and minerals. Beyond its fruit, the leaves of the guava plant have

been used for centuries in traditional medicine to treat various ailments, including digestive issues, inflammatory conditions, and infectious diseases.

The use of guava leaves in traditional medicine dates back to ancient civilizations, with records of its use found in traditional Chinese, Indian, and African medicine. The leaves have been used in various forms, including infusions, decoctions, and extracts, to treat a range of health conditions. Recent studies have validated the traditional uses of guava leaves, revealing their potential as a natural remedy for various diseases [2].

Phytochemical analysis of guava leaves has revealed a rich composition of bioactive compounds, including flavonoids, phenolic acids, terpenoids, and alkaloids. These compounds have been shown to possess a range of pharmacological properties, including antimicrobial, anti-inflammatory, antioxidant, and anti-cancer activities. The presence of these bioactive compounds has been linked to the potential health benefits of guava leaves, including their ability to prevent and manage various chronic diseases.

Classification

1. Kingdom: Plantae

Clade: Angiosperms

2. **Clade:** Eudicots

3. **Clade:** Rosids

4. **Order:** Myrtales

5. **Family:** Myrtaceae

6. **Genus:** Psidium

7. **Species:** Psidium



Fig 1: Guava Fruit And Leaf

Major Chemical Constituents

1. **Flavonoids:** Quercetin, kaempferol, and isorhapontigenin
2. **Phenolic acids:** Gallic acid, ellagic acid, and ferulic acid
3. **Terpenoids:** Ursolic acid, oleanolic acid, and beta-sitosterol
4. **Alkaloids:** Guavinine, guavine, and psidine
5. **Glycosides:** Quercetin-3-O-glucoside and kaempferol-3-O-rutinoside[5]

Volatile Compounds

1. **Essential oils:** Limonene, beta-pinene, and alpha-pinene
2. **Aldehydes:** Hexanal and nonanal
3. **Ketones:** 2-Heptanone and 2-nonanone

Other Compounds

1. **Tannins:** Gallic acid and ellagic acid
2. **Saponins:** Ursolic acid and oleanolic acid
3. **Polysaccharides:** Starch and cellulose[6]

Phytochemical Variability

1. **Geographical variation:** Chemical composition varies depending on the region, climate, and soil type.
2. **Seasonal variation:** Chemical composition changes with the season, with higher levels of flavonoids and phenolic acids found in leaves harvested during the summer months.
3. **Genetic variation:** Chemical composition varies among different guava cultivars and accessions[7].

Chemical Test of Guava :

Tests for Flavonoids

1. **Alkaline Reagent Test:** Add 1-2 drops of 10% sodium hydroxide (NaOH) solution to the extract. A yellow color indicates the presence of flavonoids.
2. **Lead Acetate Test:** Add 1-2 drops of lead acetate solution to the extract. A yellow or green precipitate indicates the presence of flavonoids[8].

Tests for Phenolic Acids

1. **Ferric Chloride Test:** Add 1-2 drops of ferric chloride (FeCl₃) solution to the extract. A green, blue, or purple color indicates the presence of phenolic acids.
2. **Potassium Hydroxide Test:** Add 1-2 drops of 10% potassium hydroxide (KOH) solution to the extract. A yellow or red color indicates the presence of phenolic acids.

Tests for Terpenoids

1. **Salkowski Test:** Add 1-2 drops of Salkowski reagent (a mixture of chloroform and sulfuric acid) to the extract. A red or pink color indicates the presence of terpenoids.
2. **Liebermann-Burchard Test:** Add 1-2 drops of Liebermann-Burchard reagent (a mixture of acetic anhydride and sulfuric acid) to the extract. A blue or green color indicates the presence of

terpenoids.

Tests for Alkaloids

1. Mayer's Test: Add 1-2 drops of Mayer's reagent (a mixture of potassium iodide and mercuric chloride) to the extract. A white or yellow precipitate indicates the presence of alkaloids.
2. Dragendorff's Test: Add 1-2 drops of Dragendorff's reagent (a mixture of potassium iodide and bismuth nitrate) to the extract. An orange or red precipitate indicates the presence of alkaloids.

Tests for Glycosides

1. Molisch's Test: Add 1-2 drops of Molisch's reagent (a mixture of α -naphthol and sulfuric acid) to the extract. A purple or red color indicates the presence of glycosides.
2. Bornträger's Test: Add 1-2 drops of Bornträger's reagent (a mixture of phloroglucinol and hydrochloric acid) to the extract. A red or orange color indicates the presence of glycosides[9,10].

Chemical Composition

1. Proximate Composition

Guava leaves (GLs) are a rich source of various health-promoting micro- and macronutrients as well as bioactive compounds. They contain 82.47% moisture, 3.64% ash, 0.62% fat, 18.53% protein, 12.74% carbohydrates, 103 mg ascorbic acid, and 1717 mg gallic acid equivalents (GAE)/g total phenolic compounds.

1.1 : Polysaccharides

1.2 Polysaccharides are macromolecules that are ubiquitously present in nature. They are made of long polymeric chains, which are composed of monosaccharide units. These polysaccharides demonstrate various physicochemical, biological, and pharmacological properties, such as antioxidant, anti-inflammatory, antidiabetic, immunomodulatory, and antitumor activities [15]. Guava leaf polysaccharides (GLPs) can be isolated using ultrasound-assisted extraction (UAE) (time: 20 min, power: 404 W, temperature: 62 °C). These GLPs contain about 9.13% uronic acid and 64.42% total sugars, out of which 2.24% are reducing sugars. GLPs are soluble in water, while insoluble in organic solvents like ethanol, diethyl ether, ethyl acetate, acetone, and chloroform. Extracted GLP with a concentration of 100 μ g/mL exhibits good antioxidant capacity with 56.38% and 51.73% 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical- and 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS) radical cation-scavenging capacity, respectively [16]. Similar results were also reported by Kong et al. [17]. They obtained up to 0.51% GLP using UAE that exhibited good DPPH•- and

OH scavenging activity (72–86% and 42.94–58.33%). GLPs can be categorized into two groups: unsulfated and sulfated GLPs. Sulfated GLP contains about 18.58% sulfate content. Sulfated GLP exhibited good antioxidant activity in terms of DPPH, hydroxyl, and alkyl radical scavenging activity (0.10, 0.02, and 0.17 IC₅₀, mg/mL, respectively). Studies showed that guava leaves extracts (GLE) effectively reduced the oxidative stress and toxicity caused by hydrogen peroxide in mammalian cell lines [11]

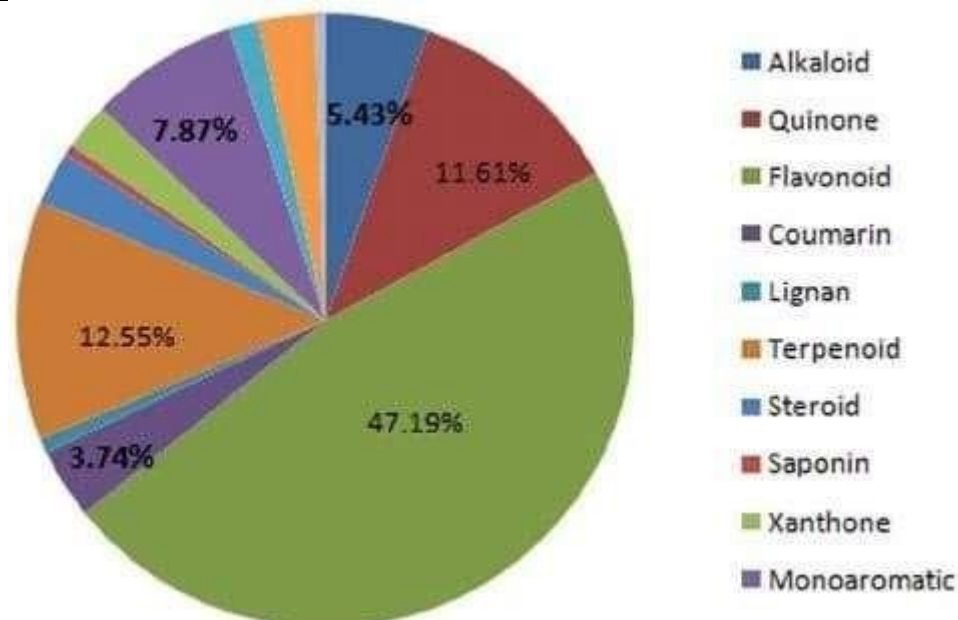


Fig 2 : Chemical Constituents

PROTEINS

4 Guava leaves contains 9.73% protein on a dry weight basis. Proteins are large biomolecules composed of amino acids and act as building blocks of cells. Proteins play a major role in growth and maintenance, enzyme regulation, and cell signaling, and also as biocatalysts¹². Recently, plant-based nutrients have gained potential because of the high demand for nutritionally rich food, particularly protein. A great effort is now being

5 made to find highly sustainable nutritionally rich food sources. Thomas et al. reported 16.8 mg protein/100g and 8 mg amino acids/100g in guava leaves as estimated according to Lowry's and ninhydrin methods, respectively. Jassal et al. reported that guava leaves can be utilized as a novel and sustainable dietary source as they are a rich source of proteins, carbohydrates, and dietary fibers^[12].

6 2.1.3. MINERALS AND VITAMINS

7 Guava leaves are the rich source of minerals, such as calcium, potassium, sulfur, sodium, iron, boron, magnesium, manganese, and vitamins C and B. The higher concentrations of Mg, Na, S, Mn, and B in GLs makes them a highly suitable choice for human nutrition and also as an animal feed to prevent micronutrient deficiency^[13]. Thomas et al. reported the concentration of minerals such as Ca, P, K, Fe, and Mg as 1660, 360, 1602, 13.50, and 440 mg per 100g of guava leaf dry weight (DW), respectively. The concentration of vitamins C and B was 103.0 and 14.80 mg per 100g DW, respectively. Consumption of Ca- and P-rich GLs reduces the risk of deficiency-related diseases like hypocalcemia, hypophosphatemia, and osteoporosis. The study also reported that the concentration of Ca, P, Mg, Fe, and vitamin B in GLs was higher than that in guava fruit^[14].

Anticancer/Antitumor Activity:-

Cancer is a complex health disorder which is identified by the development of cell proliferation or a decrease, causing apoptosis. It can be caused by several exogenous and endogenous factors involved in the excessive production of reactive oxygen species (ROS). This can result in single- or double-strand breaks in DNA or RNA, base mutations, chromosomal breaking and reorganization, DNA cross-linkage, nucleic acid degradation, damage to cell membrane integrity due to lipid peroxidation, and tumor formation . GLs are a good source of triterpenoids, sesquiterpenes, tannins, psiguadials, volatile oils, flavonoids, benzophenone glycosides, and miscellaneous quinones . Psiguadial D and psiguadial C act as inhibitors of human hepatoma cells (HepG2) and protein tyrosine phosphatase 1B (PTP1B). Terpenoids and flavonoids present in GLs exhibit antitumor effects by regulating the immune system, suppression of signal transfer and tumor cell adhesion, and an impediment to tumor angiogenesis and cell proliferation. Studies suggest that these leaves exhibit a potent inhibitory effect against cancer cell lines like MDA- MB-231 and Michigan Cancer Foundation-7 (MCF-7) for breast cancer, Henrietta Lacks (HeLa) for cervical cancer, KB for nasopharyngeal cancer, LNCaP, DU 145, and prostate cancer-3 (PC-3) for prostate cancer, and colorectal 320 double minutes (COLO320DM) for colon cancer[15].

MARKET PREPARATION :

1. Guava Syrup :



Fig3 : Guava Syrup

1. Cough syrup: Guava syrup is used as a natural cough syrup due to its expectorant properties.
2. Digestive issues: Guava syrup is used to treat digestive issues such as diarrhea, dysentery, and indigestion.
3. Fever: Guava syrup is used to treat fever and reduce body temperature.
4. Skin and hair care: Guava syrup is used as a natural remedy for skin and hair care due to its antioxidant and antimicrobial properties.

Preparation

1. Guava fruit: Fresh or dried guava fruit is used to prepare the syrup.
2. Sugar and water: Sugar and water are added to the guava fruit to create a syrup.
3. Boiling and filtration: The mixture is boiled and filtered to create a clear syrup.

Benefits

1. Rich in vitamins and minerals: Guava syrup is rich in vitamins A and C, potassium, and fiber.
2. Antimicrobial properties: Guava syrup has antimicrobial properties that help to prevent the growth of bacteria and other microorganisms.
3. Antioxidant properties: Guava syrup has antioxidant properties that help to protect the body from free radicals.
4. Natural remedy: Guava syrup is a natural remedy that is free from artificial additives and preservatives.

Side Effects

1. Allergic reactions: Some people may be allergic to guava and experience symptoms such as hives, itching, and difficulty breathing.
2. Digestive issues: Guava syrup may cause digestive issues such as diarrhea, stomach cramps, and nausea in some individuals.
3. Interactions with medications: Guava syrup may interact with certain medications such as blood thinners, diabetes medications, and blood pressure medications[16,17].

2. **Guava Powder :**



Preparation

1. Drying: Fresh guava leaves or fruit are dried to remove excess moisture.
2. Grinding: The dried guava leaves or fruit are ground into a fine powder.

3. Face Mask :



Fig 4 : Face Mask Of Guava

Benefits

1. **Antioxidant properties:** Guava face masks can help protect the skin from free radicals and oxidative stress.
2. **Anti-inflammatory properties:** Guava face masks can help reduce inflammation and soothe irritated skin.
3. **Antimicrobial properties:** Guava face masks can help prevent the growth of bacteria and other microorganisms that can cause acne and other skin issues.
4. **Skin brightening:** Guava face masks can help brighten and even out skin tone.
5. **Hydration:** Guava face masks can help hydrate and moisturize the skin.

Types of Guava Face Masks

1. **Guava leaf face mask:** Made from dried guava leaves, this face mask can help reduce inflammation and soothe irritated skin.
2. **Guava fruit face mask:** Made from guava fruit puree, this face mask can help brighten and even out skin tone.
3. **Guava and honey face mask:** Made from a combination of guava puree and honey, this face mask can help hydrate and moisturize the skin.
4. **Guava and turmeric face mask:** Made from a combination of guava puree and turmeric powder, this face mask can help reduce inflammation and soothe irritated skin.

How to Make a Guava Face Mask

1. **Guava leaf face mask:** Steep dried guava leaves in hot water, then let it cool. Apply the cooled liquid to the face and leave it on for 10-15 minutes.
2. **Guava fruit face mask:** Mash ripe guava fruit and mix it with a little honey and yogurt. Apply the mixture to the face and leave it on for 10-15 minutes.
3. **Guava and honey face mask:** Mix guava puree with honey and yogurt. Apply the mixture to the face and leave it on for 10- 15 minutes.

Precautions

1. Allergic reactions: Some people may be allergic to guava and experience symptoms such as hives, itching, and difficulty breathing.
2. Skin irritation: Guava face masks can cause skin irritation in some individuals, especially if they have sensitive skin.
3. Patch test: Always do a patch test before applying a guava face mask to ensure that you are not allergic to it[20].
4. **Guava Shampoo :**



Fig No.4.Guava Shampoo

1. Hair growth: Guava shampoo may help promote hair growth by strengthening hair follicles and improving scalp health.
2. Dandruff and itchiness: Guava shampoo may help soothe and calm the scalp, reducing dandruff and itchiness.
3. Hair strengthening: Guava shampoo may help strengthen hair strands, reducing breakage and split ends.
4. Antifungal and antibacterial properties: Guava shampoo may help control fungal and bacterial growth on the scalp, reducing the risk of infections.

Ingredients

1. Guava extract: The main ingredient in guava shampoo is guava extract, which is rich in antioxidants, vitamins, and minerals.
2. Coconut oil: Some guava shampoos may contain coconut oil, which helps to moisturize and nourish the hair and scalp.
3. Olive oil: Some guava shampoos may contain olive oil, which helps to condition and protect the hair.

Types of Guava Shampoo

1. Guava and coconut oil shampoo: This type of shampoo combines the benefits of guava extract with the moisturizing properties of coconut oil.
2. Guava and olive oil shampoo: This type of shampoo combines the benefits of guava extract with the conditioning properties of olive oil.
3. Guava and tea tree oil shampoo: This type of shampoo combines the benefits of guava extract with the antifungal and antibacterial properties of tea tree oil.

Brands

1. Pantene: Pantene offers a guava shampoo that helps to strengthen hair and reduce breakage.
2. Garnier: Garnier offers a guava shampoo that helps to nourish and moisturize dry and damaged hair.
3. Aveda: Aveda offers a guava shampoo that helps to promote hair growth and reduce dandruff and itchiness[21,22].
5. Capsule



Fig 5 :Guava Capsule

Benefits

1. Digestive health: Guava capsules may help support digestive health by reducing symptoms of diarrhea, dysentery, and indigestion.
2. Antioxidant properties: Guava capsules may help protect the body from free radicals and oxidative stress, which can contribute to chronic diseases like cancer and heart disease.
3. Immune system support: Guava capsules may help support the immune system by reducing inflammation and fighting off infections.
4. Anti-inflammatory properties: Guava capsules may help reduce inflammation and alleviate symptoms of conditions like arthritis and gout.

Ingredients

1. Guava leaf extract: The main ingredient in guava capsules is guava leaf extract, which is rich in antioxidants, flavonoids, and other bioactive compounds.
2. Vitamins and minerals: Some guava capsules may also contain additional vitamins and minerals like vitamin C, potassium, and magnesium.

Dosage

1. Recommended dosage: The recommended dosage of guava capsules varies depending on the brand and specific product. Typically, it is recommended to take 1-2 capsules per day with meals.
2. Precautions: Guava capsules may interact with certain medications or exacerbate underlying health conditions. It is essential to consult with a healthcare professional before taking guava capsules.

Side Effects

1. Allergic reactions: Some individuals may be allergic to guava and experience symptoms like hives, itching, and difficulty breathing.
2. Digestive issues: Guava capsules may cause digestive issues like nausea, vomiting, and diarrhea in some individuals.
3. Interactions with medications: Guava capsules may interact with certain medications like blood thinners, diabetes medications, and blood pressure medications[23,24,25].

PROPERTIES :-

Hepatoprotective Properties

Liver lipid metabolism requires the activity of adenosine monophosphate-activated protein kinase (AMPK) and PPAR α and rats treated with guava leaf extract demonstrated enhanced activity of both parameters. In addition, the guava leaf extracts could ameliorate hepatic insulin resistance. Alanine transaminase (ALT) and aspartate aminotransferase

CONCLUSION :-

Guava leaves have been used for centuries in traditional medicine for their numerous health benefits. The leaves are rich in antioxidants, flavonoids, and other bioactive compounds that have been shown to have anti-inflammatory, antimicrobial, and anti-cancer properties. Guava leaves can be consumed as a tea, capsule, or added to food products. They can also be used topically as a face mask, shampoo, or skin cream[34].

However, it's essential to note that guava leaves may interact with certain medications or exacerbate underlying health conditions. Therefore, it's recommended to consult with a healthcare professional before using guava leaves for medicinal purposes[35,36].

Overall, guava leaves are a natural and versatile remedy that can provide numerous health benefits when used properly. anti-inflammatory, antimicrobial, and anti-cancer properties

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