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Review Article

# Guava Oil: A Detailed Review on Pharmacognosy, Phytochemistry and Medicinal Properties

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## ABSTRACT

Essential oils have remained a popular herbal remedy for various chronic diseases since ages. But most of these products lack sufficient clinical evidence for therapeutic value. One such valuable variety of medicinal plants is Guava (*Psidium guajava*). This plant has found to have various applications in the treatment of different ailments such as diarrhea, dysentery, gastroenteritis, high blood pressure, diabetes, tooth decay and pain relief. Alongside producing benefits for improving coordination and mobility. The medicinal properties of this plant are largely derived from its leaf extract, which is used for treating cough, diarrhea, oral ulcers and swollen gums. Additionally, the fruit of the plant is packed with essential nutrients like vitamins A and C, iron, phosphorus and calcium, as well as many other organic and inorganic compounds, including antioxidants, polyphenols, antiviral compounds and anti-inflammatory compounds. The phenolic components in guava are effective in fighting against cancer cells and preventing premature aging of the skin. Relaxation effects are produced by certain components like terpenes, caryophyllene oxide and p-selinene. Guava leaves contain multiple compounds that act as inhibitors of fungal and bacterial growth. This plant is also rich in antioxidants like quercetin, providing it with radio-protective abilities, to relieve muscle spasms. The extract of guava also demonstrates pain-relieving activity and is effective in reducing inflammation and promoting the production of serum in cases of liver damage. However, there is a need for detailed research to separate and characterize the precise antimicrobial elements and to delve into other potential medicinal impacts. As a result, once the crucial oil components are isolated, they can be employed as a curative solution for combatting contagious illnesses and many other advantages of this plant.

**Keywords:** Guava oil, *Psidium guajava*, Anti-inflammatory activity, Anti-cancer.

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## INTRODUCTION

*Psidium guajava* L., commonly referred to as guava, is a tropical American plant belonging to the Myrtaceae family. It is now grown across various tropical regions and has adapted to local environments.[1] Within indigenous medicinal practices, different parts of the guava plant are utilized to treat a range of human ailments including wounds, ulcers, bowel issues and cholera.[2] Pharmacological studies have demonstrated that the bark, seeds, peels, pulp, fruit and leaves of the guava plant possess antibacterial, hypoglycemic, anti-inflammatory, antipyretic, spasmolytic and central nervous system depressant properties.[3,4] This tropical plant, belonging to the Myrtaceae family, is extensively found in the Nepalese Terai, inner Terai and mountainous regions. It is highly esteemed for its medicinal qualities, economic viability and is one of the predominant fruit crops cultivated in these areas.[5] The plant of Guava has been valued since ancient times for its medicinal properties.[6] Additionally, research in pharmacology has revealed that this plant possesses greater potential beyond being a mere source of fruit. Its abundant nutritional and phytochemical composition endow it with advantageous properties against various chronic illnesses.[7] Utilizing *P. guajava* contributes to the decrease in chronic disease risk and treatment. It is also economically significant for fruit-producing nations. Notably, this plant is safe for consumption, as indicated by non-toxicity and lack of mutagenicity *in vivo* tests, along with minimal potential for drug interactions. Presently, they have gained significant popularity for their potential in treating microbial diseases and for their beneficial properties, including anti-cancer, antioxidant and anti-inflammatory effects.[8] Furthermore, it's fruit by-products (seeds and skin) exhibit potential for future applications in the food and cosmetic sectors.[6] They are extracted from plants using methods such as hydrodistillation, steam distillation, hydrodiffusion, or solvent extraction. These techniques separate the essential oils from the plant material, allowing them to be collected and used for various purposes.[9]

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Guava oil is derived from the plant's leaves. These compounds contribute towards medicinal properties, making them suitable for various therapeutic applications.[10] These include treating conditions such as diabetes, hypertension, diarrhea, respiratory diseases, obesity, reducing fever, promoting wound healing, relieving pain and exhibiting anti-inflammatory effects.[11] The presence of phenols, terpenes, terpenoids, quercetin, glycosides, acetic acid, protocatechuic acid, citric acid, glutamic acid, malonic acid, cis-aconitic acid, trans-aconitic acid, epicatechin, asparagine and xanthine in guava leaves also grants it excellent antioxidant properties.[12,13] Furthermore, studies have shown that they inhibit cell growth in cancer cell lines, including breast cancer (MCF-7 and MDA-MB-231), prostate cancer (PC-3, DU 145 and LNCaP), cervical cancer (HeLa), colon cancer (COLO320DM) and nasopharyngeal cancer.[14-16] However, many studies suggest that the varying ratios of its constituents are influenced by genetic factors and environmental conditions such as climate and soil characteristics that can trigger alterations in the plant's secondary metabolic processes.

## Botanical source and Chemical Composition

More than 3800 species and at least 133 genera make up the Myrtaceae family.[17] It includes the tropical fruit guava (*Psidium guajava* L.), which is native to Central America. In all tropical and subtropical regions of the world, it is either farmed or growing naturally. It is a small to medium-sized perennial plant type that can produce a yield quickly. Except for rare cultivars that could have rough skin; the fruit is round or oval and has smooth skin.

When the fruit is young, the skin is dark green. As it ages, it turns light green and when it ripens, it turns yellow green. The fruit seed is small and firm and the fruit meat is white or pink with a distinctive flavor. South Africa, India, Hawaii, Colombia, Puerto Rico, Jamaica, Brazil and Israel are the top manufacturers of guava products.[18] Parts of the common guava tree that are in season include the bark, leaves, shoots, branches and fruit (mature, breaker stage and ripe).[19]

Guava is rich in minerals, including vitamin A and C, which are present in amounts that are 36 times higher than those found in oranges of the same sample weight. It also has antioxidant capabilities.[18] Additionally, it has high fiber, iron, calcium and vitamins B1, B2 and B6. The most distinguishing feature of red guava is that it has the highest concentration of lycopene, second only to tomato which has the highest content and twice as much as papaya.[20] Red guava contains some flavoring ingredients viz; hydrocarbon (a-pinene, b-caryophyllene), alcohol (hexanol, terpineol, cis-3-hexenol) and ester (ethyl acetate, cis-hexenyl acetate). Guava has its own distinct flavor.[21] The strawberry guava, *Psidium cattleianum* Sabine, is frequently referred to as having a stronger aroma than the common guava, *Psidium guajava*.

*Psidium guajava* L. essential oil has been investigated for pharmacological and industrial uses without taking into account the genotype of the plant with relation to the variability of its content.[22] Components of oil were identified by comparing the mass spectra retention indices with those of genuine samples.[23]

## Pharmacognosy of Guava Oil

Iron, calcium, phosphorus and vitamin C are all present in guava fruit. Compared to an orange, it has higher vitamin C. The fruit contains flavonoids, quercetin, guaijavarin, lyxopyranoside, arabopyranoside, saponin and oleanolic acid.[24,25] Guava have main components viz; ascorbic acid and citric acid which are crucial for its anti-mutagenic effect.[26] Fruits are rich in volatile oil, pleasant aroma is attributed to carbonyl chemicals. A total of 41 hydrocarbons, 25 esters, 13 alcohols and 9 aromatic compounds are present in guava.[27] Essential oil found in leaves are α-pinene, -limonene, β –pinene, isopropyl alcohol, menthol, terpenyl acetate, caryophyllene, longicyclene and β-bisabolene. The guava leaves also contain oleanolic acid.[28] Also, mono- and sesquiterpenes make up most of the chemical composition. The essential oil has been associated with a variety of chromatographic patterns, demonstrating chemotype diversity.[29] Even when they are present in very small concentrations (ppm), chemical tests of essential oils disclose the accessible components, both quantitatively and qualitatively. These oils may contain a variety of chemicals and identifying them could help with finding differences between genotypes, chemotypes and potential chemical markers.[30]

## Essential Oil Composition

### *Methods of Extraction*

Guava oil has been avidly extracted using multiple methods including Soxhlet extraction, low pressure solvent extraction, ultrasound extraction, hydrodistillation, supercritical fluid extraction, cold press. As various parts of this plant has been utilised to extract oil, each of the aforementioned method is specific to the phytoconstituents and the parts.[15,31]

## Different characterization Techniques

To characterize and screen the phytoconstituents of guava oil, methods like Gas Chromatography, High-Performance Liquid Chromatography, Mass Spectrometry, Fourier Transform Infrared Spectroscopy, Nuclear Magnetic Resonance Spectroscopy, Differential Scanning Calorimetry, Rheology and Sensory Evaluation have been widely utilized as described in Table 1. Every method used is specific with respect to its utility in comprehending the class of constituents.

## Phytoconstituents of Guava oil

Guava is a prime hub for essential phytoconstituents that have shown to produce various clinical utilities. Since every plant part

**Table 1: Different characterization Technique used for Guava oil.**

| Technique | Application | References |
|---|---|---|
| Gas Chromatography (GC) | Identifying and quantifying fatty acids, essential oils and other volatile compounds in guava oil. | [32-35] |
| High-Performance Liquid Chromatography (HPLC). | Analysing non-volatile components. | [31, 32, 36] |
| Mass Spectrometry (MS). | Determining the molecular structure and fragmentation pattern. | [31, 36] |
| Fourier Transform Infrared Spectroscopy (FTIR). | Determining the presence of functional groups and the chemical composition of guava oil. | [31, 36] |
| Nuclear Magnetic Resonance Spectroscopy (NMR). | Characterizing detecting the presence of other compounds in guava oil. | [15, 34, 36] |
| Differential Scanning Calorimetry (DSC). | Determining the melting point, solidification and thermal behaviour of guava oil. | [15, 36] |
| Rheology | Evaluating the viscosity and flow characteristics of guava oil. | [33, 34, 36] |
| Sensory Evaluation. | Subjective assessment of the sensory attributes of guava oil for quality control and consumer preference studies. | [33, 34] |

is rich in various constituents, it is essential to maintain specific techniques for the extraction of active compounds as per Tables 2 and 3.

## Medicinal properties of *Psidium guajava* (guava) oil

Several therapeutic uses for the management of infantile rotaviral enteritis, diarrhoea and diabetes as shown in the Figure 1.[33,34] is often by crushing the leaves and applying the extract on wounds, boils, skin and soft tissue infected sites are some of the ethnomedical uses. The root-bark, bark and stem are astringent, whereas the fruit is diuretic, while leaves are astringent. Locally, a decoction of the leaves is quite beneficial for vertigo and aching disturbances. *P. guajava* leaf is a phytotherapeutic used as an anti-inflammatory drug and to treat digestive and respiratory issues.

## Industrial and Commercial Application of Guava Oil

Essential oils are essentially the most volatile part of a plant that has been physically removed and possesses the scent and other distinctive qualities of that plant.[9] Essential oils have long been used to treat a variety of conditions, including obesity, diabetes mellitus, bronchitis, convulsions, epilepsy, wound pain and asthma attacks.[52] In addition to eugenol, cineole and fat, the essential oil from guava leaves also contains tannins, flavonoids, triterpenes, malic acid and resin. Guava leaves are suitable for a variety of therapeutic purposes, including the treatment of rheumatoid arthritis, pain management, wound healing and fever reduction.[53] Along with the biological as well as medicinal uses of guava oil, it also has following industrial and commercial applications.

## Guava Oil: A powerful skincare ingredient

Harmful free radicles are which are responsible for causing skin dame and premature ageing are inhibited by vitamins present in this oil. However, it also has nearly as much potassium, a crucial electrolyte, as a banana. Guava is a natural source of vitamin C, vitamin E and other bioactive antioxidants such as rutin, quercetin, gallic acid, catechin, chlorogenic acid, beta-carotene and lycopene. This makes it an appealing alternative to prevent and cure oxidative stressor damage that may otherwise result in dark spots, fine lines and wrinkles, as well as uneven skin texture. Collagen production is increased. This results in firmer, more elastic skin. Lycopene, a natural antioxidant, is abundant in guava vegetable oil, which offers significant anti-aging benefits as described in Figure 2. Additionally, it nourishes and restructures the skin because of its composition in polyunsaturated fatty acids. Guava vegetable oil, which is extremely high in the omega-6 fatty acid linoleic acid, is fantastic for retaining moisture in the skin and maintaining its elasticity. Therefore, it would be beneficial to nourish the dry, dull skin and hair. Additionally, the oil's carotenoid content enables skin protection. Vitamins C and A, which revitalize the skin and hair, are abundant in it as well. It is important not to confuse the vegetable oil extracted from the fruit's seeds with the guava tree's essential oil. Due in great part to its content in phenolic chemicals, the latter is renowned for its antioxidant qualities.

## Fumigant Activity of the *Psidium guajava*

Providing enough food for the world's population is one of the most difficult challenges due to the ongoing growth of population. Following are the ways to complete this endeavor (i) expand the agricultural area or (ii) maximize the output of the existing fields. One of the biggest challenges to cultivated crops is insect pests, which has a significant negative impact on global productivity.[54]

**Table 2: List of Phytocomponds and Phytoconstituents present in Guava oil and their significance.**

| Phytocompounds | Phytoconstituents | Importance | Plant Part | Extraction Method | References |
|---|---|---|---|---|---|
| Essential fatty acids | Oleic acid | Important for maintaining healthy skin, promote wound healing. Oleic acid moisturizes skin and prevents dryness. | Seeds | Cold-pressed | [35, 36] |
| | Linoleic acid | Linoleic acid reduces inflammation and promotes skin health. | Seeds | Cold-pressed | [33, 36, 37] |
| Vitamins | Vitamin C | An antioxidant that protects against oxidative damage, plays a key role in collagen synthesis and helps maintain skin health. | Fruit | Cold-pressed | [36, 38, 39, 40] |
| | Vitamin E | Helps protect against oxidative damage and maintain skin moisture. | Seeds | Cold-pressed | [36, 40] |
| Minerals | Potassium | Essential micronutrient important for various physiological processes, including muscle and nerve function. Regulates blood pressure and maintains heart health. | Fruit | Cold-pressed | [36, 41, 42] |
| | Magnesium | Essential micronutrient important for bone health and muscle function. | Fruit | Cold-pressed | [36, 37] |
| Flavonoids | Quercetin | A plant pigment that has antioxidant and anti-inflammatory properties, protecting against cancer and cardiovascular disease. Has anti-inflammatory properties and may reduce the risk of chronic diseases. | Leaves, bark, fruit | Steam distillation | [36, 43, 44] |
| | Kaempferol | A plant pigment with potential anti-cancer properties. | Fruit | Cold-pressed | [33, 36, 39, 43] |
| Terpenoids | Alpha-pinene | Organic compound with antimicrobial and anti-inflammatory properties, protecting against cancer and cardiovascular disease. Have potential anti-inflammatory properties. | Leaves | Steam distillation | [36, 38, 39, 45] |
| | Beta-pinene | Organic compound with antimicrobial and anti-inflammatory properties, protecting against cancer and cardiovascular disease. | Leaves | Steam distillation | [35, 36] |
| | Limonene | Organic compound with antimicrobial and anti-inflammatory properties, protecting against cancer and cardiovascular | Leaves | Steam distillation | [35, 36, 42, 45] |
| Phenolic acids | Gallic acid | A phytochemical with antioxidant properties, protecting against cancer and cardiovascular disease. Have potential anti-inflammatory properties. | Fruit | Cold-pressed | [36, 39, 46] |

| Phytocompounds | Phytoconstituents | Importance | Plant Part | Extraction Method | References |
|---|---|---|---|---|---|
| | Ellagic acid | A phytochemical with antioxidant properties, protecting against cancer and cardiovascular disease. Have potential anti-inflammatory properties. | Fruit | Cold-pressed | [36, 39, 46, 47] |
| Carotenoids | Beta-Carotene | A pigment with antioxidant properties protecting against cancer and cardiovascular diseases. Has potential anti inflammatory properties. | Fruit | Steam Distillation | [36, 43, 48, 49] |
| | Lycopene | Acts as a anticancer, anti-inflammatory, antioxidant with photoprotective nature. | Fruit | Steam Distillation | [36, 43, 48, 49] |

Insect infestations are frequently managed with the use of synthetic pesticides. However, these goods are hazardous to both persons and the environment due to their chemical makeup.[55] To solve these problems, researchers need to look for new pesticides that cause no or little dangers and that break down into safe molecules after showing their effect.[56] There have been reports of essential oils from plant species working on neurological and digestive enzymes as well as the tegument of insects.[57,58] When analyzing the insecticide activity of plant extracts phytochemicals are to be taken into account.[57] Despite the studies on guava's health advantages for people, nothing is known about its potential for biotechnological uses (such as fumigant activity) of guava extracts, oils and derived chemicals. By being fumigated, fruit flies were exposed to this which significantly increased mortality. The length of time and oil concentration had an impact on this outcome. At 48 hours, the calculated $LC_{50}$ was 13.8 g/mL. The essential oil of *P. guajava* var. *pomifera* demonstrated a fumigant action by impairing D. melanogaster's ability to survive and move about.[54]

## Guava Leaves Extract as the Corrosion Inhibitor

Further investigation reveals the most effective metal corrosion inhibitor, thanks to the nature's rich organic source of corrosion inhibitors. According to a qualitative analysis using $FeCl_3$ and gelatin, which produced white precipitates that showed the presence of tannins forming a film layer on the surfaces of the materials, guava leaves are one of the sources currently under discussion as a corrosion inhibitor in corrosive media.[59] Guava leaf extracts added to a NaOH solution increase anodic and cathodic polarization resistance, which lowers corrosion density. The higher value of anodic suggests that the extract from guava leaves has a significant impact on anodic reaction.[49] Additionally, a phytochemical analysis of the extracts of guava leaves shows that they contain active secondary metabolite components, including tannins, terpenoids and flavonoids. Because of this, it can regulate the rate of iron corrosion in seawater as a water medium at various concentrations. Guava leaf extract contains tannin, which slows down the deterioration of A36 steel and prevents corrosion. Tannin creates the intricate compound called Fe-tannate, which acts as a barrier between water and steel to prevent direct contact.

## Synergistic Effect of Guava oil

Rapid urbanisation and industrialization have frequently caused water's microbiological quality to decline. The drinking water has been poisoned, even in metropolitan areas. Some of the most common inhabitants of water are *Escherichia coli* and its pathotypes. The major cause of infectious diarrhoea and other gastrointestinal disorders among them is Enterotoxigenic *Escherichia coli* (ETEC).[49]

The pathogen possesses virulent and antibiotic-resistant genes that account for its virulence and resistance. The persistence of such ETEC strains is frequently linked to disease outbreaks. The drug-resistance profile of ETEC, isolated from drinking water, is the subject of the current study. Chemically created zinc oxide nanoparticles were tested for antibacterial efficacy against drug-resistant types of bacteria. Guava leaf extracts were employed and their synergistic investigation with Zinc Oxide nanoparticles was conducted, to boost the antibacterial activity of nanoparticles. ZnO-NPs were created by means of a chemical reduction process. Comparing synthetic ZnO-NPs to traditional antibiotics, they exhibit improved antibacterial activities. Additionally, the synergistic effects of ZnO-NPs against ETEC were investigated using guava leaf extract and were successful.[49]

## Safety and Toxicity of Guava Oil

### *Toxic Study Guava Seed Oil (GSO)*

The primary mouse hepatocytes and PBMC were shown to be unaffected by GSO at up to 24 and 48 hr, when their cell viability was greater than 80%. All mice given GSO (10 mg/kg, orally) survived the whole duration of the trial and during the

**Table 3: Details of plant parts for extraction.**

| Sl. No. | Country | Traditional use | Plant part | Preparation | References |
|---|---|---|---|---|---|
| 1. | Latin America, Central and West Africa and Southeast Asia. | It is used as a gargle to treat sore throats, laryngitis and mouth swelling as well as anti-irritant. | Leaves | Decoction, oil | [2, 7, 37] |
| 2. | Panama, Bolivia and Venezuela<br>Brazil<br>Peru | Used to treat dysentery, as an astringent and in bath to help with skin ailments.<br>GIT ailments<br>Conjunctivitis, cardiovascular diseases. | Bark and leaves<br>Ripe fruit, flowers and leaves.<br>Flower buds, leaves. | Decoction, oil<br>Mashed, decoction, oil<br>Infusion or decoction. | [7, 37, 50] |
| 3. | New Guinea, Samoa, Tonga, Niue, Futuna, Tahiti<br>Cook Islands<br>Trinidad | Skin hypersensitivity<br>Burns, cuts, sores<br>Microbial infections | Leaves<br>Leaves<br>Leaves | Boiled preparation, oil.<br>Infusion or decoction, oil. | [7, 37] |
| 4. | Tahiti, Samoa | Problems associated with Reproductive organs in women. | The whole plant, shoots | Infusion or decoction, paste. | [7, 37] |
| 5. | Mexico | Conditions like Arthritis, Hypoglcemia, Loss of blood. | Shoots, leaves, bark and leaves mixed, rip fruits. | Decoction, poultice, oil. | [2, 36, 51] |
| 6. | India | Chronic Kidney disease,<br>Cerebral ailments. | Shoots, leaves, bark, fruit | Decoction, poultice, infusion, paste, oil. | [2, 7, 36, 37] |
| 7. | Philippines | Astringent, ulcers, wounds, diarrhoea. | Leaf, bark, unripe fruit, roots | Decoction and poultice, oil. | [2, 36, 37, 51] |
| 8. | USA, Panama, Cuba, Costa Rica, Guatemala, Argentina | Anti-inflammatory<br>Antibiotic and diarrhoea. | Leaves | Externally applied hot on inflammations in oil form. | [2, 36-38, 51] |
| 9. | China, South Africa | Diabetes mellitus, hypertension, diarrhoea, antiseptic. | Leaves | Infusion or decoction | [2, 7, 36, 37, 51] |
| 10. | Elsewhere | Wide spectrum of diseases related to the CVS, GIT, CKD, oral health, etc., | Leaves, shoot, fruit, bark, the whole plant | Infusion or decoction, paste, poultice, juice, oil. | [2, 7, 36, 37, 39] |

observation period of 14 days after treatment, they exhibited no significant aberrant clinical indications or side effects, according to the results of an acute toxicity test. The animals that were slaughtered at termination had no abnormalities, according to a macroscopic assessment. The findings imply that GSO had an oral $LD_{50}$ larger than 10 mg/kg and was therefore practically harmless to animals. Acute injection of the GSO n-hexane extract was not hazardous to mouse hepatocytes, human PBMC, or experimental rats and included a variety of lipophilic chemicals (LA as the main component, tocopherols and tocotrienols), as well as polar phenolic compounds. The sub chronic toxicity study's findings demonstrated that levels of hematological biomarkers and indicators of kidney and liver function did not alter significantly as a result of the GSO treatment.[59]

## Future Prospects

The group of scientists when performed experiments to evaluate the efficiency of guava oil and revealed that various parts of *P. guajava* contain abundant secondary metabolites, particularly phenolics, flavonoids, squalene and Vitamin E. This characteristic makes the plant a promising source of antioxidants for use in nutraceuticals and functional food products. Analysis of the plant's essential oil identified the presence of caryophyllene and its derivatives, highlighting *P. guajava's* potential as an anti-inflammatory agent.[60] Another notable feature of *P. guajava* is its high content of meroterpenoids, primarily derived from phloroglucinol. These compounds are primarily produced by different fungi and possess immunosuppressive activity.[61]

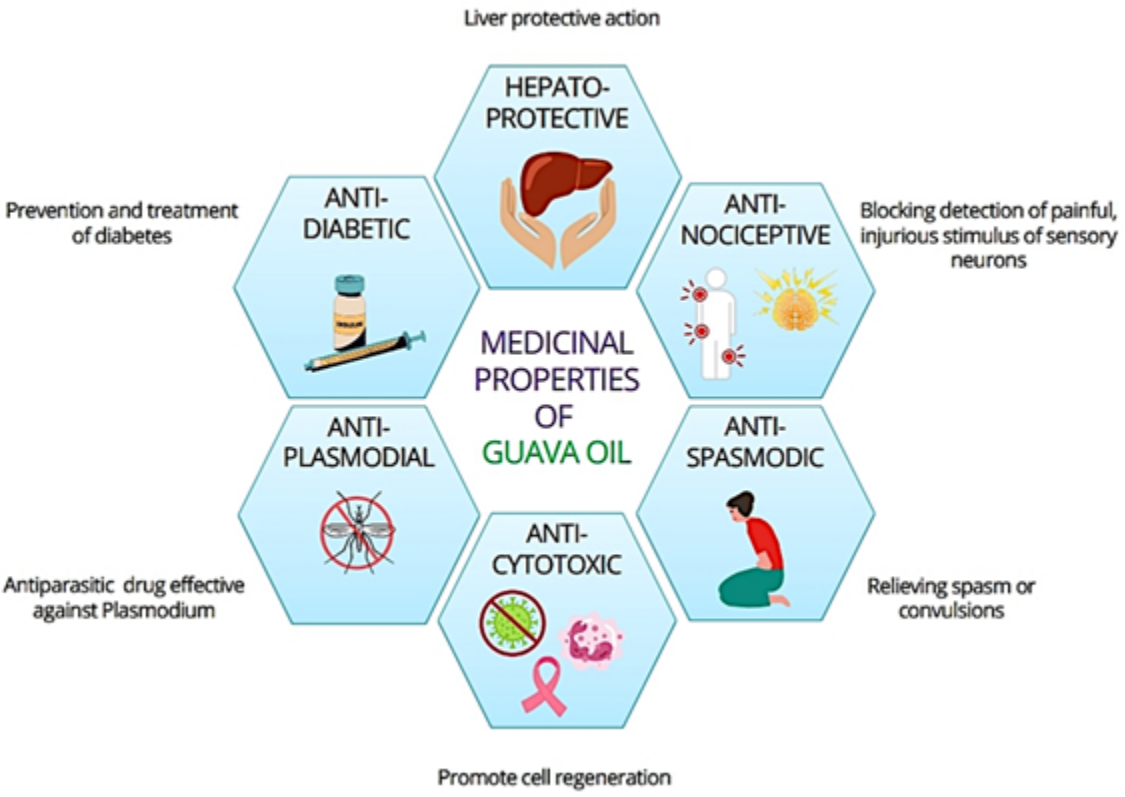


**Figure 1:** A descriptive representation of medicinal properties of Guava oil.

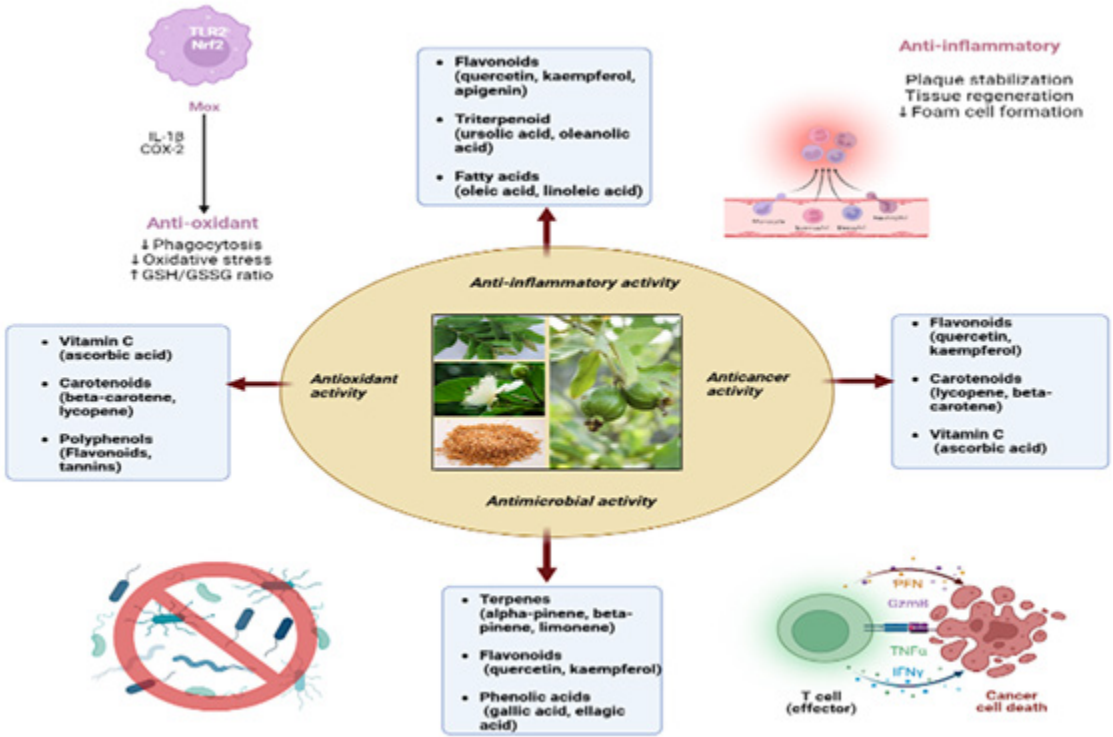


**Figure 2:** The given figure describes various activities shown by guava oil: Anti-inflammatory activity; Anti-cancer activity; Anti-microbial activity and Antioxidant activity.

Additionally, extracts from the leaves and bark of the plant can serve as natural sources of α-glucosidase inhibitors. Recent studies have demonstrated the potential of guava bioactive phytochemicals in inhibiting the growth of different types of human cancers through diverse mechanisms.[62] Although several individual studies have reported the anticancer effects of guava constituents, there is a lack of an up-to-date, comprehensive and critical review that consolidates the available research data in this area.[63]

Considerable discussions have been devoted to exploring the biological activities of secondary metabolites derived from this plant. To enhance our understanding of their therapeutic potential and their application in promoting various health benefits, researchers have established a structure-activity relationship.[62] Consequently, directing to conduct long-term clinical trials to gain deeper insights into its efficacy in treating diverse diseases and to uncover new possibilities in this field.

## CONCLUSION

Extensive research conducted over the past decade has yielded significant advancements in the discovery of pharmacological agents from natural sources. Natural products with specific activity and low toxicity have been identified as promising lead compounds. This comprehensive review highlights the strong evidence supporting the antidiarrheal, antimicrobial, antioxidant and various other beneficial activities of *Psidium guajava* L. The fruit and its juice are widely enjoyed for their delicious taste and nutritional benefits. The essential oil that exhibits the strongest antimicrobial properties has the potential to be employed as a natural substitute for antibiotics. This study presents a brief scientific overview of the selected essential oil.

Additionally, further investigation is necessary to isolate and identify the specific antimicrobial compounds and explore additional pharmacological effects. Consequently, once the essential oil is isolated, it can be utilized as a medicinal remedy for the treatment of infectious diseases. However, further clinical and pharmacological studies are necessary to fully explore the untapped potential of this plant and gain a comprehensive understanding of its beneficial effects.

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## CONFLICT OF INTEREST

There is no conflict of interest to be declared.

## ABBREVIATIONS

**MCF-7:** Michigan Cancer Foundation-7; **MDA-MB-231:** M.D. Anderson-Metastasis Breast Cancer; **PC-3:** Prostate Cancer3; **LNCaP:** Lymph Node Carcinoma of the Prostate; **Hela:** Henrietta Lacks; **COLO320DM:** Colon 320 Double Minute Chromosomes; **GC:** Gas Chromatography; **HPLC:** High-Performance Liquid Chromatography; **MS:** Mass Spectrometry; **FTIR:** Fourier Transform Infrared Spectroscopy; **NMR:** Nuclear Magnetic Resonance Spectroscopy; **DSC:** Differential Scanning Calorimetry; **GIT:** Gatrointestinal Tract; **USA:** United States of America; **CVS:** Cardiovascular System; **CKD:** Chronic Kidney Disease; **$LC_{50}$:** Lethal Concentration; **$LD_{50}$:** Lethal Dose 50; **$FeCl_3$:** Iron Chloride; **NaoH:** Sodium Hydroxide; **PPM:** Parts Per Million; **ETEC:** Enterotoxigenic Escherichia Coli; **ZnO-Nps:** Zinc Oxide Nanoparticles; **GSO:** Guava Seed Oil; **PBMC:** Peripheral Blood Monocytes.

## SUMMARY

*Psidium guajava* L., commonly known as guava, is a tropical American plant belonging to the Myrtaceae family. It is extensively utilized in indigenous medicinal practices across various tropical regions, with different parts of the plant employed to treat ailments like wounds, ulcers, and cholera. Pharmacological studies have shown that guava possesses antibacterial, hypoglycemic, anti-inflammatory, and central nervous system depressant properties. It is highly valued for its medicinal qualities and economic viability, with its nutritional and phytochemical composition offering potential against chronic illnesses. Guava, rich in essential nutrients and antioxidants, including high levels of lycopene, is beneficial for treating chronic illnesses and reducing disease risks. Guava oil, extracted from its leaves, is utilized for therapeutic purposes, including managing diabetes, hypertension, and respiratory diseases. Various extraction methods are employed to obtain guava oil, with characterization and screening utilizing techniques like Gas Chromatography and Mass Spectrometry. Guava leaf extract has shown promise as a corrosion inhibitor and a source of pharmacological agents with low toxicity. In order to comprehend the plant's potential benefits, more research is required to isolate particular compounds and investigate deeper pharmacological effects. All things considered, guava offers a promising path for therapeutic and medical uses; however, more pharmacological and clinical research is necessary for a thorough comprehension and applications.

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