AN UPDATE OF PHARMACOLOGICAL ACTIVITY OF PSIDIUM GUAJAVA IN THE TREATMENT OF VARIOUS DISEASES

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Keywords: Psidium guajava, Chemical constituents, Pharmacological activity

ABSTRACT: Psidium guajava is a small medicinal tree that is native to South America and Brazil is among the world’s top producers and most of the country’s production is destined for the food industry. It is popularly known as guava and has been used traditionally as a medicinal plant throughout the world for a number of diseases. It contains important phytoconstituents such as tannins, triterpenes, flavonoid: quercetin, pentacyclic triterpenoid, guajanoic acid, saponins, carotenoids, lectins, leucocyanidin, ellagic acid, amritoside, beta-sitosterol, uvaol, oleanolic acid and ursolic acid. It is one of the valuable plant in the Myrtaceae family. Psidium guajava which was reported the antibacterial, anti-diarrhoeal, antihyperglycemic, anti-malarial, anti-inflammatory, anti-cancer, antioxidant activity etc. The present review is an attempt to generate interest among the masses regarding its immense potential in preventing and treating several common diseases.

INTRODUCTION: The use of plants as medicines predates written human history. Ethno botany (the study of traditional human uses of plants) is recognized as an effective way to discover future medicines 1. The World Health Organisation (WHO) estimates that 80% of the population of some Asian and African countries presently uses herbal medicine for some aspect of primary health care. Studies in the United States and Europe have shown that their use is less common in clinical setting but has become increasingly more in recent years as scientific evidence about the effectiveness of herbal medicine has become more widely available 2.

Guava is a small tropical tree that grows up to 35 feet tall; it is widely grown for its fruit in tropics. It is a member of the Myrtaceae family, with about 133 genera and more than 3,800 species. The leaves and bark of P. guajava tree have a long history of medicinal uses that are still employed today 3. Psidium Guajava (P. guajava) is a plant native to tropical America and belongs to the family Myrtaceae. P. guajava is called “guayaba” in Spanish speaking countries and “goiaba” in Brazil. It is an important tropical fruit widely grown in Taiwan, Hawaii, Thailand, Philippines and Malaysia.

All parts, including the fruits, leaves and barks have been traditionally used as the folkloric herbal medicines and exhibit many therapeutic uses including 4. This plant is available in the South America, European, Africa and Asia. The common names of Psidium Guajava are guava (English), jambu batu (Malay), mansala (India) and gwaaba (Africa) 5.
Guava is a tree commonly used for shade or can be a shrub in dooryard gardens in the tropics. Brazil is among the world’s top producers of guava and most of the country’s production is destined for the food industry to produce different products, like candies, juices, jams and frozen pulp.

Various evidences depict that the leaves and bark of *P. guajava* tree possess a long history of medicinal uses. The aqueous extract of guava leaves has been reported to be efficacious in the treatment of various types of gastrointestinal (GIT) disturbances such as diarrhoea, inhibition of the peristaltic reflex and gastroenteritis. Moreover the whole plant is used as skin tonic and is employed in the treatment of female related disease like dysmenorrhoea, miscarriages, uterine bleeding and premature labour.

**Classification:**

Kingdom: Plantae  
Division: Magnoliophyta  
Class: Magnoliopsida  
Subclass: Rosidae  
Order: Myrtales  
Family: Myrtaceae  
Subfamily: Myrtoide  
Tribe: Myrteae  
Genus: Psidium  
Species: guajava

Guava's main plant chemicals include: alanine, alpha-humulene, alpha-hydroxyursolic acid, alpha-linolenic acid, alpha-selinene, amritoside, araban, arabinose, arabopyranosides, arjunolic acid, aromadendrene, ascorbic acid, ascorbigen, asiatic acid, aspartic acid, avicularin, benzaldehyde, butanal, carotenoids, caryophyllene, catechol-tannins, crataegolic acid, D-galactose, D-galacturonic acid, ellagic acid, ethyl octanoate, essential oils, flavonoids, gallic acid, glutamic acid, goreishic acid, guafine, guavacumaric acid, guaijavarin, guajiverine, guajivolic acid, guajavolide, guavenoic acid, guajavanoic acid, histidine, hyperin, ilelatifol D, isoneroniucumaric acid, isoquercetin, jacoumaric acid, lectins, leucocyanidins, limonene, linoleic acid, linolenic acid, lysine, mecocyanin, myricetin, myristic acid, nerolidiol, obtusin, octanol, oleic acid, oxalic acid, palmitic acid, palmitoleic acid, pectin, polyphenols, psidioinic acid, quercetin, quercitrin, serine, sesquiguavene, tannins, terpenes, ursolic acid and some other compounds listed Table 1. Recent studies on the pharmacological properties of the bark, fruit and leaves depicts antibacterial, hypoglycaemic, anticancer, anti-inflammatory, anti-pyretic, spasmyloytic and central nervous system depressant activities. Thus, this review depicts the pharmacological activity on guava in the treatment of various disorders.

**TABLE 1: CHEMICAL COMPOSITION OF VARIOUS PARTS OF GUAVA (PSIDUIM GUAJAVA LINN.)**

<table>
<thead>
<tr>
<th>Parts</th>
<th>Constituents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit</td>
<td>Vitamin C, Vitamin A, iron, calcium, Manganese, phosphoric, oxalic and malic acids, saponin combined with oleanolic acid. Morin-3-O-α-L-lyxopyranoside and morin-3-O-α-L-arabopyranoside, flavonoids, guaijavarin, quercetin. Essential oil contains hexanal, -2-hexenal, 2,4-hexadienal, 3-hexenal, 2-hexenal, 3-hexenyl acetate and phenol, while β-caryophyllene, nerolidiol, 3-phenylpropyl acetate, caryophyllene oxide, pentane-2-thiol, 3-penten-2-ol and 2-butenyl acetate, 3-hydroxy-2-butan-1-butanol, 2,3-butanediol, 3-methylbutanoic acid, (Z)-3-hexen-1-ol, 6-methyl-5-hepten-2-one, limonene, octanol, ethyl octanoate (pink guava fruit)</td>
</tr>
<tr>
<td>Leaves</td>
<td>α-pinene, β-pinene, limonene, menthol, terpenyl acetate, isopropyl alcohol, longicyclene, caryophyllene, β-bisabolene, caryophyllene oxide, β-copapene, farnesene, humulene, selinene, cardinene and curcumene, malic acids, nerolidiol, β-sitosterol, ursolic, crategolic, and guayavolic acids, cineol, quercetin, 3-L.4-4-arabinofuranoside (avicularin) and its 3-L-4-pyranoside (Essential oil), resin, tannin, eugenol, caryophyllene (1α, 4α, 7α, 7β, 7b α-)[1-deacydro-1H-cyclopropene] azulene, guajavolide (2α,3β-β,β, 23-tetrahydroxyxyr-12-en-28,20 β-olide; 1) and guavenoic acid (2α,3β-β, β,23-tetrahydroxyxyr-12(20)(30)-dien-28-oic acid, triterpenolic acid, triterpenoids, flavinone-2 2’-ene, prenol, dihydrobenzo-phenanthridine and cryptonine</td>
</tr>
<tr>
<td>Bark</td>
<td>Polyphenols, resin and crystals of calcium oxalate</td>
</tr>
<tr>
<td>Root</td>
<td>Tannin, leucokyanidins, sterols, gallic acid, carbohydrates, salts, tannic acid</td>
</tr>
<tr>
<td>Seed</td>
<td>Proteins, starch, oils, phenolic, flavonoid compounds, flavonol glycoside, quercetin-3-O-β-D(2”-O-galloylglycoside) -4′-O-vinlypropionate</td>
</tr>
<tr>
<td>Twigs</td>
<td>Calcium, magnesium, phosphorous, potassium, sodium, fluoride, copper, iron, zinc, manganese and lead</td>
</tr>
</tbody>
</table>
Morphology: It’s a low evergreen tree or shrub 6 to 25 feet high, with wide spreading branches and square, downy twigs, is a native of tropical America. It’s a common vegetation cover by roads and in waste places in Hawaii. Guava is a tropical and semitropical plant. It is well known in the islands for its edible fruit. It is common in the backyards. The branches are crooked, bringing opposite leaves. The flowers are white, incurved petals, 2 or 3 in the leaf axils; they are fragrant, with four to six petals and yellow anthers. The fruit is small, 3 to 6 cm long, pear-shaped, reddish-yellow when ripe.

Pharmacological Activity: Studies indicates that number of pharmacological active components are present in the Psidium guajava which are responsible for the various biological activities like antidiabetic, antidiarrhoeal, antimicrobial, antioxidant, cardioactive, hepatoprotective, antipyretic, spasmylytic, immunomodulatory and contractile effect, which are explained in latter part of review.

Anti-diabetic Activity: Psidium guajava has been reported to lower the blood glucose level. Guava fruit extract has been shown to significantly restore the loss of body weight and reduces the blood glucose level in the diabetic condition. In STZ induced diabetic’s guava fruit extract, when administered at a dose of 125 and 250 mg/kg. Fruit extract of guava protects the pancreatic tissues, including islet beta cells, against lipid per oxidation and thus reduces the loss of insulin-positive beta cells and insulin secretion. The ethanolic stem bark extract exhibited significant hypoglycaemic activity in alloxan induced hyperglycaemic rats at an oral dose of 250 mg/kg.

Aqueous leaf extracts of guava at 0.01 - 0.625 mg/ml showed significant inhibition on low density lipid (LDL) glycation in a dose dependent manner. Various investigations indicated that leaf extract of guava and its phenolic compounds inhibit the glycation process in an albumin/glucose model system. The guava leaf extracts also showed strong inhibitory effects on the production of Amadori products and advanced glycation end products (AGEs) from albumin in the presence of glucose.

P. guajava leaf aqueous extract (PGE, 50 - 800 mg/kg) in rat experimental paradigms. The hypoglycemic effect of the plant's extract was examined in normal and diabetic rats, using streptozotocin (STZ)-induced diabetes mellitus model. Hypertensive Dahl salt-sensitive rats were used to investigate the hypotensive (anti hypertensive) effect of the plant's extract. Chlorpropamide (CPP; 250 mg/kg, p.o.) was used as the reference hypoglycemic agent for comparison. Acute oral administrations of the plant's extract (PGE; 50 - 800 mg/kg, p.o.) caused dose-related, significant (p < 0.05-0.001) hypoglycemia in normal (normoglycemic) and STZ-treated, diabetic rats.

Moreover, acute intravenous administrations of the plant's extract (PGE, 50 - 800 mg/kg i.v.) produced dose dependent, significant reductions (p < 0.05-0.001) in systemic arterial blood pressures and heart rates of hypertensive, Dahl salt-sensitive rats. Although the exact mechanisms of action of the plant's extract still remain speculative at present, it is unlikely that the extract causes hypotension in the mammalian experimental animal model used via cholinergic mechanisms, since its cardio depressant effects are resistant to atropine pretreatment.

The numerous tannins, polyphenolic compounds, flavonoids, pentacyclic triterpenoids, guaijaverin, quercetin, and other chemical compounds present in the plant are speculated to account for the observed hypoglycemic and hypotensive effects of the plant's leaf extract. However, the results of this experimental animal study indicate that the leaf aqueous extract of Psidium guajava possesses hypoglycemic and hypotensive properties, and thus lend pharmacological credence to the suggested folkloric, ethnomedical uses of the plant in the management or control of adult-onset, type 2 diabetes mellitus and hypertension in some rural African communities.
Anticancer Effect: Various studies showed that Thai medicinal plants of *Psidium guajava* have anti-proliferative effects on human mouth epithelial carcinoma and murine leukemia cells. Further Studies showed that the acetone extracts of guava (*Psidium guajava L.*) branch (GBA) had cytotoxic effects on HT-29 cells. The GBA showed highly cytotoxic effects via the MTT reduction assay, LDH release assay, and colony formation assay. The extract showed inhibition against growth of HT-29 cells at 250 μg/ml. branch extract showed characteristic apoptotic effects in HT-29 cells, including chromatin condensation and shrinking. It induces cytotoxicity and an increase in the sub-G1 phase of HT-29 cells.

Studies showed that budding leaves of *psidium guajava* contain huge amounts of soluble polyphenols (SP) including (in mg/g) gallic acid (348), catechin (102), epicatechin (60), rutin (100), quercetin (102), and rutin (100) and to exhibit potent anticancer activity. It could be used as an anti-tumor chemo preventive in view of anti-angiogenesis and anti-migration, indicated that the IC$_{50}$ of *Psidium guajava* for DU145 cells was 0.57 mg ml$^{-1}$.

In addition, *Psidium guajava* effectively inhibited the expressions of VEGF, IL-6 and IL-8 cytokines, and MMP-2 and MMP-9, and simultaneously activated TIMP-2 and suppressed the cell migration and the angiogenesis. *Psidium guajava* potentially possesses a strong anti-DU145 effect. Thus, clinically it owns the potential to be used as an effective adjuvant anti-cancer chemo preventive. It has been reported that essential oil of *Psidium guajava* has the potent anti proliferative activity.

We used ferric-reducing antioxidant power (FRAP) and 2, 2-diphenyl-1-picryl hydrazil (DPPH) assays to estimate antioxidant activity of *P. guajava* leaf extracts (methanol, hexane and chloroform). Antitumor and *in-vivo* cytotoxic activities were determined using potato disc assay (PDA) and brine shrimp lethality assay, respectively. Three human carcinoma cell lines (KBM5, SCC4 and U266) were incubated with different doses (10 - 100 μg/mL) of extracts and the anticancer activity was estimated by MTT assay. NF-κB suppressing activity was determined using electrophoretic mobility shift assay (EMSA).

Chemical composition of the three extracts was identified by GC-MS. Total phenolic and flavonoid contents were measured by colorimetric assays. The order of antioxidant activity of three extracts was methanol > chloroform > hexane. The IC$_{50}$ values ranged from 22.73 to 51.65 μg/mL for KBM5; 22.82 to 70.25 μg/mL for SCC4 and 20.97 to 89.55 μg/mL for U266 cells.

The hexane extract exhibited potent antitumour IC$_{50}$ value = 65.02 μg/mL) and cytotoxic (LC$_{50}$ value = 32.18 μg/mL) activities. This extract also completely inhibited the TNF-α induced NF-κB activation in KBM5 cells. GC-MS results showed that pyrogallol, palmitic acid and Vitamin E were the major components of methanol, chloroform and hexane extracts. We observed significant (p < 0.05) difference in total phenolic and flavonoid contents of different solvent extracts. The present study demonstrates that *P. guajava* leaf extracts play a substantial role against cancer and down-modulate inflammatory nuclear factor κB.

Anti-inflammatory Effect: The anti-inflammatory and analgesic activities of 70% ethanolic extract of *Psidium guajava* was investigated in rats using the carrageen induced hind paw oedema model. Extracts which exhibited anti-inflammatory activity were screened for analgesic activity using the Randall-Selitto method in rats. The extracts were administered at a dose of 300 mg/kg, p.o. Aspirin (300 mg/kg, p.o.) was employed as the reference drug. *Psidium guajava* leaves, showed significant anti-inflammatory activity with percentage inhibitions of 58.27%.

Another modern study confirms many of the traditional uses. The methanol extract of guava leaves was found to inhibit paw oedema induced by carrageenan in rats, and pain induced by acetic acid in mice, and it exhibited an antipyretic effect in mice. The oral administration of the extract reduced intestinal transit time and prevented castor oil-induced diarrhoea in mice.

The essential oil has also been proven to have anti-inflammatory effect. The essential oil, steam-distilled from leaves of *P. guajava* leaves, was given orally rats to study its effects on the exudative and proliferative phases of the inflammatory reaction (carrageenan-induced paw
oedema and cotton pellet-induced granuloma models). The essential oil (0.8 mg/kg) significantly reduced oedema formation induced by carrageenan. The essential oil (0.4 and 0.8 mg/kg) significantly reduced granuloma formation induced by cotton pellets. Another paper confirmed the anti-inflammatory activity and also showed significant antipyretic activity and potent anti-arthritic activity in rats. In Peru it is said to be good for oedema \(^{36, 37, 38}\). A decoction of *Psidium guajava* leaves is used for the treatment of various inflammatory ailments including rheumatism.

Anti-inflammatory and analgesic effects of the leaf extracts of *psidium guajava* was due to the presence of polyphenolics compound and triterpenoids. Aqueous extract of *Psidium guajava* at a dose of 50-800 mg/kg, i.p. produced dose-dependent and significant inhibition of fresh egg albumin-induced acute inflammation (oedema) in rats. Further, leaf extract (50 - 800 mg/kg, i.p.) also produced dose-dependent and significant analgesic effects against thermally and chemically induced nociceptive pain in mice \(^{39}\).

**Antidiarrhoeal Activity:** Diarrhoea is a major problem in the world. The ripe fruit of guava has been reported as laxative which is used to treat constipation. Studies indicate that guava fruit is more effective Antidiarrhoeal when it is used with the peel \(^{48}\), but if taken unripe fruit in large quantity cause indigestion, vomiting \(^{43}\). The leaf decoction of guava has been reported for the gastroenteritis and chronic diarrhoea, while the young leaves and shoots has been reported for dysentery and diarrhoea \(^{50, 51}\).

Quercetine, the major component of the guava leaf extract is responsible for the inhibition of the intestinal movement and reduce capillary permeability in the abdominal cavity and inhibition of increased watery secretion that occur in the acute diarrhoeal disease \(^{44, 52}\). Fresh leaf extract of the plant when administered at a dose of 0.2 ml/kg of morphine sulphate showed inhibition of propulsion \(^{53, 54}\). Flower buds and leaf extraction of the *Psidium guajava* consist of Quercetin and quercetin-3-arabinoside which are used in the treatment of diarrhoea in the Costa Rica \(^{42, 38}\). This extract at concentrations of 1.6 ug/ml showed a morphine-like inhibition of acetylcholine release in the coaxially stimulated ileum, as well as an initial increase in muscular tone, followed by a gradual decrease \(^{51}\). Various studies indicates that a galactose specific lectin in guava was shown to bind to *Escherichia coli* preventing its adhesion to the intestinal wall and thus preventing its adhesion to the intestinal wall and thus preventing infection resulting diarrhoea \(^{55}\). It is also reported that the asiatic acid, which is present in the leaf extraction, showed dose-dependent (10-500 µg/ml) spasmyloytic activity in spontaneously contracting isolated rabbit jejunum preparations \(^{39}\). Methanol extract from leaves (8 µg/ml) of *Psidium guajava* showed activity against simian (SA-11) rotavirus (93.8% inhibition) \(^{41}\).

**Antimicrobial Activity:** 4 antibacterial flavonoids (morin-3-O-lyxoside, morin-3-O-arabinoside, quercetin and quercetin-3-O-arabinoside) of the leaf extract of *Psidium guajava* are found to be effective against the pathogenic bacteria including *Bacillus stearothermophilus, Brochothrix thermosphacta, Escherichia coli* O157:H7, *Listeria monocytogenes, Pseudomonas fluorescens, Salmonella enterica, Staphylococcus aureus* and *Vibrio cholera* \(^{57}\). Studies showed that *P. guajava* leaf extract has trypanocidal properties which could be attributed in parts to the broad antimicrobial and iron chelating activity of flavonoids and tannins respectively. Iron chelation has been suggested by several reports as an effective way of killing trypanosomes.

The methanolic root extract of *Psidium guajava* has been found to possess fungicidal effect because of the quercetin which is present in the root extract \(^{41}\). Bark tincture showed fungicidal activity at different concentrations but exhibit only fungistatic property in case of *Candida albicans* \(^{39, 60}\). Leaf extract of *psidium guajava* also reported for the anti-bacterial activity on *staphylococcus aureus* due to the protein degrading activity of the leaf extract \(^{61}\). The aqueous extract was more potent in inhibiting the growth of *E. coli*, *Staphylococcus aureus* and *Pseudomonas aerugionsa* than the organic extracts.

The gram negative bacteria were less susceptible to the effect of crude drugs \(^{62}\). Due to the presence of tannins the leaf extract of guava has been reported for antimicrobial activity against gram-positive and gram-negative organisms (*Sarcina lutea* and...
Guava leaf extracts and fruits are a potential source of natural antioxidants. Studies indicated that guava fruit also exert antioxidant action, collagen formation and radio protective activity in the assay with technetium-99m.

**Antitussive Activity:** It has been reported that water infusion from Psidium guajava leaf extract decreases the frequency of coughing induced by capsaicin aerosol. In Senegal and Peru, Psidium guajava leaves boiled together to make decoction is very effective for cough and treatment of trachea bronchitis. Hepatoprotective Activity: The aqueous leaf extract of psidium guajava has been reported for their hepatoprotective action at a dose of 500 mg kg⁻¹.

Studies indicate that the Asiatic acid which is present in the leaves and fruit of Psidium guajava is responsible for the hepatoprotection. Psidium guajava leaf extracts (500 mg/kg, p.o.) significantly reduced the elevated serum levels of aspartate aminotransferase, alanine aminotransferase (AAT), alkaline phosphatase, protein and bilirubin, some antioxidant enzymes, reduced glutathione (GSH), GPx, SOD and CAT activities, were also evaluated in the rats liver homogenate. The higher dose of the extract (500 mg/kg, p.o.) prevented and showed increase in liver weight while the lower dose was ineffective in the paracetamol-induced liver damage. In the acute liver injury induced by paracetamol the higher dose (500 mg/kg, p.o.) of P. guajava leaf extract was found to be more effective than the lower dose (250 mg/kg, p.o.). Studies showed that the unripe fruit peel of psidium guajava has a potent hepatoprotective agent.

**Cardiovascular Effects:** Studies showed that the aqueous leaf extract of Psidium guajava exhibited cardioprotective effects against myocardial ischemia-reperfusion injury in isolated rat heart. Augmentation of endogenous antioxidants, maintenance of the myocardial antioxidant status and significant restoration of most of the altered hemodynamic parameters may have contributed to its cardioprotective effect. Further investigation showed that aqueous fractions obtained from the acetic extract of Psidium guajava leaf exhibit the negative inotropic effect by decrease the atrial contractile by reducing the calcium (Ca²⁺) entry in myocardial cells and also by opening potassium channels.
channels of cardiac tissue. Moreover various reports showed that the cardio-inhibitory actions in rats and guinea pigs of the aqueous leaf extract of Psidium guajava also appeared to be due to cholinergic involvement.

**Miscellaneous Activity:** Leaf extract of psidium guajava is reported in the Acne vulgaris, a chronic inflammatory disease involving colonization of Propionibacterium acnes, plus activation of neutrophils and lymphocytes. Psidium guajava leaf extracts have potent antimicrobial activities against Propionibacterium acnes may be beneficial in treating acne especially when they are known to have anti-inflammatory activities. Further, the aqueous leaf extract of Psidium guajava has been reported to be effective against dental caries and helpful in reducing dental plaque caused by Staphylococcus sanguinis, Staphylococcus mitis and Actinomyces sp. at a dose of 1 mg/ml.

Moreover Guava stem bark and leaf stem extract has been found to possess antigiardiasic activity and inhibit growth of Entamoeba histolitica respectively Table 2.

**TABLE 2: PHARMACOLOGICAL EFFECT OF GUAVA**

<table>
<thead>
<tr>
<th>Pharmacological effect</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antioxidant activity</td>
<td>The extracts from distilled water, 65% ethanol and 95% ethanol respectively showed effects on scavenging hydroxyl radicals and inhibiting lipid peroxidation in the dose-dependent manner, had 50% effective concentration (EC50) on scavenging hydroxyl radicals of 0.63, 0.47 and 0.58g/L, had EC50 on inhibiting lipid peroxidation of 0.20, 0.035, 0.18g/L.</td>
</tr>
<tr>
<td>Treatment of cough</td>
<td>The water extract of the plant at doses of 2 and 5 g/kg, p.o. decreased the frequency of cough induced by capsaicin aerosol by 35 and 54%, respectively, as compared to the control, within 10 min after injection of the extract, (P &lt; 0.01)</td>
</tr>
<tr>
<td>Anti-diabetic activity</td>
<td>The ethanolic stem bark extract exhibited statistically significant hypoglycaemic activity in alloxan-induced hyperglycaemic rats but was devoid of significant hypoglycaemic effect in normal and normal glucose loaded rats (OGTT). In both acute and sub-acute tests, the water extract, at an oral dose of 250 mg/kg, showed statistically significant hypoglycaemic activity and 300 microg/ml against Bacillus cereus, respectively.</td>
</tr>
<tr>
<td>Antimicrobial activity</td>
<td>Psidium guajava aqueous bark and methanolic extracts were found to possess anti-bacterial activity. Four antibacterial compounds were isolated from leaves of guava were identified. The minimum inhibition concentration of morin and quercetin, present in the leaf and in the extract respectively was 200 microg/ml for each against Salmonella enteritidis, and 250 microg/ml and 300 microg/ml against Bacillus cereus, respectively.</td>
</tr>
<tr>
<td>Hepatoprotective activity</td>
<td>P. guajava aqueous leaf extracts (250 and 500mg/kg, po) possesses good hepatoprotective activity.</td>
</tr>
<tr>
<td>Antidiarrhoeal activity</td>
<td>Psidium guajava leaf aqueous extract (PGE) (50-400 mg/kg p.o.) produced dose-dependent and significant protective effects of rats and mice against castor oil-induced diarrhoea, inhibited intestinal transit, and delayed gastric emptying. Like atropine (1 mg/kg, p.o.), PGE produced dose-dependent and significant antimitotility effect, and caused dose-related inhibition of castor oil-induced enteropooling in the animals.</td>
</tr>
<tr>
<td>Treatment of plaque</td>
<td>The active flavonoid compound, quercetin-3-O-alpha-larabinopyranoside (guaiaverin) isolated from Psidium guajava demonstrated high potential antiplaque agent by inhibiting the growth of the Strep. Mutans.</td>
</tr>
<tr>
<td>Spermatoprotective activity</td>
<td>The extracts of the leaves of Psidium guajava Linn. Possess beneficial effects on sperm production and quality, and may thus improve the sperm parameters of infertile males with oligospermia and non obstructive azoospermia.</td>
</tr>
<tr>
<td>Antimutagenic activity</td>
<td>The water extract of P. guajava was effective in inactivating the mutagenic activity of direct-acting mutagens.</td>
</tr>
<tr>
<td>Inotropic effect</td>
<td>The extract from P. guajava leaves depress myocardial inotropism.</td>
</tr>
<tr>
<td>Spasmolytic effect</td>
<td>The spasmolytic activity of the Psidium guajava leaf remedy is mainly due to the aglycone quercetin, present in the leaf and in the extract mainly in the form of five flavonols, and whose effect is produced when these products are hydrolyzed by gastrointestinal fluid.</td>
</tr>
<tr>
<td>Treatment of infantile rotaviral enteritis</td>
<td>Psidium guajava showed good curative effect on infantile rotaviral enteritis</td>
</tr>
</tbody>
</table>
| Anti-cancer activity    | Aqueous extract of Psidium guajava L. budding leaves has been shown to possess anti-prostate cancer activity in a cell line model. Treatment with Psidium guajava L. budding leaves (1.5
CONCLUSION: The plant is show different type of chemical constituents like araban, arabinose, arabopyranosides, arjunolic acid, ascorbigen, asiatic acid, aspartic acid, D-galactose, D-galacturonic acid, ellagic acid, guaijavin, guajiverine, guajavanoic acid, linoleic acid, myristic acid, octanol, oleanolic acid, palmitoleic acid, pectin, polyphenols, psidiolic acid, quercetin, quercitrin, serine, sesquiguavene, tannins, terpenes, ursolic acid. The plant has been extensively studied in terms of pharmacological activity of its major components, and the results indicate potent anti-diarrheal, antihypertensive, hepatoprotective, antioxidant, antimicrobial, hypoglycaemic and antimutagenic activities. In recent years, emphasis of research has been on utilizing traditional medicines that have a long and proven history of treating various ailments. In this regard, further studies need to be carried out to explore *Ps. guajava* Linn. for its potential in preventing and treating diseases.

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CONFLICT OF INTEREST: Nil

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