

Psidium Guajava Leaves: Phytochemical study and Pharmacognostic evaluation

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RESEARCH ARTICLE

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DOI [10.22270/hjhs.v5i1.48](https://doi.org/10.22270/hjhs.v5i1.48)

ABSTRACT

Psidium guajava known as Guava is a medicinal plant belonging to the family Myrtaceae. *P. guajava* is a well-known traditional medicinal plant used in various indigenous systems of medicine. *P. guajava* leaves are green to dull green colour with characteristic taste and having ovate-elliptic shape. The chief constituents like essential oil, poly phenols, tannin, pinene, gallic acid, isoflavonoid, catechin, rutin, ascorbic acid, beta carotene, terpenoid and triterpene shows pharmacological importance against several disorders like antibacterial, anti-inflammatory, antispasmodic, diarrhoea, diabetes, colic, cough, pain, high cholesterol, heart disease, cancer and weight loss. The extract of guava leaves also have antimicrobial and antioxidant activity. *P. guajava* also contain ascorbic acid beneficial for skin and effective against oxidation and act as antioxidant. The present study reveals the pharmacognostical, physicochemical and phytochemical study of leaves *P. guajava* which are useful in laying down standardization and pharmacopoeial parameters.

Keywords: *Psidium guajava*; Pharmacognostical; Physicochemical; Phytochemical study; Pharmacopoeial parameters.

1. Introduction

Psidium guajava commonly known as Guava, belonging to the family Myrtaceae. (1) Different parts of the plant are used in the indigenous system of medicine for the treatment of various human ailments such as wounds, ulcers, bowels and cholera. (2) Now a day's guava leaves and any other part of guava tree is useful in medical field or industrial field. It has 100 species of tropical shrubs. It is cultivated all over the world, including India, Native to Mexico, Central America, and Northern South America. It is a frequently eaten species. (3,4) The two guava leaves grows in an opposite arrangement, it have short petioles or stalk that join the leaf to the stems. *P. guajava* leaves are astringent, anodyne, febrifuge, antispasmodic and tonic. (5)

The guava leaves is obtained from guavas tree, they belong to other species or genera. The colour of guava leaves is dull green to dark green. It has characteristic odour and the size of guava leaves is 7 to 15 cm in length and 3 to 5 cm in width. The leave of guava leave may be oval, oblong, and ovate-elliptic and they have hairy undersides entire margin. The chemical constituent of Guava contains

phenolic compound, iso flavonoside, gallic acid, catechin, rutin, tannins, saponins, glycoside, starch etc. The guava leaves is used in the treatment of colic, diarrhoea, diabetes, cough, pain, a high cholesterol, Heart disease, pain, weight loss, and cancer. It is also used as antioxidant, stimulant and as dysentery. (6-10) The properties of guava leaves are anti-spasmodic and anti-microbial properties. The other important properties of guava leaves are hepatoprotective, anti-allergy, anti cough, anti diabetic and anti-inflammatory etc. The extract of guava leaves also have antimicrobial and antioxidant activity. *P. guajava* also contain ascorbic acid beneficial for skin and effective against oxidation and act as antioxidant and shows free radical scavenging activity. *P. guajava* parts like roots, stem, bark, fruits, leaves, flowers and juices also shows therapeutic effects against several diseases, it is the most common and popular traditional remedy for GIT disorders like indigestion, stomachic, diarrhoea, dysentery. (11-13) The present study reveals the morphological and anatomical features, physicochemical constants and qualitative phytochemical study leaves extract of *Psidium guajava*.

2. Material and Methods

2.1 Collection and Extraction of Plant Material

The fresh leaves of *Psidium guajava* were collected from Herbal Garden of Himalayan

Institute of Pharmacy, Kala Amb H.P. India. The leaves were washed under tap water, air dried as shown in figure 1 and 2.



Figure 1. Fresh wet guava leaves



Figure 2. Dried guava leaves

2.1.1 Extraction method:

6g dried mashed of guava leaves was extracted with 600 ml of boiling water at 100°C for 20 min. The obtained of guava leaf

extract was filter using a filter paper and evaporate to obtain the final extract volume 60ml. (figure 3, 4). These extract is used for further analysis and determination.



Figure 3. Extract at 100°C



Figure 4. Extract value

2.2 Pharmacognostic studies

2.2.1 Macroscopic characteristics

For morphological observations, fresh leaves were used. The morphological features of the leaf were observed under magnifying lens. (14)

2.2.2 Microscopic characteristics

Free hand section of leaf was taken and stained by safrannin reagent to confirm its lignification. (15)

2.2.3 Physicochemical parameters

The physicochemical parameters like total ash value, loss on drying, water soluble ash, acid

insoluble ash, foaming index, saponification value and water soluble extractive value etc were determined as per WHO guidelines. (16,17)

2.2.3.1 Loss on drying

Transfer to the beaker the quantity of sample, cover it and accurately weigh the bottle and the content individually. Then keep it for 1 hour at 60°C. After that you can calculate the final value and % yield of moisture content or LOD (loss on drying).

2.2.3.2 Ash value

The object of ashing drugs is to remove traces organic matter which can be interfering during determination process. Weigh (3g) dry guava leafs in crucible. Then keep it in Muffle

furnace for 5 to 6 hour. After 5 to 6 hour switch off the instrument. Then after 15 minute crucible is cool and weight.(figure 5,6)



Figure 5. Muffle furnace



Figure 6. Ash of guava leafs

2.2.3.3 Water soluble and insoluble ash value

Leaves (0.7g) with 25 ml of water in beaker. Heat it for 5 min. Then filter and warm the filter paper after filtration. Weight the ash of filter paper which is remaining on the filter paper and water insoluble extract .The filtrate is water soluble extract.

Dissolve 3g of accurately weigh dry guava leaves in 20ml water by taking measuring cylinder as shown in figure 7. Then keep it for 24 hour, agitate occasionally. After that observe the swelling value of guava leaves. Measure the volume occupied by swollen.

2.2.3.4 Swelling Index



Figure 7. Swelling index

2.2.3.5 Foaming Index

Transfer 1g extract in 10ml of water. Then shake it for few minute and allowed to stand. If any foam is observed then there is the present of Saponin. Foaming Index is calculated by formula

$$\text{Foaming Index} = 1000/a$$

Where a = volume of decoction used for preparing dilution in the tube

2.2.4 Phytochemical Analysis (18,19)

The qualitative phytochemical tests of leaves extract were carried out to identify different phytoconstituents.

Chemical test

The chemical test of Guava leaves extract constituent. (fig. 8) which determine the present of chemical



Figure 8. Chemical Test Evaluations

3. Result and Discussion

3.1 Macroscopic Characteristics

Macroscopically, the leaf was simple in composition, opposite, decussate, ovate-elliptic

or oblong elliptic. They have hairy undersides entire margin prominent below, apex acute. The average leaf size was 7-15 cm in length and 3-5 cm in width. The fresh leaf was dull green to dark green in color (Fig. 9 & 10).



Figure 9. Guava leaves shape



Figure 10. Size of guava leaves

3.2 Microscopic characteristics

The transverse section of *P. guajava* leaf showed presence of upper epidermis chlorenchyma, palisade, air globules, lower epidermis, phloem, xylem, sclerenchyma; cuticle and trichomes The vascular bundle was surrounded by 4-6 layers of cortex. Xylem was lignified, phloem was non-lignified, vascular bundles were arc shaped. The pith was made up of large cells. The anomocytic stomata were present in epidermis. Oil glands were present below the epidermis. Plenty of blunt and

pointed unicellular trichomes were present. Prismatic and cluster type of crystals of calcium oxalate were found.

The microscopic structure of T.S of guava leaves is shown in figure 11. **3.3**

Physiochemical Investigation

The physical constant evaluation of the drugs is an important parameter in detecting adulteration or improper handling of drugs. The moisture content of dry powder of *P. guajava* leaves was 20 % which is not very

high, hence it would discourage bacteria, fungi or yeast growth. The ash value was determined by three different forms viz., total ash, water soluble ash and acid insoluble ash. The total ash is particularly important in the evaluation of purity of drugs; i.e. the presence or absence of foreign inorganic matter such as metallic salts or silica. Acid insoluble ash measures the amount of silica present, especially sand. Water soluble ash is the water soluble portion

of the total ash. The total ash of crude powder of *P. guajava* leaves was 7.6%, water soluble ash was 2.50% and acid insoluble ash was 6.66%. Less amount of these three parameters indicate that the inorganic matter and silica was less in *P. guajava* leaves. Foaming index of guava leaf showed that there was presence of small amount of Saponin. Results of Phytochemical screening of *P. guajava* leaves extract are shown in Table no.1

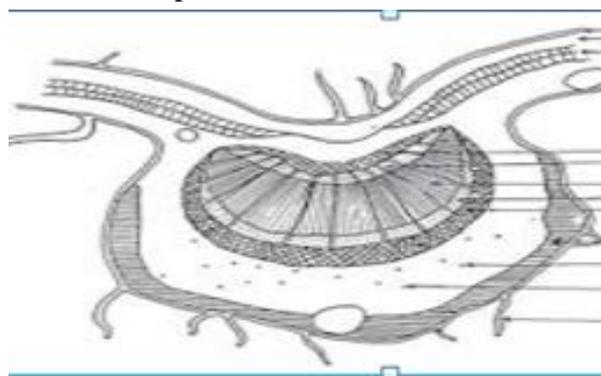


Figure 11. T.S of guava leaf

Table 1. Physiochemical parameters of leaves of *Psidium guajava*

| Physiochemical Parameters | Results |
|---------------------------|---------|
| Loss on drying | 20% |
| Ash value | 7.6% |
| Acid insoluble ash value | 6.66% |
| Water soluble | 2.50% |
| Swelling index | Nil |
| Foaming index | Present |

3.4 Phytochemical Analysis

The results of qualitative phytochemical analysis of the extract of *P. guajava* leaves are shown in Table 2. The extract contained maximum amount of alkaloids, flavonoids and saponins while triterpenes was present in moderate amount. In the crude powder tannins and cardiac glycosides were present in high amount. Phlobatanins, steroids and amino acids were absent in the extract.

Table 2. Qualitative phytochemical analysis of *P. guajava* leaves

| Phytochemicals | Test | Results |
|-------------------|--------------------------|---------|
| Alkaloids | Hager's reagent Test | + |
| | Dragendroff's test | ++ |
| | Mayer's test | +++ |
| Amino acid | Million's test | - |
| | Ninhydrine test | - |
| Carbohydrate | Molisch's test | ++ |
| Cardiac glycoside | Baljet's test | +++ |
| | Legal's test | ++ |
| | Keller-kilianni test | - |
| Tannin | Ferric chloride test | ++ |
| Steroids | Liebermann-Burchard test | - |
| Saponins | Frothing test | ++ |
| Flavonoids | Alkaline reagent | +++ |
| | Shinoda test | ++ |
| Volatile oil | | ++ |

| Phlobatanins | HCl test | — |
|--------------|----------|---|
|--------------|----------|---|

– : No presence; + : Less presence; ++ : Moderate presence; +++ : High presence

4. Conclusion

The present work was taken up with a view to lay down standards, which could be useful to establish the authenticity of this medicinally useful plant. Macro and micro morphological standards discussed here can be considered as identifying parameters to authenticate the drug. In the present study, we have found that most of the biologically active phytochemicals were present in the extract *P. guajava* leaves. The medicinal properties of *Psidium guajava* leaves may be due to the presence of above mentioned phytochemicals.

Acknowledgements

I would like to express my gratitude to Himalayan Journal of Health Sciences who gave me the opportunity to publish the article.

Financial Disclosure statement: The author received no specific funding for this work.

Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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