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Swati Pawar
M.Sc Student, Department of Food Science and Nutrition, College of Community Science, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Dr. Vijaya Pawar
Associate Professor and HOD, Department of Food Process Technology, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Dr. Ashwini Bidwe
Teaching Associate, Department of Food Science and Nutrition, College of Community Science, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Shubham Pachankar
M.Sc Student, Department of Food Science and Nutrition, College of Community Science, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Pooja Warkad
M.Sc., Student, Department of Food Science and Nutrition, College of Community Science, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Corresponding Author:
Swati Pawar
M.Sc Student, Department of Food Science and Nutrition, College of Community Science, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Determination of nutritional constituents of guava (*Psidium guajava*) leaves powder

Swati Pawar, Dr. Vijaya Pawar, Dr. Ashwini Bidwe, Shubham Pachankar and Pooja Warkad

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Abstract
Guava (*Psidium guajava*) leaves are nutrients rich and value adding dietary plant. It contain plenty amount of macronutrient and micronutrients which posses several medical properties to cure diabetes, heart diseases, cancer, diarrhoea, anaemia and digestive problem etc. In the present study, guava leaves were dehydrated (cabinet dryer) at 600C for 45 minutes and powder was made. Nutrients analysis of guava leaves powder shows the presence of Moisture (g) 2.77±0.01, Total Ash (g) 20.84±1, Total Fat (g) 5.05±0.015, Protein (g) 2.29±0.01, Carbohydrate (g) 38.23±0.1, Energy Value (K Cal) 290.2±1, Crude Fiber (g) 5.41±0.001, Phosphorus (mg) 360±0.12, Calcium (mg) 1660±1, Magnesium (mg) 440±1.5, Iron (mg) 13.50±0.001, Sodium (Na) 2.48±0.01, Potassium (mg) 2.24±0.01, Zinc (mg) 0.23±0.001 by using standard laboratory methods.

Keywords: Guava leaves, heart diseases, micro and macro nutrients, diarrhoea

Introduction
Plants are the primary natural source of many bioactive compounds. Several diseases have been treated with a variety of plant preparations in folk medicine since ancient times, and the cosmetic, pharmaceutical, and nutraceutical industries are now focusing more on plant preparations and pure phytochemicals. The plant preparation market is expected to grow to around USD 86.74 billion by 2022, with the pharmaceutical sector accounting for the largest share, followed by the nutraceutical industry. Surprisingly, the use of plant preparations in cosmetics, beverages, food, and medicine is primarily dependent on plant leaves. Among all plant organs, leaves accumulate the most bioactive compounds, such as secondary metabolites. Several recent studies examined the phytochemical profiles and biological activities of leaf extracts from various cultivated plants. As a result, despite being considered agricultural waste, plant leaves are a rich source of high-value nutraceutical compounds. One of them guava (*Psidium guajava* L.) tree, a member of the Myrtaceae family, is a very unique and traditional plant that is grown for its various medicinal and nutritional properties. Guava leaves contain antioxidants, antibacterial & anti-inflammatory properties and helpful tannins, and thus is considered as a natural pain reliever, Kumar *et al*. (2021) [11].
Guava has been grown and utilized as an important fruit in tropical areas like India, Indonesia, Pakistan, Bangladesh, and South America. Different parts of the guava tree, i.e., roots, leaves, bark, stem, and fruits, have been employed for treating stomach-ache, diabetes, diarrhoea, and other health ailments in many countries. Guava leaves are dark green, elliptical, oval, and characterized by their obtuse-type apex. Guava leaves, along with the pulp and seeds, are used to treat certain respiratory and gastrointestinal disorders, and to increase platelets in patients suffering from dengue. GLs are also widely used for their antispasmodic, cough sedative, anti-inflammatory, antidiarrheic, antihypertension, antiobesity, and antidiabetic properties. Studies on animal models have also established the role of GL isolates as potent antitumor, anticancer, and cytotoxic agents.
Traditional medicine is an important part of culture and health is defined by Indigenous people in most of the world. The use of letters, colds, diabetes, cough and other diseases requires a number of diseases to eat many diseases such as a symptom (gram positive organisms), *Escherichia coli* (gram negative living nuclear), magic species) and so on The growth of gram-positive bacterial and fungal species estimated using *Aspergillus niger*

(pottery, fungal strain) strains was strongly inhibited, while non-susceptible gram-negative bacteria strain has antimicrobial (antifungal and bactericidal) property a guava leaf extract exhibits phytochemical analysis (qualitative and quantitative) showed that guava leaf extract contains a wide range of polyphenols. Amaranth leaves are rich in phenols, flavonoids and tannins while the presence of alkaloids, flavonoids, saponins, triterpenes and other substances were found to be relatively low because polyphenols have strong antibacterial properties, Manika and Subhagata (2019) [21]

Psidium guajava L. is known as a tropical apple. Guava can help prevent degenerative diseases due to its high antioxidant content. Many civilizations have long used guava parts in their folk medicine. Guava leaf extract exhibited strong antioxidant and free radical-scavenging properties. Important minerals include ellagic acid, beta-sitosterol, uvaol, quercetin, guazanoic acid, saponins, carotenoids, lectins, leucocyanidins, and oleanolic and urasolic acids, Dube *et al*. (2021) [22].

El-Gazzar *et al*. (2018) [23] It was used in cows milk with extract of guava (*Psidium guajava*) leaf extract. Phenolic compounds were extracted with methanol. At an extraction ratio of 1:12, 890, 879, and 883 ug/g powder total phenols were used, respectively. Significant changes in pH and titratable acidity were observed during cold storage when guava leaf juice extract was added to milk before addition of different starter concentrations There was a significant (p>0.05) decrease in activity with time which is kept at the end of the whole sample. The concentration of phenolic compounds in milk products for labneh increased up to 300 µg/100 ml, then decreased slightly during collection Phenolic component of guava leaf extract added 75 µg/100 ml increased cell density there in labneh increased from 960 CFU/ml after one day to 9.77 day five CFU/ ml during storage This decrease was observed. The data from the sensitivity analysis shows that there is no detectable change (p>005) between the treated and control samples. Adding juice distilled from guava leaves means using labneh as a natural antioxidant.

Zuhana *et al*. (2018) [28] said the aim of the study was to determine the long-term effects of boiled guava (*Psidium guajava* Linn) left in water for wound healing. Perineum of the nurse after childbirth. This study uses an experimental-like research method. posttes and the design of a control group. The population was maintained through perineal suturing after birth in general. The sampling strategy in Pekalongan province in 2017 was completed through non-probability sampling .Types of samples. Data analysis using un-paired t test showed that guava leaf extract (*Psidium guajava* Linn) has an effect on the duration of wound healing on postpartum nurse perineum.

Deguchi and Miyazaki (2010) [7] reviewed that guava leaf extract has been traditionally used for diabetes in East Asia and other countries. Moreover, the extract has been reported to have significant antihyperglycemic activity in several animal models. But little is known about the safety of the extract, the underlying therapeutic mechanisms, and its therapeutic activity in human medical studies Guava leaf tea commercially available in Japan (Bansoureicha, Yakult Honsha, Tokyo, Japan) Examples and clinical trial strains describe inhibition of alpha-glucosidase enzymes *in vitro*, and protective effects of extract and guava leaf tea improve hyperglycemia, hyperinsulinemia, hypoadiponectinemia, hypertriglycemia, and hypercholesterolemia in rats, reduce hyperglycemia on after meals and if they can do it. Type 2 diabetes can be partially prevented by preventing long-term postprandial spikes in blood glucose, and guava leaf tea is believed to be helpful as a long-term maintenance dietary treatment.

Materials and Methods

Purchase of guava leaves

Fresh guava leaves were collected from VNMKV Parbhani University Garden.

Guava leaves processed

The guava leaves were removed from the stem for healthy leaves and thoroughly washed under running tap water to remove all dirt and other substances Cabinet drying method was used to dehydrate the guava leaves. Shinde, M. (2023) [17].

Guava leaf powder

The dried leaves were ground into a fine powder and stored in an airtight plastic container at room temperature for analysis.

Determination of nutritional composition of guava leaves

The carbohydrate content of guava leaf extract was determined using AOAC (2007) [1] which is a standard laboratory procedure close to guava leaf powder i.e. moisture, ash, crude fiber, crude fat and crude protein were estimated by differential method**.**

Materials for the production of minerals

The total minerals (total ash) content of selected samples of the bakery products were analysed by the ashing method of A.O.A.C. (2007) [1] Mineral content *Viz*, calcium, iron, zinc, potassium, magnesium of guava leaves powder were determined by AAS according to the procedure of Lindsey and Norwell (1969) [24] and phosphorus content was determined by calorimetrically according to Chen *et al*. (1956) [25] Sodium was analysed by digital flame photometer, Ranganna *et al*. (1986) [15].

Statistical analysis

Data were generated using statistical tools of mean-standard deviation.

Result and Discussion

Moisture

Moisture content in guava leaves powder was 2.77 g/100 g.

Ash

Ash content in guava leaves powder was 20.84 g/100 g. It shows that guava leaves are rich in mineral content. These values were comparable with the value of Gurusamy *et al*. (2020) [26] i.e. 10.15% and 9.92 gm/100 g ash.

Crude fibre

Guava leaves powder had fair amount of fibre i.e. 5.41 g/100 g. It can be considered as good ingredient of fibre in diet. This fibre value was comparable with the value 16.1g reported by Feedipedia (2015) [8].

Crude fat

Fat content in guava leaves powder was 5.05 g/100 g. It was low in amount as compare to other proximate content. It can be used as supplement for weight loss included as low fat diet.

Crude protein
It had found good amount of protein i.e. 22.29 g/100 g. It can be preferred as valuable source of protein. These values were comparable with the value 22.98g reported by Kumar *et al*. (2021) [11].

Carbohydrate
Guava leaves powder had abundant amount of carbohydrate i.e. 38.23 g/100 g. It shows that guava leaves powder is a good source of carbohydrate.

Table 1: Result of proximate content of guava leaves powder

Proximate content	Nutrient content of Guava leaves powder (mean±SD)
Moisture	2.77±0.01
Ash	20.84±1
Crude fiber	5.41±0.001
Crude fat	5.05±0.015
Crude protein	22.29±0.01
Carbohydrate	38.23±0.1

Minerals content
Calcium
Calcium content was found in abundant amount i.e. 1660 mg/100 g which was highest among other minerals. It shows that guava leaves can be used as supplement in diet for calcium deficiency. Gurusamy *et al*. (2020) [26] reported 1612 mg calcium in their study.

Phosphorus
Phosphorus content of guava leaves powder was 360 mg/100 g. Thomas *et al*. (2017) [27] reported 360 mg/100 g phosphorus in guava leaves powder.

Iron
Guava leaves powder was found with appreciable amount of iron i.e. 13.50 mg/100 g.

Zinc
Zinc content i.e. 0.23 mg/100 g was found in guava leaves powder. Presence of zinc may be helpful to regularise insulin hormone and boost immunity.

Sodium
It had 2.48 mg/100 g of sodium in guava leaves powder.

Potassium
Potassium content was found in fair amount i.e. 2.24 mg/100 g.

Magnesium
Magnesium content was found in good amount i.e. 440 mg/100 g.

Table 2: Minerals content of guava leaves powder (mg/100 g)

Mineral content	Values(mg/100 g)
Calcium	1660±1
Phosphorus	360±0.12
Iron	13.50±0.001
Zinc	0.23±0.001
Sodium	2.48±0.01
Potassium	2.24±0.01
Magnesium	440±1.5

Conclusion
The present study concluded that guava leaves are highly nutritious as they contain a good amount of carbohydrates, protein, fibre, fats, minerals to prevent many diseases such as diabetes, heart disease, bone problems, weight management, colds and more about it can be effective.

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