

Proximate Composition and Phytochemical Analysis of Developed Guava Products for Diabetes Mellitus

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Abstract: *Psidium guajava* (common name Guava) is well known tropic tree which is abundantly grown for fruit. It belongs to phylum Magnoliophyta, class Magnoliopsida and Myrtaceae family. Guava is often marketed as super fruit which has a considerable nutritional importance in terms of vitamin A and C with seeds that are rich in omega-3, omega-6, poly unsaturated fatty acid, and especially dietary fibre, riboflavin as well as in protein and mineral salt. Guava is good for the brain this fruit contain vitamin B3 and B6, as well as niacin and pyridoxine, which are known to help in improving your nerve and the brain. the present study, was undertake the following objectives. Standardization and formulation of Guava sweets to analyse the nutritive value of the developed Guava sweets, To analyse the phytochemical constituents of the developed guava sweets, To analyse the sensory characteristic of the developed guava sweets. The product Guava Halwa and Guava candy were prepared from the pulp. The prepared Guava Halwa and Guava candy were analysed for nutritive value, phytochemical analysis and sensory evaluation was done. Result The prepared product where analysed for it nutritive value it was shown that the Product has got good amount of energy, a good amount of protein, moderate amount of moisture moderate amount of carbohydrate, low in fat and fibre. The prepared product was analysed for phytochemical analysis. It shows that the product has got good amount of total phenolic content and total flavonoid content.

Keywords: Guava, flavonoid, phytochemical, vitamin, fiber, omega-3.

1. Introduction

Psidium guajava (common name Guava) is well known tropic tree which is abundantly grown for fruit. It belongs to phylum Magnoliophyta, class Magnoliopsida and Myrtaceae family (Dakappa SS et al., 2013) [1]. It has about 133 genera and more than 3,800 species. *Psidium guajava* and its all parts have an old history of medicinal value (Nwinyi O et al., 2008) [2]. The plant is well known by a common name Guava in English, Guayabo in Spanish, Goyave and Goyavier in French, Guyaba or Goeajaab in Dutch, Goiaba and Goiberia in Portuguese, Jambubatu in Malaya. Pichi, Posh and Enandi are the names commonly used in Mexico and America (Morton JF., 2004) [3].

The guava fruit contains vitamin A, C, iron, phosphorus and calcium. It has more vitamin C than the orange. The fruit contains saponin, oleanolic acid, lyxopyranoside, arabopyranoside, guaijavarin, quercetin and flavonoids (ArimaH et al., 2002, 2011, 1987) [4]. Ascorbic acid and citric acid are the major ingredients of guava that play important role in anti-mutagenic activity (Glover IS et al., 1993) [5]. The chemical structures of quercetin and ascorbic acid. The skin of fruit contains ascorbic acid in very high amount; however, it may be destroyed by heat. The strong pleasant smell of fruit is credited to the carbonyl compounds (DweckA.C 1987) [6].

Guava fruit contains terpenes, caryophyllene oxide and p-selinene in large quantity which produce relaxation effects (Meckes M et al., 1996) [7]. The flavonoid content is higher

in the methanolic extract of the guava (SanchesNR et al., 1993). [8]. There are 41 hydrocarbons 25 esters, 13 alcohols and 9 aromatic compounds in guava (VerninG et al., 1991) [9]. Titratable acidity and the total soluble solids are present in fruit (Reyes MU et al., 1995) [10]. Guajadialis also present in guava (YangXet al., 2007) [11].

Psidium guajava is consumed not only as food but also as folk medicine in subtropical areas all over the world due to its pharmacologic activities (Deguchi Y et al., 2010) [12]. Medicinal plants find a very important place in medical systems almost in the entire world. These observations are reflected from traditional knowledge. It is well known that guava is frequently employed in numerous parts of the world for the cure of a lot of sickness like diarrhea, reducing fever, dysentery, gastroenteritis, hypertension, diabetes, caries, pain relief and wounds. The countries which have a long history of using medicinal plants are so using guava at big level like Mexico, Africa, Asia and Central America. With its medicinal uses it is also used as food and in the preparation of food products. It is also used in house construction and toys making.

Guava contains high content of organic and inorganic compounds like secondary metabolites e.g. antioxidant, polyphenols, antiviral compounds and anti-inflammatory compounds. Guava has a lot of compounds which have anti-cancerous activities. It has a higher number of vitamins and minerals. Phenolic compounds like flavonoids also find an important place in the guava. Lycopene and flavonoids are important antioxidants. They help in the cure of cancerous

cells and help to prevent skin aging before time (Anand V et al., 2016) [13]. Guava can affect the myocardium inotropism (Conde Garcia EA et al., 2003) [14]. Guava skin extract can control level of diabetes after 21 days treatment (Raj P.K et al.,2010) [15].

Guava has a high antimicrobial activity. Methanolic extract of guava contains a remarkable antimicrobial activity. Species of *Bacillus* and *Salmonella* bacteria can be controlled by these extracts. It also has anti-plaque activity due to the presence of active flavonoids compounds (Limsong J et al.,2004) [16]. The flavonoid compounds and their derivatives can be isolated from the guava. These compounds can inhibit the growth of different bacteria in different dilutions. Terpinene and pinene are present into the aqueous extract of plant's leaves which shows antimicrobial activity. Due to bacteriostatic effects on pathogenic bacteria it is also used as medicine in cough, diarrhea, oral ulcers and in some swollen gums wound (Rattanachaikunsopon P et al., 2010) [17].

Guava contains high amount of antioxidants and anti-providing nutrients which are essential not only for life but also help to control the free radical activities. It also have a variety of phytochemicals which are beneficial for human health like diabetes, obesity and high blood pressure. There are two common methods by which antioxidants neutralize free radicals that is DPPH and FRAP assay. Extracts of guava in water and organic solvents have a large quantity of antioxidants which can stop the oxidation reaction. The concentration of these compounds become high with the increase in concentration (He Q et al.,2004) [18]

Pink guava also has a high antioxidant activity (Musa KH et al.,2011) [19]. Guava is highly rich in antioxidants which are helpful in decreasing the incidences of degenerative diseases such as brain dysfunction, inflammation, heart disease, cancer, arteriosclerosis and arthritis (Feskanich D et al., 2002) [20]. In fruits, the most abundant oxidants are polyphenols and ascorbic acid. The polyphenols are mostly flavonoids and are mainly present in glycoside and ester forms (Fleuriet A et al., 2003) [21]. The free elagic acid and glycosides of apigenin and myricetin and are found to be present in guava (Koo MH et al.,2001) [22].

2. Materials and Methods

Development of Guava products

The Guava fruit was taken from my Garden and the other ingredients such as (sugar, Milk, Ghee, Almond, Dry grapes, Cashewnut, Cardamom powder) was purchase from the grocery shop in Vellore.

Preparation of Guava Halwa

Table 1: Ingredients used for the preparation of Guava Halwa

Ingredients	Quantity
Guava	100g
Sugar	200g
Milk	50ml
Ghee	6tspn
Almond	2g

Dry Grapes	2g
Cashew Nut	2g
Cardamom Powder	1g

Wash the guava fruit and cut it into four pieces, boil it for 10minutes and add in a jar and grind it well. Now sieve the mixture to the seeds from guava puree and take a pan add 4tsp of ghee and add nuts, dry grapes fry it well and keep it aside. Add guava puree in a pan and stir it continuously, add milk and sugar, stir it continuously, add cardamom powder, fried nuts, mix it well and add 1 tsp of ghee, stir it continuously until the halwa consistency and serve it.

Preparation of Guava Candy

Table 2: Ingredients used for the preparation of Guava Candy

Ingredients	Quantity
Guava	100g
Sugar	100g
Lemon	2drops
Ghee	2tspn

Wash the guava fruit and cut it into four pieces, boil the guava pieces for 10minutes and add in a jar and grind it well. Now sieve the mixture to the seeds from guava puree, mix with sugar and add the mixed guava pulp in a heat pan and stir it continuously, add two drops of lemon and stir it continuously, add ghee mixed it well until the candy consistency.

Proximate composition of developed guava products:

Guava halwa and candy were assessed for proximate analysis in moisture, energy, carbohydrates, proteins, fat and fiber. According to their respective AOAC method.

Phytochemical Analysis of Developed guava products:

Total Phenolic Content (TPC):

Total polyphenols were determined following the Folin-Ciocalteu's method using gallic acid as standard. Folin-Ciocalteu's reagent (12.5μl) along with 7% sodium carbonate (125μl) was added to the guava extracts. Samples were then incubated for 90 min at room temperature. The absorbance was measured at 750 nm using microplate reader (Synergy HT, Bio Tek Instruments, Winooski, VT, USA).

TotalFlavonoids Content (TFC):

Flavonoid content was determined using an aluminum chloride colorimetric assay using catechin as a standard. Samples, 7.5% sodium nitrite (7.5 μL) and 15 μL of 10% aluminum chloride were added to 1M NaOH. Absorbance was measured at 520 nm after 5 min incubation. Total flavonoid content was expressed as mg of catechin equivalent (CE) per 100g.

3. Result and Discussion

Proximate Composition

Proximate Composition of Guava Halwa and Guava Candy:

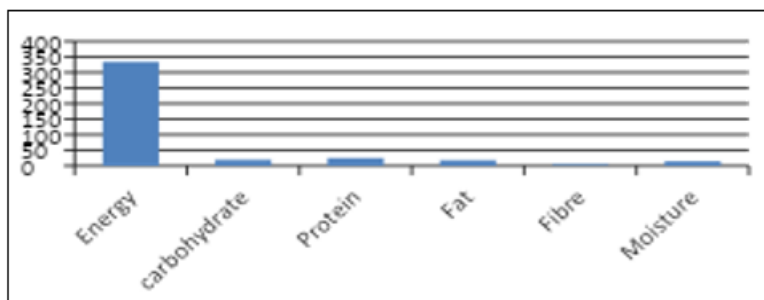
Proximate compositions and minerals play vital role in

proper development and good health of human body. Fruit is considered to be the main source of minerals needed in the human diet. Minerals in fruit are some of the important nutrients besides vitamins, flavonoids and phytochemicals which have been reported to contribute to health (Khalili et al., 2006) [23]. Guava Halwa and Guava Candy was analysed for Energy, Carbohydrate, Protein, Fat, Fibre, Moisture using AOAC methods and result are shown in Table 3 and Table 4:

Table 3: Proximate value of Guava Halwa

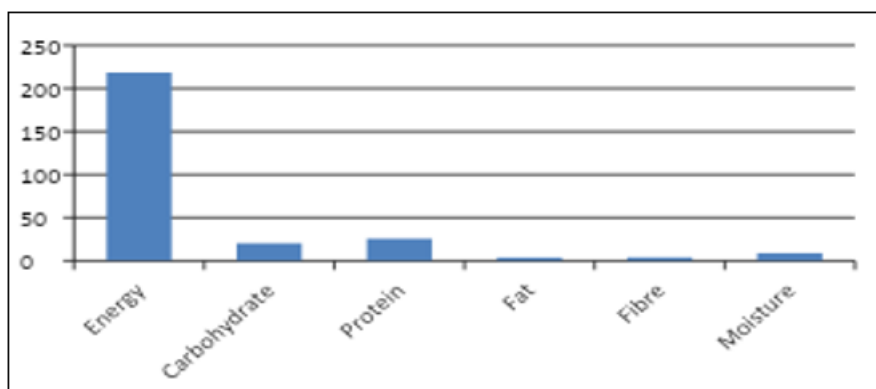
Nutrients	Guava Halwa
Energy kcal	335.12± 28.3
Carbohydrategms	19.353± 2.9
Protein gms	24.77± 1.5
Fat gms	17.684± 2.1
Fibre gms	4.354± 0.7
Moisture gms	14.2931 ± 1.3

From the Table 3, It was observed that the nutrient content of Guava Halwa were 335.12kcal of Energy, 19.353gms of Carbohydrate, 24.77gms of Protein, 17.684 gms of Fat, 4.354gms of Fibre and 14.2931gms of Moisture.

**Figure 1:** Proximate value of Guava Halwa**Table 4:** Proximate value of Guava Candy

Nutrients	Guava Candy
Energy kcal	218.56 ± 19.5
Carbohydrate gms	20.3303± 2.7
Protein gms	25.711± 1.8
Fat gms	3.8424 ± 0.3
Fibre gms	4.01± 0.9
Moisture gms	8.94± 1.1

From the Table 4, It was observed that the nutrient content of Guava Candy was 218.56kcal of Energy, 20.3303gms of Carbohydrate, 25.711gms of Protein, 3.8424gms of Fat, 4.01gms of Fibre and 8.94gms of Moisture.

**Figure 2:** Proximate value of Guava Candy

Phytochemical Analysis of Developed Guava Products

The total phenolic content was determined using the Folin-Ciocalteu method, as described by Singleton et al. (1999) [24]. Total Phenolic Content and Total flavonoid Content was investigated using Solid Phase Extraction (SPE) method for Guava Halwa and Guava Candy are shown in Table 5 and Table 6:

Table 5: Phytochemical Analysis of Guava Halwa

Guava Products	Phytochemical Analysis	
	Total Phenolic Content	Total Flavonoid Content
Guava Halwa	21.25±2.9 mg	10.98±1.5 mg

From the table 5, It was found the Phytochemical constituent of Guava Halwa were 21.25mg of Total Phenolic Content and 10.98mg of Total Flavonoid Content.

Table 6: Phytochemical Analysis of Guava Candy

Guava Products	Phytochemical Analysis	
	Total Phenolic Content	Total Flavonoid Content
Guava Candy	12.45±0.8 mg	9.64±0.6 mg

From the table 6, It was found the Phytochemical constituent of Guava Candy were 12.45 mg of Total Phenolic Content and 9.64 mg of Total Flavonoid Content.

4. Discussion

From the results, guava fruits were shown to have high moisture and crude fiber contents. Reasonable level of carbohydrate and lower level of fat content was found in guava varieties. Similar results were reported by Uzzaman et al., (2018) [25]. This study also showed that guava fruits are rich in macronutrients compared with other fruits like papaya, apple and pineapple. Therefore, from this result it could be suggested that guava can be included in the diet therapy which may reduce the chance of diabetes, hypertension and cancer.

5. Conclusion

It is conclude from the study that the developed Guava product was found to be nutritionally rich. The nutrient present in Guava Halwa and Guava Candy are Energy, Vitamin A, Vitamin C, Vitamin E, Fiber etc., This product can be suggested for School Going Children and Adult Person. It can easily affordable for low- income families with highly acceptable sensory qualities and rich nutritional values. Inclusion of these fruits will aid in combating many health benefits like Improve digestion, Helps during Pregnancy, Lower Blood Sugar level, Boost heart health, weight loss and Boost immunity.

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