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Medicinal properties of banana and papaya: A review

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Abstract

Papaya is a tasty, juicy and healthy fruit belonging to the Caricaceae family scientifically known as (*Carica papaya L.*) and is cultivated in all the tropical and sub-tropical states of world. It is a rich source of vitamin C and vitamin B due to which it possess many antibacterial, antiviral and antifungal properties. Its mineral composition consists of K and Mg with calcium, iron, manganese, phosphorus, zinc etc. The consumption of fruit is either as a fresh fruit or vegetable or as a processed product globally. Banana (*Musa*) is a healthy and moderately well balanced origin of nutrient rich several carbohydrates, vitamins and mineral salts with a low amount of protein and oil. Banana is an essential cultivate of livelihood of farmers around the wet subtropics and topics, which includes America, Africa, South Asia, Melanesia, Pacific and Island Southeast Asia. The fruit plant of both papaya and banana as a complete along with peel, bark, root, pulp and seeds possess many medicinal and nutritional properties. Many studies show that papaya and banana have several pharmacological and medicinal properties that are used for the treatment several disease like diarrhoea, diabetes, cancer, ulcers, hypertension etc. and at present both are observed as neutraceutical fruits.

Keywords: Antibacterial properties, antiviral properties, antifungal properties, medicinal properties, nutritional properties

1. Introduction

A diet high in fruits and vegetables lowers the chances of chronic diseases like cardiovascular disease and cancer, and phytochemicals including flavonoids, phenolic and carotenoids in vegetables and fruits play a major role in prevention of chronic health risks.

Papaya is a tasty and juicy fruit belonging to the Caricaceae family scientifically known as (*Carica papaya L.*) and is cultivated in all the tropical and sub-tropical states of world. In 2004 globally the production of fruit was over 6.8 million tonnes (FAO, 2004). Out of which 47% were produced in South and Central America and 30% in Asia. The papaya industry which is the largest industry in Brazil which recommence to show fast growth. Papaya is growing as important fruit globally both as processed and fresh products and is mainly grown and the consumption is high in developing countries (Nakasone HY, 1998) [21]. Papaya is considered one of the exotic fruit in ancient times due to its buttery taste.

Papaya is a rich source of vitamin C and vitamin B. Its mineral composition consists of K and Mg with calcium, iron, manganese, phosphorus, zinc etc. (Hardisson *et al.*, 2004) [10]. It also has a digestive enzyme papain that helps in preventing allergies, sports injuries and trauma. It also exhibit a significant role in the protein digestion present in food at alkaline, neutral and acidic medium and hence can be advised for the dyspeptic patients, who has the difficulty in digesting wheat protein gliandin but can indulge it if it is dealt with the crude papain. Papaya as a whole, enhance cardiovascular system, provide protection from heart attacks, colon cancer and strokes. This fruit is a very rich source of beta-carotene that stops damage produced by free radicals which can be the cause of cancer. It was announced that it also helped out in the stoppage of diabetic diseases. The brewed papaya is also a good neutraceutical as the antioxidant. It enhances the antioxidant protection in old patients although in the absence of any antioxidant inadequacy state at the dosage of 9 g per day orally (Marotta *et al.*, 2006) [19].

Papaya as a healthful fruit is also used in desert; ripened fruit is eaten as salad and unripe is cooked as a vegetable. It is purgative, stimulates production of bile and digestion which makes our liver and pancreas healthy (Aravind *et al.*, 2013) [4]. As it is rich in fibre it helps in lowering high cholesterol level. It also has been incorporated in commercial preparation such as meat tenderizer, stabilizer and as chew-gums and to clarify the beer. Though some work on utilization of papaya in preparation of valuable products such as beverages, jam, jelly etc. has been reported in the literature but negligible work on development of toffee and leather has far been reported.

Banana (*Musa*) is one of the major fruit which is produced in nation in terms of both production (1,245,615.60 q year⁻¹) and area coverage (28,695 ha) (CSA, 2004) where the bulk is produced in traditional agricultural system. They are well adapted to customary agricultural system because it require less area of land, a relatively high yield, maintenance and care for a particular time and area. Not long ago it was announced that banana fruit is taking the place of another fruit crops like mango and lime and the major food crops such as sweet potato and maize in the southern side of country (Seifu, 1999) [29].

Banana is an essential cultivate of livelihood of farmers around the wet subtropics and tropics, which includes America, Africa, South Asia, Melanesia, Pacific and Island Southeast Asia. In spite of the fact that banana is one of major commercialized crop on the earth, it is approximated that 87% of the crop produced is for limited food utilization (Bioversity International, 2008) [5]. Apart from the various kind of banana which are fully cultivated, out of which several grows beyond their standardized range, an unknown number of varieties which are cultivated now are yet in several domestication stages because they all are yet inter-fertile along with wild neighbouring populations that continue to introduce a newly genetic material to the cultivated stock.

Banana is a healthy and moderately well balanced origin of nutrient rich several carbohydrates, vitamins and mineral salts with a low amount of protein and oil (Simmonds, 1966; Ketiku, 1973; Ahenkora *et al.*, 1997) [30, 16, 2]. They are eaten as raw as well as desert fruits. Agricultural industries and public agencies increasingly use nutritional information to upgrade fresh products. Consumers are apprised of the health advantages of fresh vegetables and fruits and looking for variation in the diets. They are rich in anti-oxidant vitamins (Vitamin C, Vitamin A, and Vitamin E), calcium, magnesium and potassium (Marisa, 2006) [18]. They are considered as nutritional with a high amount of vitamin A and vitamin C content but is low in vitamins B. Generally, they contain an appreciable content of mineral and therefore can be used as mineral supplement in diets.

1.1. Nutritional Factors of Papaya

The Papaya is a rich source of carbohydrates, fat, protein, vitamin A, vitamin C, several minerals and many more as shown in Table 1.

Table 1: Nutritional Factors of Papaya

Elements	Amount (per 100g)
Energy	163kJ (39kCal)
Carbohydrates	9.81g
Sugar	5.90g
Dietary Fibre	1.8g
Fat	0.14g
Protein	0.61g
Vitamin A	55µg (6%)
Beta- carotene	276µg (3%)
Thiamine (vit- B ₁)	0.04mg (3%)
Riboflavin (vit- B ₂)	0.05mg (3%)
Niacin (vit- B ₃)	0.338mg (2%)
Vitamin B ₆	0.1mg (8%)
Vitamin C	61.8mg (103%)
Calcium	24mg (2%)
Iron	0.10mg (1%)
Magnesium	10mg (3%)
Phosphorus	5mg (1%)
Potassium	257mg (5%)
Sodium	3mg (0%)

1.2 Proximate composition of Banana

Banana contain protein, carbohydrate, several minerals and is a rich source of vitamin C, riboflavin, thiamine etc. as shown in Table 2.

Table 2: Proximate Composition of Banana

Element	Amount
Water	75.7%
Carbohydrate	22.2%
Protein	1.1%
Fat	0.2%
Ash	0.8%
Minerals (mg per 100 g)	
Phosphorus	22
Potassium	358
Calcium	8
Iron	0.42
Zinc	0.18
Magnesium	30
Vitamin Content (mg per 100 g)	
Thiamine	0.04
Riboflavin	0.07
Pantothenic acid	0.26
Pyridoxine	0.51
Ascorbic Acid	10

Source: Woolfe 1992; Robinson 1996; Lassoudiere 2007; Aurore *et al.*, 2009; Wang *et al.*, 2012.

2. Medicinal Properties of Papaya

2.1 Antioxidant Activity of Papaya

The methanolic produced from immature (*C. papaya*) was assessed in vivo to know that what are its effects on the activities of few antioxidant enzymes that includes glutathione peroxidase, glutathione transferase, glucose-6-phosphate dehydrogenase, glutathione reductase and catalase in mice which was treated with an orally dosage of 100 mg/kg. Due to the presence of ethyl acetate fraction, there was a remarkable increment in activities of glutathione reductase, GPx, GST and glucose-6-phosphate dehydrogenase. A remarkable decrement in GPx was noticed in kidney due to the presence of ethyl acetate fraction. It was proposed that β-sitosterol and quercetin can be the reason behind the antioxidant potential (Oloyede OI, 2005) [23].

2.2 Anthelmintic Activity of Papaya

The dried seeds of papaya given as mixture with honey have indicate a remarkable effect on intestinal parasites of human, without any side effects. The main anthelmintic present in the seeds of papaya is Benzyl iso thiocynate (Kermanshai *et al.*, 2001; Panse *et al.*, 1943; Krishnakumari *et al.*, 1960; Bose *et al.*, 1961) [15, 24, 17, 6]. The papaya latex has anthelmintic efficiency for the *Heligmosomoides polygyrus* in a preliminary infected mice that act as an anthelmintic for the intestinal nematodes in mammals (Satrija *et al.*, 1995) [28]. It also possess anthelmintic potential for the natural contamination of *Ascaris suum* caused in pigs and was found to be effective 100% at the dosage of 8 g/kg of body weight (Satrija *et al.*, 1994) [27].

2.3 Antimicrobial Activity of Papaya

The aqueous produced from (*C. papaya*) roots and leaves at various combinations (25, 50, 100, 200 mg/mL) perceived antimicrobial activity for few human pathogenic bacteria by using agar diffusion method (Anibijuwun II, Udeze *et al.*, 2009) [3].

2.4 Antifungal Activity of Papaya

The (*C. papaya*) latex and fluconazole possess synergistic action to inhibit the growth of the *Candida albicans* which results in partial degradation of cell wall. Latex proteins proved to have minimum concentration of protein and antifungal action to produces a complete inhibition (Giordani *et al.*, 1991) [9].

2.5 Hypoglycaemic Activity of Papaya

The ethanolic extract of the (*C. papaya*) leaves at a dosage of 5.0 mg/kg bring a remarkable reduction in blood sugar level with no remarkable effects at a high dosage of 10 mg/kg. This ethanolic extract from the leaves delay the beginning of the hypoglycaemic potential of glimepiride and brings an increase in the hypoglycaemic effect of the metformin with variables interconnecting separately for every drug produced combinations (Fekeye *et al.*, 2007) [8].

3. Medicinal Properties of Banana

3.1 Anti-Diabetic Activity of Banana

The ethanol produced from ripe and green fruits of (*Musa Chenkadali*) possess hypolipidaemic and antioxidant properties and can be used to treat diabetes mellitus (Kaimal S *et al.*, 2010) [13]. The methanol extracted from ripe and green fruits of (*Musa paradisiaca*) has hypoglycaemic effect in streptozotocin-treated and in normal (normoglycaemic), diabetic (hyperglycaemic) mice. Thus it was showed that the extract of (*Musa*) has hypoglycaemic activity which help to control the level of type-2 diabetes mellitus in adults (Ojewole JA, Adewunmi CO, 2003) [22].

3.2 Anti-Cancer Activity of Banana

The consumption of banana reduce the risk for colorectal cancer (Hugo, D -P *et al.*, 1996) [11]. The Cell Quest, a knowable formula which is obtained from the Musaceae (plantain) plant extract and contains a high amount of tannic acid can hinder the tumour cell proteasome activity. Thus in this study it was proposed that the Cell Quest inhibits and targets the proteasome mainly in the tumour cells, which can be said as the anticancer activity (Kazi A *et al.*, 2003) [14]. The higher consumption of banana reduce the risk for breast cancer in women (Zhang C X *et al.*, 2009) [32]. The confirmation that antioxidants, phenols and anti-proliferative actions are present in Banana was given (Sun J *et al.*, 2002) [31].

3.3 Anti-hypertensive Activity of Banana

If a banana flavour rich liqueur pisang ambon is consumed once in a day for a week helps in reducing the arterial pressure in the human body mainly in females along with cold stress producing hypertension. Rao N.M *et al.* [13] researched on the matured and unmaturred 'Nendran', 'Poovan', 'Rasthali', 'Bontha', 'Safed Velchi' and 'Robusta' varieties of banana obstructing for the (ACE) angiotensin converting enzyme. It was observed that the obstruction for the ACE by the various variety of matured cultivars of banana was more as compared to that of unmaturred cultivars of banana (Jo S and Megawati R, 2010) [12]. There is great influence of banana on peak expiratory flow rate, hypertension caused due to cold stress and the activity of plasma ACE in a healthy human body. This advantage of banana of lowering blood pressure at the time of cold stress can be used in medicinal activities and banana can also be used as an accessory in hypertension therapy (Sarkar C *et al.*, 1999) [26].

3.4 Anti-Diarrhoeal Activity of Banana

The use of methanolic extract of (*Musa sapientum*) in ethno medical practice for diabetic patients and shows curative properties at a dosage of 10 mg kg⁻¹ body weight every day. In this study it was indicated that there is a main curing effect of the both methanolic and aqueous extracts of powder of pulp of ripe fruit of (*Musa sapientum var paradisiaca*) and these results can be compared with Vitamin E on several biochemical and physical properties of wound healing (Agarwal *et al.*, 2009) [1]. The effect of green banana on the prolonged or acute diarrhoea and concluded that a diet containing green banana helps in the recovery of recovery of prolonged and acute diarrhoea in childhood. Ripened green banana contain a high amount of amylase-resistant starch which stimulates the production of colonies of fatty-acids with short-chain and is helpful in the treatment of diarrheal diseases. Hence it was concluded that a diet including green banana improved the clinical severeness in small children shigellosis and can be a useful and simple accessory for treating this illness (Rabbani GH *et al.*, 2010) [25].

4. Conclusion

Globally the banana and papaya plant and their several parts are consumed as a wholesome and healthy fruit and traditionally used in various medicines for treating a number of diseases. Both the plant as a whole have their own medicinal values. The papaya and banana plant possess many pharmacological properties which make them a neutraceutical plant and they have a huge range of vitamins and enzymes that can be used for treating several diseases. Hence several studies concluded that both the fruit plant have many pharmacological properties and are also used in the manufacturing of various medicines.

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