

Antioxidant Activity of Papaya Peel and Developed Chapathis

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ABSTRACT

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Consumption of natural bioactive compounds and dietary fiber offers health benefits and protection against various diseases. The by-products of papaya is approximately 20-25% of fruit weight and it is a good source of minerals, fiber and phenolic compounds that have a wide range of pharmacological activities. The results of present study revealed that phenols, flavonoid and antioxidant activity of papaya peel paste and powder. As the concentration of the processed papaya peel increased, the antioxidant activity increased in comparison to control chapathis. The IC₅₀ values were 0.11 and 0.18 mg/ml for PSP and PPP. The control chapathi, PSC and PPC had IC₅₀ of 0.60, 0.37 and 0.35 mg/ml respectively indicating that heat treatment did not have much effect on papaya peel.

Introduction

Currently papaya peel is discarded which contribute to environment pollution. The agro-industrial by-products are good sources of bioactive compounds and the exploitation of these abundant and low-cost renewable resources can be used to develop new products with uses in pharmaceutical and food industries (Brasi *et al.*, 2014). They are good sources of minerals, fibre and phenolic compounds with antiviral, antibacterial and cardio protective properties. Phytochemicals act as an antioxidant and anti-inflammatory

agents playing vital role in detoxification of harmful and deleterious chemicals from human body (Djilas *et al.*, 2009).

Papaya is known for its hydrogen peroxide and hydroxyl radical scavenging activity along with guava, water melon, grapefruit and kiwi fruit (Murcia *et al.*, 2001). Phenolic compounds are important fruit constituents as they inactivate free radicals as well as prevent decomposition of hydro peroxides into free radicals (Maisuthisakul *et al.*, 2007).

Materials and Methods

Ripe papaya and other ingredients were procured from local market of Hyderabad. Papaya peel paste (PSP) and papaya peel powder (PPP) was prepared as procedure given by (Pavithra *et al.*, 2017). Chapathis were prepared by the method as reported by (Cheng and Bhat, 2015).

Preliminary phytochemical screening, Phenols, Flavonoids and antioxidant activity of PSP, PPP and developed chapathis

The phytochemical screening was carried out as per the procedure given by Harbourne (1993). Total phenolic compounds were determined according to a modified method of Slinkard and Slingleton, (1997).

Total flavonoid content of samples were done as per the procedure given by Meda *et al.*, (2005). Free radical scavenging assay by DPPH method as described by Dorman *et al.*, (2004).

Results and Discussion

PPP, PSP and developed chapathis were screened for phytochemical components as given in table 1. Results of present study showed that the methanol extract of control chapathi contained carbohydrates, proteins, and amino acids. The methanol extract of PPP contained fats and oils.

The methanol extract of PPP, PSP, PPC (peel powder added chapathi) and PSC (peel paste added chapathi) contained carbohydrates, proteins, alkaloids (Mayer's test) flavonoid, terpenoids, cardiac glycosides, phenols and tannins. PPP, PSP, PPC and PSC lacked in fixed oils and fats, phlobatinins, steroids, saponins and quinones. The alkaloids, flavanoids, terpenoids, cardiac glycosides,

phenols and tannins were present in developed chapathis compared to control sample due to incorporation of processed papaya peel.

Total phenolic and flavonoid content

The presence of phenolic compound affects the sensory qualities of plant-derived processed foods including taste, colour and texture. Flavonoids represent the most common group of plant phenolic compounds which influences the flavour and colour of fruits and vegetables (Akyol *et al.*, 2016). Phenolic compounds such as tannins, flavonoids are considered to be the major contributors to the antioxidant capacity of plants. These antioxidants also possess diverse biological activities, such as anti-inflammatory, anti-atherosclerotic and anti-carcinogenic activities (Mala and Kurian, 2016).

In this study the phenolic and flavonoid content of PSP was 169.36 and 36.80 µg/ml. PPP contains phenolic and flavonoid content of 108.53 and 24.42 µg/ml and 0.028 to 5.07µg/ml for chapathis. The value added chapathi showed increase in Phenolic and flavonoid content in comparison with control chapathi. There was a significant difference ($p < 0.05$) in the phenolic and flavonoid content of the chapathis. The phenolic and flavonoid contents were decreased in drying of papaya peel. Percentage change in phenolic and flavonoid content of developed chapathis was given in figure 1.

The phenolic content diamond cookies with mango peel powder were 6.66 mg/g catechol equivalents. Although there may be some loss during processing there was increase in the phenolic, flavonoid and DPPH antioxidant activity of the diamond cookies prepared by adding mango peel powder due to addition at 15 % level (Nisha and Bhatnagar, 2014).

Table.1 Phytochemical screening of PPP, PSP, control and developed chapathis

S. No.	Phytochemicals	Test	PPP	PSP	Chapathis		
					Control	PPC	PSC
1	Carbohydrate	Molisch test	+	+	+	+	+
2	Alkaloids	Mayer's test	+	+	-	+	+
		Wagner's test	-	-	-	-	-
		Hager's test	-	-	-	-	-
3		Proteins	Kjeldhal method	+	+	+	+
4	Amino acids	Ninhydrin test	-	-	+	+	+
5	Flavanoids	With NH ₃ solution	+	+	-	+	+
6	Fixed oils and fats	Foam test	+	-	-	-	-
7	Terpenoids	-	+	+	-	+	+
8	Cardiac glycosides	-	+	+	-	+	+
9	Steroids	Liebermann- Buchard test	-	-	-	-	-
10	Saponins	Foam test	-	-	-	-	-
11	Tannins	FeCl ₃ test	+	+	-	+	+
12	Phlobatinins	With Conc. HCl	-	-	-	-	-
13	Phenols	FeCl ₃ test	+	+	-	+	+
		Liebermann's test	+	+	-	+	+
14	Quinones	With Conc. HCl	-	-	-	-	-

Note: All screening tests were carried out in triplicates.

Control: 100% wheat flour chapathi

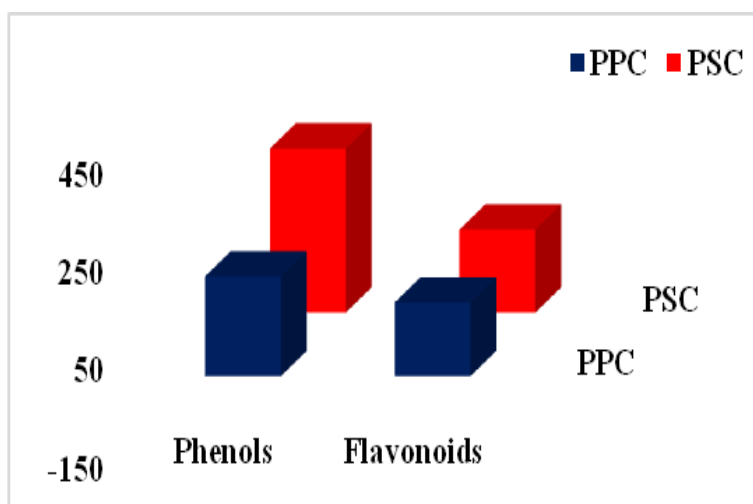
PPC: 10% PPP incorporated chapathi

PSC: 15% PSP incorporated chapathi

PPP: Papaya peel powder

PSP: Papaya peel paste

Fig.1 Percentage change in phenolic and flavonoid content of developed chapathis



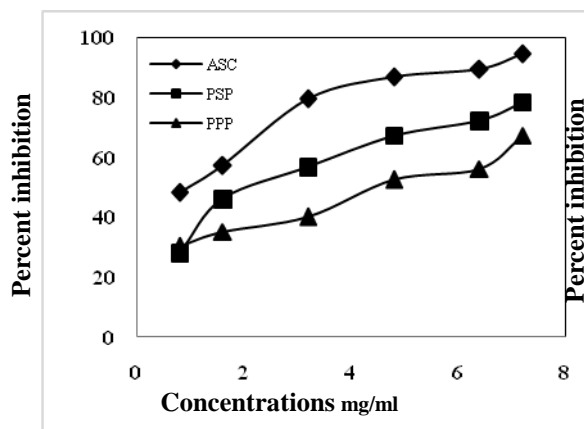


Fig.2 Percentage scavenging activity peel samples

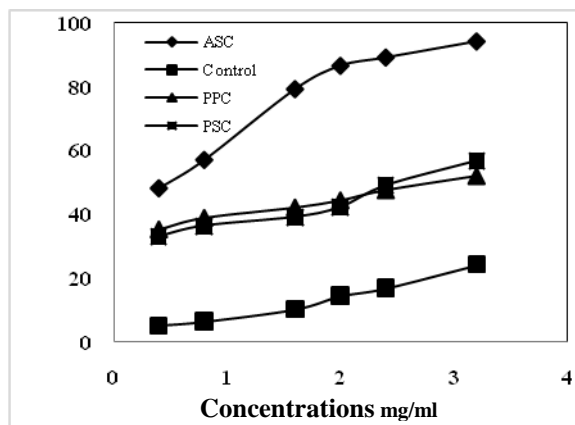


Fig.3 Percentage scavenging of activity of developed chapathis

Free radical scavenging assay by DPPH method

In the present study, the free radical scavenging potentials of the extracts at different concentrations were tested to deduce the IC_{50} value and lower the values better the scavenging activity. The total phenol and flavonoid contents in the PSP and PPP extracts could be responsible for the observed DPPH radical scavenging activity.

The percentage scavenging activity of PSP and PPP samples by DPPH method was given in figure 2 and percentage scavenging activity of control, PSC and PPP samples were given in figure 3.

The IC_{50} were 0.11 and 0.18 mg/ml for PSP and PPP. The control chapathi, PPC and PSC had IC_{50} of 0.60, 0.38 and 0.35 mg/ml respectively. The increase in the antioxidant activity of PPC was 57.89% and for PSC it was 65.78%. It can be concluded that PSC chapattis had the higher potency than PPC chapattis and both the developed chapattis had free radical scavenging activity than control chapathi. Similarly the antioxidant activity of 92.7% was in pomegranate peels, 75.9% in lemon peels and 71.4% was found in orange peels (Singh and Immanuel, 2014).

The results revealed that the addition of PPP and PSP extract to DPPH solution caused a rapid decrease in IC_{50} values as indication to its good scavenging activity. The results indicated that PPP and PSP has a noticeable effect on scavenging free radicals. This could be attributed to its high content of phenols, tannins, β carotene and flavanoids. The IC_{50} values were 0.11 and 0.18 mg/ml for PSP and PPP. The control chapathi, PPC and PSC had IC_{50} of 0.60, 0.37 and 0.35 mg/ml respectively.

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