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DEVELOPMENT OF PAPAYA PEEL FLOUR BASED CHAPATTI AND EVALUATION OF ITS QUALITY

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ABSTRACT

Consumption of natural bioactive compounds and dietary fibre offers health benefits and protection against various diseases. The focus of this research was to develop papaya peel flour from raw papaya and utilizing the papaya peel flour for the development of value added chapatti. Fresh papaya was blanched, peeled, cut into small pieces, further washed and treated with sanitizer, tray dried and finally grinded to powder form. Prepared papaya peel flour was evaluated for chemical analysis. In the present study the moisture (%), ash (%), acidity, fat (%), insoluble solid(%),soluble solid(%), protein content(%), vitamin C, total fibre, total carbohydrate and antioxidant content of papaya peel flour were estimated as 13.63%, 5.25%, 163% ,1%, 80%, 20%, 8.64%,22I.U,33.5%,38.88% and 514.6mg/100gm respectively. Papaya peel flour fortified chapatti were formulated by incorporating 5%, 7.5% and 10% papaya peel flour with ordinary flour in the present investigation. Experimental result revealed 5% peel flour formulated chapatti gives the best results in terms of physicochemical quality. The physicochemical and nutritional quality parameters viz. moisture(%), ash(%), acidity, fat(%),vitamin C, insoluble solid (%),soluble solid(%),protein content(%),total fibre, total carbohydrate and antioxidant content of all fortified varieties of chapatti were determined. The best result obtained for 5% papaya peel fortified chapatti and was determined as 10.35%, 4.5%, 0.02%, 15.4%, .31U, 85%, 15%,9.3%,.017%,60.43% and 9gm/100gm respectively. Now the experimental result revealed that papaya peel flour fortified chapatti contains significant amount of protein and antioxidant in comparison to its ordinary counterpart which improves its nutritional characteristics. Sensory evaluations of all fortified varieties were also carried out and it was found that 5% papaya peel flour blend for chapatti formulation was acceptable. Therefore 5% papaya peel flour based formulated chapatti proves enhanced nutritional properties, physicochemical characteristics and organoleptic attributes.

KEYWORDS- *Papaya peel flour, value addition, antioxidant, sensory evaluation, nutrition*

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INTRODUCTION

Papaya (Carica papaya L.) belongs to the family Caricaceae. Papaya (*C. papaya L.*) is the fourth most important tropical fruit around the globe[9]. The major producers of papaya in the world are Australia, United States, Philippines, SriLanka, South Africa, India, Bangladesh, Malaysia and a number of other countries in tropical America[1].Some of the active compounds in papaya are ascorbic acid (108 mg/100 g), antioxidant, β-carotene, α-tocopherol, flavonoids, vitamin B1, papain and niacin[7, 9.] Fruit processing results in large amounts of waste as by products such as peels and seeds. Thus, by-products and its further utilization in the production of food additives or supplements with high nutritional value have aroused great interest since they are high-value products It is very much interesting that such wastes are important sources of sugars, minerals, organic acids, fibber, and phenolic compounds that have a wide range of pharmacological activities, which include antitumor, antiviral, antibacterial, cardio protective, and anti-mutagenic activities[5]. In addition, these components help to maintain health and prevent diseases such as cancer, cardiovascular and many other degenerative diseases[6].Fortification of these nutritional constituents in processed food products is a way to increase daily cooking by creating new recipes such as jellies, pies, juice, and pastries, in addition to nutritionally enriched diets, providing more fiber, vitamins, and minerals[13].[13]elaborated preparations using papaya seed cake and papaya peel jam and observed an increase d fibre content and sensory analysis were conducted. In many countries, cookies are generally consumed and it could be considered as a vehicle for nutrient transfer [2]. A number of studies have been reported on the improved nutritive value of high protein cookies made of composite flour such as a blend of soybean[13] and unripe banana flour replacing the wheat flour. Rice and black bean extruded flour replacing wheat flour can be considered as a good source of protein and fibre and reducing lipids in cookies[10]. This study was conducted with the objective to produce and analyze papaya waste (peel) flour for its chemical constituents with the purpose to use it in preparations and formulations of nutritionally enriched value added cookies in terms of nutritional properties, physicochemical characteristics and organoleptic attributes.

II. MATERIALS AND METHODS

Papaya fruits were brought from the local market of Deralakatte. They were selected according to the ripening stage (completely yellow peel, when the fruit is suitable for consumption), to color uniformity, average size, and absence of defects. The criteria reported by [4]were used to determine the maturity indices of the fruit and according to this, the ripe fruit was selected for this purpose. Figure 1, figure 2 and figure 3 represents ripe papaya, papaya peel flour and papaya peel flour fortified chapatti respectively. Moreover manufacturing of papaya peel flour and papaya peel flour based chapatti were represented by flow charts 1 and 2. The finely grinded papaya peel flour was then considered for further analyses. This flour was then incorporated for the preparation of papaya peel flour based chapatti.

Figure 1: papaya peel

Figure 2: Papaya Peel flour

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Figure 3: Peel incorporated Chapati

Flow Chart 1.
Preparation of Papaya Peel Flour

Papaya
↓
Washed in normal water
↓
Peeled manually
↓
Peels cut & washed & kept in container dipped in water
↓
Sanitized using 6 drops of zeolin & kept covered for 15 mins
↓
Dried for 24 hours at 60ºC in hot air oven
↓
Powered and stored in sealed container.

Flow Chart 2. Production of Value Added Chapatti from Papaya Peel Flour

Control (sample containing 100% of wheat flour) and (3 samples containing wheat flour:
Papaya peel flour 95:5, 92.5:7.5 & 90;10
↓
Addition of 2ml of oil
↓
Pinch of salt
↓
Mixed well with adequate amount of water and preparation of dough
↓
Cook at 80ºC - 100ºC

DETERMINATION OF PHYSICOCHEMICAL AND NUTRITIONAL CHARACTERISTIS OF PAPAYA PEEL FLOUR AND PAPAYA PEEL FLOUR BASE CHAPATTI

All the samples are analyzed for acidity, ash content, moisture content, lipid, soluble protein, soluble solid, insoluble solid and total antioxidant (polyphenols content) and determined by using (AOAC,2012).

SENSORY ANALYSIS OF PAPAYA PEEL FLOUR BASED CHAPATTI OF DIFFERENT FORMULATIONS

A 9 point hedonic scale (1= lowest desirability, 9= highest desirability) is designed to evaluate the sensory characteristics of wheat based chapatti and formulated (wheat flour: papaya peel flour) based chapatti by using ten trained panellists[8].

RESULTS AND DISCUSSIONS

Evaluation of physicochemical and nutritional composition of papaya peel flour

The results of the proximate composition obtained for papaya waste peel flour are shown in Table 1.

Table 1. Average values of the proximate composition of papaya peel flour

Sl No.	Physicochemical & nutritional quality parameters (%)	Papaya peel flour (%)
1.	Ash content	5.25
2.	Acidity as citric acid	.163
	Vitamin C(I.U)	.22 IU
3.	Moisture	13.63
4.	Lipid	0.1
5.	Soluble protein	8.64
6.	Soluble solid	20
7.	Insoluble solid	80
8.	Antioxidant content(mg/100gm GA equivalent)	514.6
9.	Total fibre	33.2
10.	Total carbohydrate	38.88

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Experimental result shows the significant physicochemical and nutritional characteristics in terms of all nutritional constituents. Moreover, the significant availability of antioxidant and high dietary fibre content proves its health beneficial importance.

Determination of physicochemical and nutritional characteristics of papaya peel flour based chapatti of different formulations

Physicochemical and nutritional characteristics of papaya peel flour based chapatti of different formulations are determined. Results are represented by the following table (table-2A and 2B)

Table 2A.Average values of the proximate composition of papaya peel flour based chapatti of different formulations

Formulated chapatti	Moisture (%)	Ash (%)	Acidity (%)	Fat (%)	Vitamin C
Control (100:0)	12.75	0.93	0.12	.42	-
90:10	12.12	3.8	0.05	12.4	-
92.5:7.5	11.64	4.0	0.03	13.6	.28
95:5	10.35	4.5	0.02	15.4	.31U

Table 2B. Average values of the proximate composition of papaya peel flour based chapatti of different formulations

Formulated chapatti	Insoluble solid (%)	Soluble solid (%)	Protein (%)	Total fibre	Total carbohydrate	Antioxidant (gm/-100gm)
Control (100:0)	95	5	1.08	.08	84.74	-
90:10	90	10	8.14	.012	63.53	7.8
92.5:7.5	88	12	8.6	.014	62.14	8.4
95:5	85	15	9.3	.017	60.43	9

The analytical data of control and different formulated papaya peel flour based chapatti are represented by table 2. The experimental results clearly shows the significance of 5% formulated papaya peel flour based chapatti in terms of nutritional constituents and antioxidant content in comparison to other formulated chapatti (92.5%:7.5%,90%:10%) and control(100%:0%).The significant dietary fibre of 5% formulated papaya peel flour based chapatti contributes high digestibility and consumers acceptance in terms of health benefit. Therefore this formulated variety will be considered for further studies.

Evaluation of sensory characteristics of papaya peel flour based chapatti of different formulations in comparison to ordinary chapatti

Sensory or organoleptic characteristics of ordinary and formulated chapatti (i.e. wheat flour: 95:5; 92.5:7.5 & 90:10) are represented in figure 6.In this study all organoleptic parameters like appearance, colour, body and texture, flavor, mouthfeelness and overall acceptability i.e. six attributes are considered.

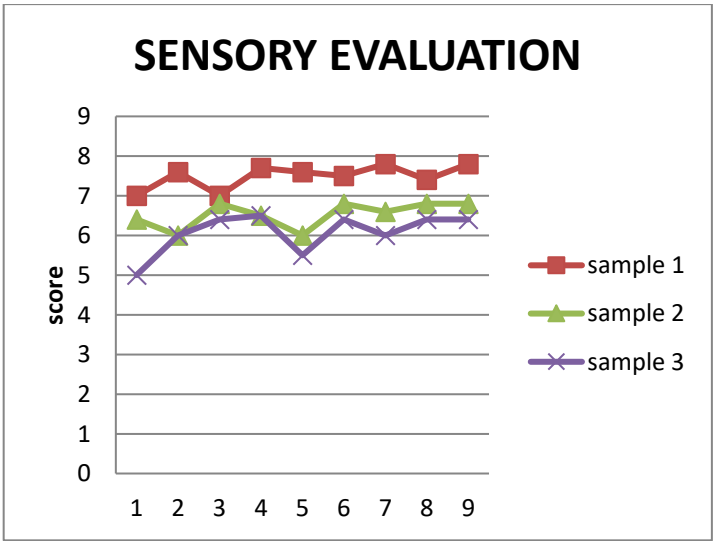

Figure 6. Sensory quality of papaya peel flour formulated chapatti

Sensory evaluation revealed that formulated chapatti of wheat flour: papaya peel flour (95:5) shows better overall acceptability of 7.6 in comparison to other formulations like wheat flour: papaya peel flour 92.5:7.5 and 90:10 of 6.8 and 6.4 respectively. Moreover consistent values of other sensory attributes are observed in the former formulations. It is interestingly recorded that though the overall acceptability of the control i.e. wheat flour: papaya peel flour(100:0) is higher i.e.8.0 than 95:5 formulation but due to significant antioxidant and dietary fibre content the later one is considered for further studies.

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CONCLUSION

The knowledge about the chemical composition of papaya peel provides useful information for industries interested in using papaya by-products, reducing waste, and adding value to the fruit bringing benefits to the environment. It is important to analyze the composition of the papaya peel flour to utilize properly for the production of papaya peel flour based chapatti. Evaluation of physicochemical and nutritional quality of papaya peel flour and different formulated papaya peel flour-based chapatti and its sensory characteristics for quality enhancement are considered in our study. It is interestingly observed that the antioxidative potential as well as keeping qualities are improved in case of formulated wheat flour and papaya peel flour-based chapatti. It is found from the sensory evaluation that the overall acceptability of 5% formulated papaya peel flour based chapatti is more in comparison to the other fortified variety. Therefore, papaya peel flour fortified chapatti of specific formulation is found suitable for its better nutritional value as well as sensory characteristics in comparison to other formulated chapatti.

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