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## EVALUATION OF THE SENSORY CHARACTERISTICS OF NAMKEEN PREPARED FROM COMPOSITE PAPAYA SEED FLOUR

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### Abstract

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#### Keywords:

Papaya seeds, papain, Antioxidant, composite flour, sensory evaluation.

The objective of present study was to develop namkeen incorporated with composite papaya seed flour (PSF). The idea behind using papaya seeds was to re-utilize the waste, which is generally discarded. Papaya seeds being rich in protein can be explored as an ingredient in making protein enriched products. The namkeen prepared from composite PSF was baked, keeping in mind the ill effects of fried foods and the rising concern of people over lifestyle disorders.

Two namkeen samples (i.e. test sample and control sample) were prepared. The test namkeen sample contained PSF and gram flour while the control sample contained buckwheat flour and gram flour. The namkeen was standardized using different formulations. On collating the sensory evaluation test results, it was observed that the taste, texture and the overall acceptability mean scores differed significantly ( $p < 0.05$ ). The mean acceptability scores for Sample-A (namkeen sample with PSF) was more acceptable than control sample (namkeen without PSF).

Namkeen prepared from composite PSF could be a boon to savoury industry by adding variety to the shelf. More research could be done so as to mask the dark colour of PSF in the product by processes like frying etc.

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## 1. Introduction

Papaya (*Carica papaya*) is a common tropical fruit used for nutrition as well as medicinal purposes. Apart its fruit, seed, latex and other plant parts of papaya tree have been shown to have medicinal properties [15].

Papaya is one of the very popular tropical fruits belonging to the cactus group of plants. While it can tolerate dry and hot environment, it needs adequate water supply throughout its life span. It prefers deep loamy soils rich in plant nutrient, well drained, good air flow and plenty of sunlight [46].

*Carica papaya* is known with many other common names such as papaya, papaw, pawpaw, chichpu, mamao and melon tree [18].

Papaya is a powerhouse of nutrients and is available throughout the year. It is a rich source of three powerful antioxidant, vitamin C, vitamin A and vitamin E; the minerals, magnesium and potassium; the B vitamin pantothenic acid, folate and fiber. In addition to all this, it contains a digestive enzyme - papain that effectively treats causes of trauma, allergies and sports injuries. All the nutrients of papaya as a whole improve cardiovascular system, protect against heart diseases, heart attacks, strokes and prevent colon cancer. The fruit is an excellent source of beta carotene that prevents damage caused by free radicals that may cause some forms of cancer. It is reported that it helps in the prevention of diabetic heart disease. Papaya lowers high cholesterol levels as it is a good source of fiber [9].

Papaya helps in the digestion of proteins as it is a rich source of proteolytic enzymes. Even papain - a digestive enzyme found in papaya is extracted, dried as a powder and used as aid indigestion. Ripe fruit consumed regularly helps in habitual constipation. It is also reported that papaya prevents premature aging. It may be that it works because a poor digestion does not provide enough nutrients to our body. The fruit is regarded as a remedy for abdominal disorders, the skin of papaya works as a best medicine for wounds. The enzymes papain and chymopapain and antioxidant nutrients found in papaya have been found helpful in lowering inflammation and healing burns. That is why people with diseases (such as asthma, rheumatoid arthritis, and osteoarthritis) that are worsened by inflammation, find relief as the severity of the condition reduces after taking all these nutrients. Papaya contributes to a healthy immune system by increasing the resistance to cough and cold because of its vitamin A and C contents. Papaya included in one's diet ensures a good supply of vitamin A and C that are highly essential for maintaining a good health [9].

### **Papaya Seed**

The papaya seed is currently a waste product as it is often discarded after eating the papaya fruits due to its very limited uses at the moment [6, 7].

Papaya seeds are found embedded in the fruit. They are whitish in coloration in the immature stage of the fruit development and darkish in color when at full maturation of the fruit. It is spherical in shape with an outer coating known as the sarcotesta covering the seed coat and an inner endosperm. Papaya seeds are a rich source of amino acids especially in the sarcotesta [29, 49].

The seed is a rich source of protein (27.8% undefatted, 44.4% defatted), lipids (28.3% undefatted) and crude fibre (22.6% undefatted, 31.8% defatted). The seed is low in free monosaccharide's [36].

The seed extract is used to treat bleeding piles and enlarged liver and spleen. A seed paste with glycerine is applied to cure ringworm and psoriasis. The seeds are beneficial as carminative and thirst quencher. The ripe seeds are taken with rice and useful to treat diarrhoea. The seeds are effective to control diabetes mellitus, hypertension and hypercholesterolemia. A seed decoction is beneficial to cure liver and renal disorders. The papaya seed extracts showed anti-fertility effect, inhibited jejunal contraction and suppressed caudaepididymal sperm motility [52].

Papaya seeds have important nutrients for proper functioning of the human organism. They also have antioxidant activity, as well as high water holding capacity [10].

Contraceptive efficacy of papaya seed extracts have also been well documented in various animal models [33]. Papaya seeds possess herbal medicinal property which is anti-parasitic activity [2]. *Carica papaya* seed extracts had been shown to have several medicinal as well as nutritional properties [37]. The seeds and leaves consist of the significant amount of protein which could be harness for food formulation or supplementation [29,21].

The domestic and industrial utilisation of *Carica papaya* fruit creates major disposal problems in the form of the seed which constitutes 25% of the fruit mass. Disposal of these seeds materials is often compounded by legal restrictions and economy cost to the industry. This "waste material" produces ecological problems related to the proliferation of insects and rodents and an economic burden because of transportation to repositories; therefore strategies for the profitable use of these materials are needed. The making these seeds, leaves or peels economic viable will reduce the economic burden pose to industries making use of the fruit for juice production hence the needs for research scholars to place more emphasis on how the potential of these plant can be optimize [29].

#### **Health Benefits of Papaya Seeds**

Papaya seeds may protect the kidneys from toxin induced kidney failure. Papaya can eliminate intestinal parasites. Cure for piles and typhoid and anti-helminthic and anti-amoebic properties [9]. The seed of papaya has antimicrobial activity against *Trichomonas vaginalis* trophozoites. It could also be used in urinogenital disorder like trichomoniasis with care to avoid toxicity. The seeds, irrespective of its fruit maturity stages have bacteriostatic activity on gram positive and negative organisms which could be useful in treating chronic skin ulcer [44].

The seeds are also effective as a vermifuge and in the treatment of hypertension, diabetes mellitus and hypercholesterolemia [4, 24].

### **Clinical Applications of Papaya Seed**

#### **1. Peptic ulcer**

Papaya seed extract significantly increased gastric pH and percentage of ulcer inhibition relative to indomethacin-induced ulcer rats. The extract significantly decreased gastric acidity, gastric acid output, gastric pepsin secretion, ulcer index and gastric secretion volume relative to the other group taken in the experiment [42].

*Carica papaya* seeds have recently attracted attention as a potential health food, while much of the evidence supporting this notion is unverified. The papaya seeds are nontoxic and might be treated as supplement or eating them whole or the seeds could be grinded [23,9].

#### **2. Human Intestinal Parasitosis**

Human intestinal parasitosis constitutes a significant global health problem with enormous financial implications. Unfortunately, reasons are mainly attributable to poor hygiene; Papaya seeds are efficacious in treating human intestinal parasites [40].

#### **Composite Flour**

Composite flour is a mixture of different flours from cereal, legume or root crops that is created to satisfy specific functional characteristics and nutrient composition. The use of composite flour based on wheat and other cereals including minor millets in bakery products is becoming popular because of the economic and nutritional advantages of composite flour [12, 20].

Composite flour technology refers to the process of mixing various flours from tubers with cereals or legumes with or without addition of wheat flour in proper proportions to make economic use of local cultivated crops to produce high quality food products. Some studies were reported on the use of cereal-tuber-legume combination for the production of various products. It can be deduced from these reports that the qualities of product depend on the proportional composition of the composites and flour properties [15, 8,41, 28].

The FAO reported that the application of composite flour in various food products would be economically advantageous if the imports of wheat could be reduced or even eliminated and that

demand for bread and pastry products could be met by the use of domestically grown products instead of wheat [38, 26].

### **Baking**

Baking involves the exposure of food to dry heat in an oven. Three types of ovens-general-purpose, convection and deck are used for baking. Deck ovens are wide flat ovens made to accommodate one or two baking sheets side-by-side. The heat is controlled by thermostats, often with separate controls for top and bottom heat. The oven are heavily constructed and well insulated to enable them to build up a store of heat. Humidity is controlled by a lever that operates a flue in the back Of the oven. Baked goods such as bread and choux pastry require a steamy atmosphere, so the vent should be closed. For meringues, biscuits and to finish choux pastry goods, where a drying effect is important, the vent should be open. For items such as puff pastry and yeast goods, high starting temperatures are required to make the goods rise before the outside crust is set. This is called oven spring. The temperature may then need to be lowered so that the goods can cook through. Items such as baked custard and meringues require constant low temperatures for poaching in a bain-marie or drying as the case may be [17].

### **Namkeen: A Snack Food**

Ready-To-Eat (RTE) Snacks and Namkeen are generally considered as take away food and usually preferred as hunger quencher and are eaten whenever the consumers are hungry. The sev snack preparation is mainly composed of wheat flour, rice flour and enriched by gram flour [51]

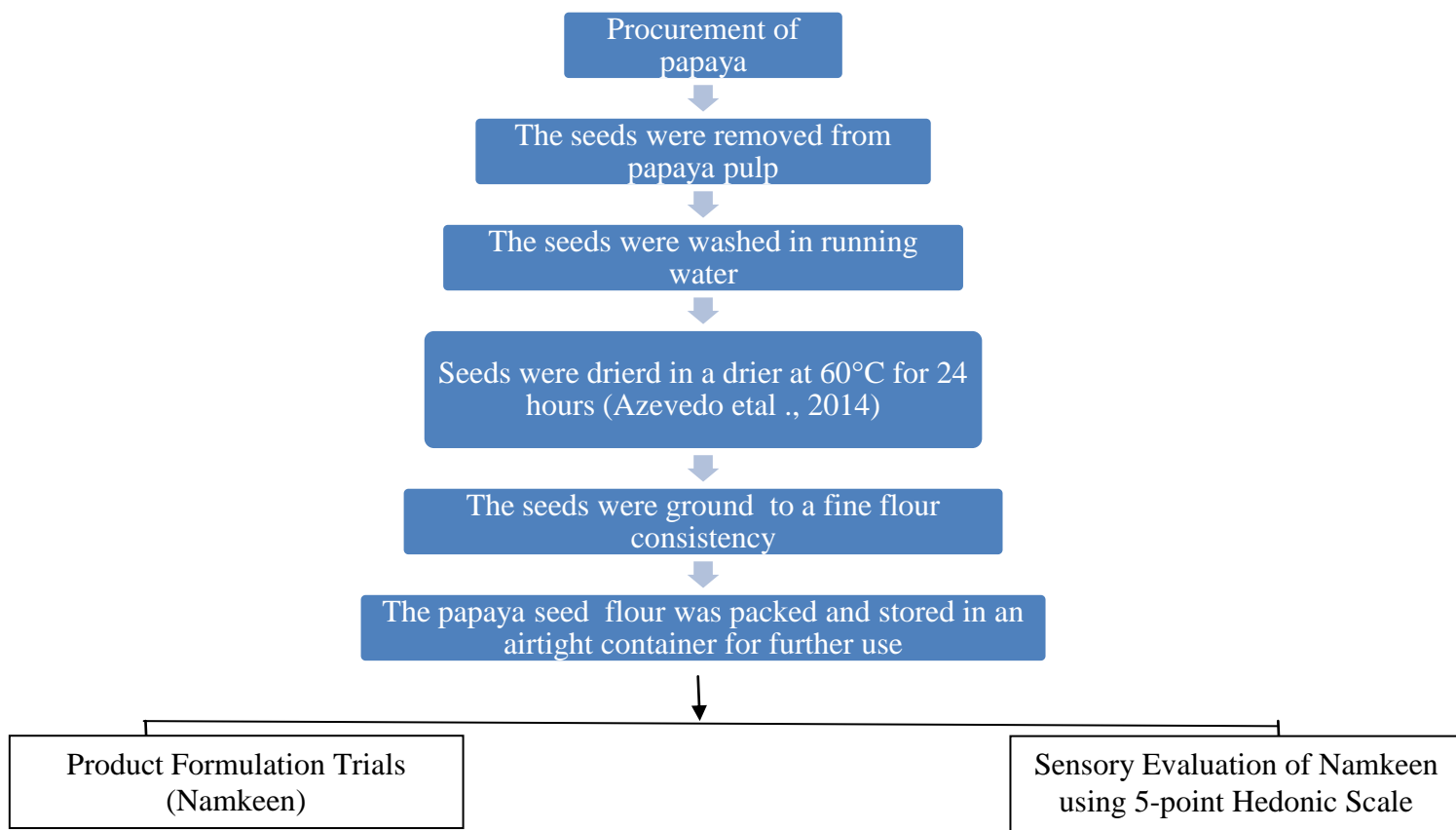
Sev is a popular Indian snack food. It is available in small pieces of crunchy noodles made from chickpea flour paste which is seasoned with turmeric and chili powder and deep-fried in oil. These noodles vary in thickness. Ready-to-eat varieties of sev, including flavoured sev are available in Indian stores. Sev is eaten as a standalone snack as well as a topping on dishes like Bhelpuri and Sev puri [50].

## **METHODOLOGY**

The section includes information about the study design, study population, variables and analytical methods. The term method is used to refer to specific techniques, tools, procedure applied to achieve a given objective.

Methodology refers to the study of the general approach to inquiry in a given field. When we talk of research methodology we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why not we are using others so that research are capable of being evaluated either by the researcher himself or by other. As defined by Polking Horne, the word methodology means- "a study of the plans which are used to obtain knowledge.

### STUDY DESIGN



The study was conducted in the following four phases:

#### Phase I: Procurement of Raw Materials

The raw materials that were used in this study were papaya seeds, gram flour and spices. The papaya seeds were collected from fruit chaat sellers in B.K Chowk N.I.T, Faridabad. The spices and gram flour were collected from the local market of Faridabad.

#### Phase II: Preparation of Papaya Seeds Flour

The papaya fruit was cut and the seeds were carefully scraped out of the endocarp in a clean poly bag. The seeds were then rinsed with clean water. The seeds were sun dried for 3-4 days until dry. The dried papaya seeds were ground in a high speed blender to produce papaya seed flour. The flour was then packed in air tight container and stored in cool place.

#### Phase III: Preparation of Namkeen

The namkeen was prepared using composite flour (containing papaya seed flour and gram flour). The spices used in namkeen were asafoetida (hing), black salt, garlic paste, red chili powder, dry mango powder. In sample-A (i.e. test sample) was made using papaya seed flour, gram flour and spices. They were further mixed together and soft dough was prepared with water. Sample B (i.e. control sample) was prepared using gram flour, buckwheat (kuttu) flour and spices. Both the dough balls were given a resting time of 10 minutes and an oven was pre heated at 180°C for 5-6 minutes. The prepared dough's were fed into extruders (conventional namkeen maker) and then baked. The tray was lastly put in an oven for 6-8 minutes.



Plate No. 3.1 Namkeen Samples

#### Phase IV: Sensory Evaluation of Namkeen

Sensory evaluation is a critical part of food experimentation because it is the means of determining how people, the consumers will react to a food. Sensory evaluation encompasses use of all the senses as they come into contact with the food being evaluated. Usual evaluation includes the judgment on color, as well as on texture. The olfactory sense is utilized in evaluating the aroma of the food, and it also contributes to the overall perception of flavour. The taste buds are significant aspect of their ability to identify sour, sweet, salt, and bitter taste components of flavour (B. Srilakshmi, 2010) [1]

For sensory evaluation a hedonic rating test was used based on which the evaluator was asked to rate the samples on the scale of 1-5 based on appearance, aroma, taste, texture and overall acceptability. The sensory evaluation test was conducted in the Food Science Laboratory, MRIIRS, 20 panellists (10- semi- trained and 10- untrained) were asked to evaluate the product on the criterion given in Table 1.

Table 1: Scale for Hedonic Testing

Hedonic Rating	Score
Liked Extremely	5
Liked Moderately	4
Neither liked nor disliked	3
Disliked Moderately	2
Disliked Extremely	1

The panellists were provided with the sensory evaluation performa, for which they were briefed before the beginning of the sensory session.

Panellists were also provided with water to overcome the taste bud saturation. The samples which were provided to the panellist were coded A and B to avoid biased response.

#### RESULTS AND DISCUSSION

Research is an orderly compilation of the data observed after following the research. Discussion consolidates the data and connects it to the data of other researches. In the discussion one should highlight the main study findings, compare and contrast the results with similar studies and relate the finding to data that highlight the magnitude of the problem.

The present study was carried out to develop namkeen from composite papaya seed flour which envisaged on waste product re-utilization and adding a healthy option to the market shelf.

After the product's formulation it's an organoleptic evaluation was carried in Food Science Laboratory, MRIIRS for various parameters like appearance, aroma, taste, texture and overall acceptability using a 5-point Hedonic Scale.

**Sensory Evaluation of Namkeen**

The developed namkeen samples were subjected to sensory evaluation using 5-Point Hedonic Scale. The mean acceptability scores of various sensory parameters are tabulated in Table 2.

**Table 2: Mean Scores for different Sensory Parameters**

ATTRIBUTES	SAMPLE A	SAMPLE B	p-Value
Appearance	4.26±0.44	4.1±0.76	.015*
Aroma	4.03±0.55	3.9±0.76	.220
Taste	4.5±0.57	3.8±0.76	.00*
Texture	4.27±0.52	3.9±0.83	.02*
Overall Acceptability	4.3±0.46	3.9±0.67	.014*

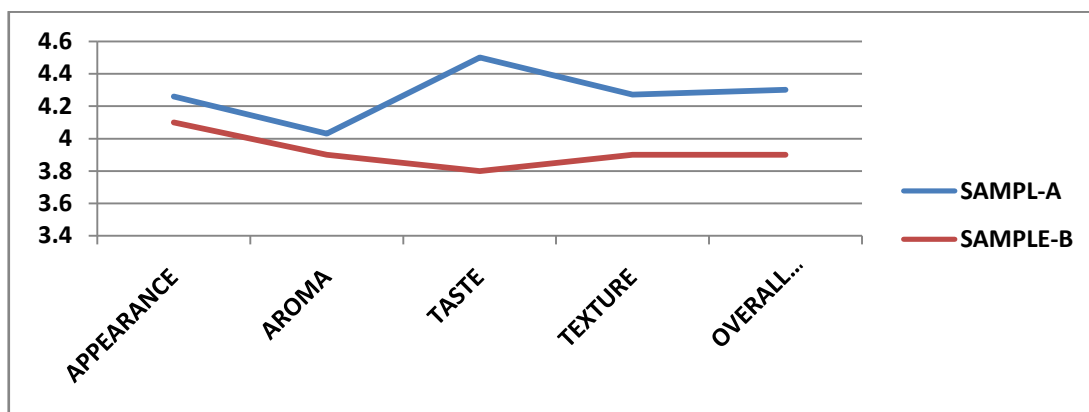
#Values are represented as Mean ± SD; Sample-A: namkeen with composite PSF; Sample-B: namkeen without PSF.

\*Significance value  $p \leq 0.05$  for independent t-test administered

On applying statistical test, Sample A scored higher mean score value for all the sensory parameters (like appearance, aroma, taste, texture and overall acceptability) in comparison to Sample-B.

All the parameters showed significant difference among two namkeen samples (i.e. Sample-A and Sample-B). Sample-A (namkeen with composite PSF) was more acceptable to panellists in comparison to Sample-B (namkeen without PSF). The mean acceptability scores of various sensory parameters are depicted in Graph 1.

**Graph 1: Representation of Mean Acceptability Scores of Sensory Evaluation**



\*Sample-A: Namkeen with Composite PSF and Sample-B: Control namkeen sample (without Composite PSF)

### Summary and Conclusion

The present study was carried out to develop a value added food product i.e. namkeen to know the nutrient content of the developed product using different methods of analysis.

The value added product was developed by waste product re-utilization. The purpose of adding papaya seed flour and gram flour were selected from the local market. The product was developed to increase nutritive value of food product in the market.

The study was carried in four phases. In the first phase, the raw materials were procured from various places. In the second phase, the papaya seed flour was prepared by cutting the papaya fruit and scraping off the seeds from the endocarp, and followed by their storage in a clean polybag. The seeds were then rinsed with clean water. The seeds were sun dried for 3-4 days until dry. The dried papaya seeds were ground in a high speed blender to produce papaya seed flour.

In the third phase, the namkeen was prepared using composite flour (containing papaya seed flour and gram flour). The spices used in namkeen were asafoetida (hing), black salt, garlic paste, red chili powder, dry mango powder. In sample-A (i.e. test sample) was made using papaya seed flour, gram flour and spices. They were further mixed together and soft dough was prepared with water. Sample B (i.e. control sample) was prepared using gram flour, buckwheat (kuttu) flour and spices. Both the dough balls were given a resting time of 10 minutes and an oven was pre heated at 180° C for 5-6 minutes. The prepared dough's were fed into extruders (conventional namkeen maker) and then baked. The tray was lastly put in an oven for 6-8 minutes.

In the fourth phase, Sensory evaluation of namkeen was performed to analyze the overall acceptability. The test was performed using 5-point hedonic rating scale. To measure acceptability, samples were served to panellists in an unbiased atmosphere. In the sixth phase, the data was statistically analyzed by subjecting the data obtained by statistical tools like mean and standard deviation. The statistical significance of sensory value of the two variations was evaluated by independent t-test. The data on sensory quality attributes obtained by panellists showed that there was a significant ( $p < 0.05$ ) among all the sensory parameters. This stated that Sample-A, made from composite PSF was more acceptable than Sample-B, made without composite PSF. The namkeen product made from composite PSF can be a boon to the savoury industry by providing the benefit of variety as well as a nutritive option for consumers.

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