Functional And Sensory Properties Of Papads Developed With Semolina And Chia Seeds

Dr. Luxita Sharma, Shelly Garg, Dr Akanksha Yadav

Abstract: Functional and sensory attributes of Papads made from semolina and chia seeds were studied. Physico-chemical properties of the papads were also calculated. The five samples of papads were divided into the ratios of semolina and chia seeds as 20:60, 30:50, 40:40, 50:30 and 60:20 respectively. Papads were subjected to physical analysis (Papad diameter, papad thickness, spread ratio, bulk volume, bulk density, breaking strength, and color analysis). The papads were also evaluated for industrial acceptance by sensory analysis by hedonic scale. The results of Sensory analysis using the quantitative descriptive analysis method revealed that all samples had good overall quality and had higher scores for the positive attributes, namely color, crispness, snappiness and aroma. The percentage expansion of papads negatively correlated with moisture content of raw and fried papads (-0.86 and -0.76, respectively). The percentage expansion on frying ranged from 32.75 ±2.73 (S4) to 73.53 ±3.47 (S3) and the extent of oil absorption varied from 28.30 ±0.02 (S4) to 49.45 ±0.03 (S3).

Index Terms: Papad, chia seeds, diameter, thickness, bulk density, breaking strength, spread ratio, sensory evaluation and oil absorption.

1 INTRODUCTION
FUNCTIONAL foods are a wide variety of food products which influences a number of body functions that are important for maintaining a healthy well-being and also helps in preventing or controlling various chronic diseases. Chia seeds (Salvia hispanica L.) can be considered as "functional food" because apart from contributing nutrition to the human body, it helps to increase the satiety index, prevent cardiovascular diseases, inflammatory and nervous system disorders and diabetes among many others. Chia seeds are packed with a rich power house of natural omega 3 fatty acids, high quality protein, high dietary fiber, vitamins and minerals and are composed of a wide range of polyphenolic antioxidants that acts as antioxidants. This work is focused on the development and laboratory analysis of a food supplement which was developed from a variation of Chia seeds (Salvia hispanica L.), Semolina (Triticum aestivum), Cumin seeds and Garlic powder. According to Luxita Sharma and Zarrin Ashraf [14], garlic powder and cumin seeds show hepatoprotective activity and hence are used in the development of product. The products were made into five different samples with each sample having all the food ingredients in different varying proportions and the sensory evaluation test was carried out to find out the sample with the most accepted sensory evaluation.

2 BRIEF REVIEW
2.1 Chia seeds
According to Cahill[1] chia seeds are packed with a rich power house of natural omega 3 fatty acids, good quality protein, high dietary fiber, vitamins and minerals and are composed of a wide range of polyphenolic antioxidants that acts as antioxidants and protects the seeds from various chemical and microbial breakdown. According to Ixtaina V.Y., Martinez M.L., et al. [2] chia seeds contain alpha-linolenic and linoleic acid which are the essential fatty acids; Vitamins A, B, E and D and minerals such as sulphur, iron, iodine, magnesium, manganese, niacin, etc. According to Beltran-Orozco et al. [3] Chia is considered as a safe food that has no potential harmful effects and is widely used as a nutritional supplement or as an ingredient in baked goods, cereal bars, cookies, biscuits, bread, snacks and others. Luxita Sharma [10] shows that, it is also used to increase HDL levels, reduce body weight and regulate blood cholesterol. According to the Scientific opinion, chia seeds do not cause any adverse allergic, anti-nutritional or toxic effects. According to EFSA J. (p 1-2) [4], no proof has been found which indicates allergic or adverse side effects caused by consuming chia seeds have been found till date. It was approved as a 'novel food' in the year 2009 by the European Parliament and Council of Europe. The declaration of chia seeds as a 'functional food' by the European Parliament had a great deal of effect on its popularity and today chia seeds are now extensively used as a part of food, consumed and used for different purposes in different countries across the globe.

2.2 Semolina
Cereals are an important source of food and are a staple food for a large part of the world's population. Of all the cereals, wheat (Triticum spp.) occupies a unique position as it is used for the preparation of a wide range of food stuff. According to Chung O.K. and Pomeranz Y. [5], about 50% of the total protein consumed by the human population is supplied by cereals and wheat alone contributes one third of the total cereal protein production. Wheat forms the major source of protein and calories for large section of Indian population. Most of the wheat produced in India, is utilized in the preparation of chapatti’s and other bakery products. But with the changing food habits, wheat is milled into semolina used for the preparation of a number of products.
2.3 Papad
Papador papadumis a thin, crispy, disc-shaped food of the Indian subcontinent and is consumed as countrywide food and is an important part of the meal in an Indian cuisine. In India, a variety of papads are available which are produced from a wide diversity of ingredients. According to Luxita S and Puneeta A. [7], typically, they are made from flour or pastes derived either from lentils, chickpeas, black gram (urad flour) or potato. According to Arya S.S. [6], in addition, papads are also made from tapioca, sago, jackfruit and gelatinized rice flour and wheat flour.

3 MATERIALS AND METHODS
The materials which were used in developing the product were: chia seeds (Salvia hispanica), semolina (sooji), garlic powder, cumin seeds and salt. Chia seeds were bought online from local market, Gurgaon.

4 STEPS INVOLVED
4.1 Roasting
Chia seeds (Salvia hispanica) and semolina were both roasted in a frying pan in an open gas flame until it turned golden brown in color. Roasting enhanced the aroma and flavor of both the ingredients. After roasting was completed, the ingredients were allowed to cool down for further procedure. Dry roasting can be done in a frying pan or wok or in a specialized roaster. It changes the chemistry of proteins in the food, changes the flavor and enhances the scent. Roasting can enhance flavor through caramelization and Maillard browning on the surface of the food. Roasting is applied to a number of foodstuffs.

4.2 Grinding
Chia seeds (Salvia hispanica), Semolina and Cumin seeds were grinded separately in the mixer to make them into flour type. Grinding is a method of food processing where big chunks or particles of food are cut into fine pieces or bits. It is the process of reducing the size of solid food stuffs by mechanical actions, dividing them into smaller particles.

4.3 Boiling
Chia seeds (salvia hispanica) and Semolina were taken in a pan and an adequate quantity of water was added to it and was allowed to boil. Sometime after boiling/cooking, cumin seeds, garlic powder and salt were added and continued to cook until the food product become soft and properly cooked. Boiling is a method by which foods are immersed in water and cooked at 100°C and the temperature of the water are maintained at that temperature till the food becomes soft and tender.

4.4 Procedure for making chia seeds papad
1. In a frying pan, roast the chia seeds, semolina and cumin seeds separately in an open gas flame until golden brown.
2. Allow all the roasted ingredients to cool down.
3. Grind the roasted chia seeds, semolina and cumin seeds in a mixer.
4. In another pan, boil the chia seeds and semolina in adequate quantity of water and add the cumin seeds, garlic powder and salt for taste.
5. Once cooked, allow it to cool down.
6. Now transfer the product in a bowl and knead into dough.
7. Make small balls of the dough.
8. Take a clean transparent plastic sheet and put the ball inside it and roll it out with the help of your hands or a rolling pin in a circular movement.
9. Put the papad in a clean cotton cloth.
10. Repeat step 8 and 9 for the rest of the balls.
11. Once all the papads are rolled and ready, put it under the direct contact of sunlight for drying to take place. Turn the papads from time to time to dry them evenly.

4.5 Drying
The final product (chia seeds papad) was shaped into round disc shaped papad and kept on a clean cloth for sun drying. The product was sun dried for 2-3 days.

5 STANDARDIZATION OF RECIPE
A standardized recipe is a recipe that has been tried, tested, evaluated and adapted for use by a food service. It produces a consistent quality and yield every time when the exact procedures equipment and ingredients are used.

6 VARIATION OF SAMPLES
After collecting all the ingredients required for making the food product, the variation of samples was carried out. Chia seeds (Salvia hispanica) were the key variable for which all the other variables were dependent. Five variation samples were made which contained different quantities and amount of the ingredients.

Fig 1 Various sample premixes
The different variations were made into samples and were taken for sensory evaluation. The hedonic rating test was used and the ratings were calculated and interpreted afterwards. Table 1 shows the ratios as following:

6.1 Sample A  
It constituted 20% chia seeds, 60% semolina, 10% cumin seeds and 10% garlic powder. When translated in quantities; 4 grams chia seeds, 12 grams semolina, 2 grams cumin seeds and 2 grams garlic powder. Altogether made sample of 20 grams.

6.2 Sample B  
It constituted 30% chia seeds, 50% semolina, 10% cumin seeds and 10% garlic powder.

6.3 Sample C  
It constituted 40% chia seeds, 40% semolina, 10% cumin seeds and 10% garlic powder.

6.4 Sample D  
It constituted 50% chia seeds, 30% semolina, 10% cumin seeds and 10% garlic powder.

6.5 Sample E  
It constituted 60% chia seeds, 20% semolina, 10% cumin seeds and 10% garlic powder.
7.4 Physico-chemical properties
The Bureau of Indian Standards (1984) methods were used to find the physicochemical characteristics. The diameter of all papads were same and thickness of papads were measured by model 549 E micrometer (Testing Machines, Inc. Mineola, NY, USA) at four corner points and then mean was taken as final score. The expansion of papads is also important parameter and was calculated by formula of Annapure [11].

7.5 Texture measurements
The texture of raw and fried papads was measured in a SMI texture analyzer model TA-XDi attached with three-point bending (Stable Microsystem, Surrey, UK). The breaking strength was measured under the following conditions: load cell, 50 kg; crosshead speed, 100 mm/min. The average force of five replicates from each brand was reported in Newtons, and the data were subjected to Duncan’s Multiple Range Test (Duncan 1955).

Percentage Expansion
The percentage expansion on frying was calculated using the formula given by Annapure [11]. Values are reported as the mean±standard deviation.

Papad diameter, papad thickness, spread ratio, bulk volume, bulk density

7.6 Papad Thickness
The thickness was measured by placing ten papad stacking to one another. The thickness was measured in centimeter with the help of vernier calipers. The process was repeated three times to get the mean thickness in centimeters.

7.7 Papad spread ratio
Papad spread was calculated by using the following formula –

\[ \text{Spread Ratio} = \frac{\text{Diameter}}{\text{Thickness}} \]

7.8 Bulk Volume
Bulk volume of cookies was determined with slight modifications to the method given by Mir N. A. et al [12].

7.9 Bulk density
Bulk density of cookies was determined by the help of bulk volume and weight of cookie, using the following formula-

\[ \text{BD} = \frac{\text{Weight}}{\text{Bulk Volume}} \]

7.10 Bulk density Measurement
Bulk density was tested by the procedure as described by Mir et al. [13]. For loose bulk density, the material used was an unfilled and dried 50 ml measuring flask was taken. The flour was made to fall freely in the flask till mark and tapping was done simultaneously. The pre weight and post weight of the flask was measured. For packed bulk density, again the sample tapping was done using the help of rubber pad. The sample was added again till the mark before weighing. The results were reported as g/ml.

8 RESULTS AND DISCUSSION
According to Table 2, the sample A was proved to best as the mean scores given to the sample by the experts were the highest. The taste, color, texture, firmness and overall acceptability of Sample A proved to be best. The firmness for sample A papad was best which is most important trait when we make papads.

The nutritional composition of papads was calculated by AOAC methods. The values are depicted in Table 3.

The Table 4 shows the various parameters of the papads. The diameter of dried sample of papad A, B, C, D and E was 10.3±.04, 10.05±.07, 11.06±.14, 10.50±.12 and 10.40±.05 respectively. During frying, the diameter of the papad was reduced to 10 percent their original size. The moisture content of dried papads was reduced from 90 percent to 15 to 18 percent. The papads pH was alkaline in nature. Deep frying of papads causes the hardening of the texture and breaking strength is increased. The gelatinization of chia seeds causes physical changes in the texture of papads. The breaking strength of Sample A was highest i.e. almost double as compared with Sample E in which there was greater ratio of chia seeds. This concludes that elevated chia seeds quantity increased the breakage of papads.

9 Conclusion

This was done for the development of nutritionally adequate food product or papads. As traditionally developed papads are not nutritionally adequate. The chia seed papads are infused with many macro and micronutrients and thus making it nutritionally fit for consumption, when compared to traditional ones.

10 References


