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Studies On The Acceptability Of Some New Food Products Prepared From The Seeds Of *Cucurbita maxima*

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Abstract: *In this research work, an attempt was made to popularize the seeds of Cucurbita maxima or pumpkin seeds as food by formulating some new food preparations using the seeds and also to determine their acceptability. Five new food products were prepared from the seeds. The acceptance of those food items were evaluated by a sensory panel of 100 human subjects having normal health. The respondents were divided into two different age groups 10-20 years and 21-50 years respectively. Acceptability was measured by applying a 5-point hedonic rating scale to the feedback provided by the sensory panel on the appearance, taste and smell of the food items. Nutritive values of those products were also calculated. The experimental food items were found to have been well accepted by the sensory panel.*

Keywords - *acceptability, hedonic rating scale, nutritive value, pumpkin seed, sensory panel*

I. Introduction

Though the flesh of different vegetables have found their way into the Indian diet for time immemorial, the seeds have almost always been discarded as waste in spite of having a great nutritive value. One of such type of seed is seed of *Cucurbita maxima* . These seeds are known as pumpkin seeds in India and have been categorized as less familiar foodstuffs in the book 'Nutritive Value of Indian Foods', published by ICMR.[1] The seeds of *Cucurbita maxima* have been known to have a multitude of health benefits.. These seeds have antiparasitic activity due to the presence of cucurbitin.[2]Pumpkin seeds have been used in the treatment of benign prostatic hyperplasia,[3,4] urinary tract problem, gastritis & to remove tapeworms and roundworms from the intestine,[5]depression,[6] most common type of kidney stone[7]and acrodermatitis enteropathica.[8]From the analysis done by Gopalan et al (2000),it has been revealed that pumpkin seeds have high amount of fat (47.2gm/100gm), considerable amount of protein(24.3gm/100gm), iron(5.5mg/100gm), calcium(50mg/100gm) and phosphorus(830mg/100gm) in comparison with other oil seeds.[1]These seeds can be considered as a good source of Choline which is essential for brain development.[9]Inspite of being highly nutritious and having some known medicinal values, these seeds have still not come into the limelight and are relatively less acceptable amongst the people as compared to other oil seeds like groundnuts and cashew nuts, though nutritionally the seeds of *Cucurbita maxima* can easily be compared to the above mentioned seeds. Although in some rural areas sometimes these seeds (roasted/fried) are taken with puffed rice but majority people do not know the utility and use of these seeds. An extensive review of literature throws light on the fact that these seeds contain a lot of valuable nutrients and may provide considerable nutritional value to the Indian diet. This research work is an attempt to acquaint the people with these neglected seeds and to determine whether these seeds can find acceptability with the people and therefore included in the diet. Hence the aims and objectives of the present research are to:

a. Prepare some food products for human subjects.
b. Determine the acceptability of these food items across the age groups.
c. Calculate the nutritive values of the prepared food items.

II. Materials And Methods

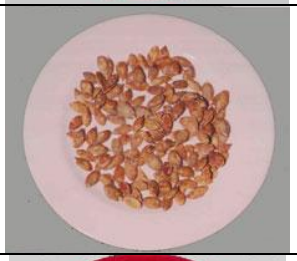
2.1 Collection of seeds

Pumpkin seeds were collected from vegetable sellers of the local market .These were then cleaned, thoroughly washed with water and sun-dried. The seeds were then dehusked and preserved in a dry, clean container for preparing the food products.

2.2 Item of some new food products

Five new food products were prepared from pumpkin seeds by mixing the ingredients in suitable proportions:

Table I - New Trial Food Products

Items	Ingredients	Images
Item-1 (Roasted pumpkin seeds with sugar)	Pumpkin seeds, Sugar, Water	
Item –2 (Roasted pumpkin Seeds with molasses)	Pumpkin seeds, Molasses, Water	
Item -3 (Biscuit)	Pumpkin seeds, Refined wheat flour, Powdered sugar, Butter, Milk, Baking powder.	
Item -4 (Barfi)	Pumpkin seeds, Sugar, Butter, Water	
Item -5 (Tikia)	Pumpkin seeds, Onion, Ginger, Garlic, Green chili, Sugar, Salt, Oil and Water	

2.3 Calculation of the nutritive value of prepared food items

The nutritive value of each of the five new food products were calculated with the help of the book named "Nutritive Value of Indian Foods"written by C. Gopalan.[1]

2.4 Experiment on the acceptability of these food products

A sensory panel consisting of 100 human subjects was chosen randomly irrespective of age and sex. The details of the test panel are given in the table below.

Table II - Age-wise distribution of subjects based on sex

Age Group (in years)	Total	Male	Female
Age between 10 and 20	50	27	23
Age between 21 and 50	50	26	24

The five new food preparations were given to each member of the panel. They evaluated the appearance, taste and smell of these products using a 5-point scorecard proforma based on the 5-point hedonic rating scale [10,11] given below.

Table III - 5-point hedonic rating scale

Score	Interpretation
1	Extremely dislike
2	Dislike
3	Neither like nor dislike
4	Like
5	Extremely like

III. Results And Discussions

3.1 Determination of the acceptability of five new food products

A sensory panel was prepared by selecting 100 people having normal health. They were divided equally into two different age groups 10-20 years and 21-50 years respectively. The final results have been obtained by applying the 5-point hedonic rating scale on the actual feedback obtained from each of the respondents.

Table IV - Parameter wise and overall mean rating scores for five food items based on the feedback of respondents in age group of 10 – 20 years

Parameter	Item 1 (Roasted Pumpkin Seeds with sugar)	Item 2 (Roasted Pumpkin Seeds with molasses)	Item 3 (Biscuit)	Item 4 (Borfi)	Item 5 (Tikia)
Appearance	3.1	3.4	4.6	4.7	4.2
Smell	3.8	3.3	4.3	4.2	4.2
Taste	4.2	3.8	4.7	4.9	4.6
Mean Score	3.7	3.5	4.5	4.6	4.3

Table V - Parameter wise and overall mean rating scores for five food items based on the feedback of respondents in age group of 21 – 50 years

Parameter	Item 1 (Roasted Pumpkin Seeds with sugar)	Item 2 (Roasted Pumpkin Seeds with molasses)	Item 3 (Biscuit)	Item 4 (Borfi)	Item 5 (Tikia)
Appearance	3.8	3.7	4.6	4.8	4.1
Smell	3.9	3.3	4.3	4.4	4.2
Taste	4.3	3.8	4.8	4.9	4.5
Mean Score	4.0	3.6	4.6	4.7	4.3

Table VI - Item wise interpretation of overall scores based on 5-point hedonic rating scale applied to feedback provided by respondents of both age groups

Items	Age group 10 – 20 years	Age group 21 – 50 years
Item 1(Roasted Pumpkin Seeds with sugar)	Like	Like
Item 2(Roasted Pumpkin Seeds with molasses)	Like	Like
Item 3(Biscuit)	Extremely Like	Extremely Like
Item 4(Borfi)	Extremely Like	Extremely Like
Item 5(Tikia)	Like	Like

From Table VI where the overall feedback of all respondents was evaluated, it is seen that items 1, 4 and 5 were liked and items 3 and 4 were liked extremely. Again looking at the interpretation of the parameter wise scores of respondent feedback in Table IV and Table V, it is seen that the smell of item 2 (Roasted pumpkin seeds with molasses) did not evoke a positive response in both age groups. This may have been due to the presence of the characteristic smell of molasses in item 2. Hence an effort may be made to improve the smell of item 2 in future. The appearance aspect of item 1(Roasted pumpkin seeds with sugar) and item 2 (Roasted pumpkin seeds with molasses) was not liked by the respondents in the age group of 10–20 years, on the other hand the same was liked by the respondents in the age group of 21–50 years. This might be due to the fact that the people in the age group 10-20 comprising mainly of children and adolescents are known to give a greater importance on the appearance of a food product than other considerations and hence did not find the appearance of item 1 and 2 to be very appealing. The tastes of all the five food items were found to have been liked by the respondents of both age groups. The food items 3, 4, 5 i.e. Biscuit, Barfi and Tikia were well liked by all respondents with respect to appearance, taste and smell.

3.2 Calculation of nutritive values of food products

Nutritive values i.e. carbohydrate, protein, fat, calorie and iron have been calculated.

Table VII Nutritive Values of New Five Food Items per 100 gm serving

ITEMS	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Calories (kcal)	Iron (mg)
Item 1 (Roasted pumpkin seeds with sugar)	15.6	30.86	45.14	519.6	6.13
Item 2 (Roasted pumpkin seeds with molasses)	18.33	35.43	35.45	533.75	7.73
Item 3 (Biscuit)	11.23	12.25	58.46	474.87	3.49
Item 4 (Barfi)	12.15	23.6	57.8	492	4.72
Item 5 (Tikia)	18.47	45.58	18.92	558	7.19

From the nutritional point of view-

- Item1 is rich in carbohydrate and fat and thus calorie dense food item. So it can be suitable for underweight person.
- Item2 is nutritionally superior to Item 1 as it provides more calorie, protein, fat and iron. Molasses are good source of iron so this Item can be helpful for anaemic patient.
- Item3,biscuit also provides appreciable amount of carbohydrate and calorie, moderate amount of protein, fat and iron. Since this Item is quite tasty and crispy, it is a good choice for children.
- Item4, barfi, contains high amount of all the nutrients so it is very suitable for the patient of PEM, anaemia, underweight etc.
- Tikia, Item5 is moderate in carbohydrate content but provides a very high amount of calorie, because it due to the presence of large amount of fat. As most of the people has a common perception that high fat intake is linked to coronary heart disease and atherosclerosis, but it has been reported that pumpkin seeds contain a good quality fat like phytosterol(β-sitosterol) which is known as to have a positive role in the treatment of hypercholesterolemia.[12]

IV. Conclusion

The seeds of *Cucurbita maxima* or pumpkin seeds have been categorized as less familiar foodstuffs in the book 'Nutritive Value of Indian Foods', published by ICMR.This study was an attempt to include a highly nutritious but neglected food like pumpkin seeds (*Cucurbita maxima*) in our diet. Five new food Items were prepared and were given to a sensory panel consisting of 100 persons of different age groups. According to their responses about appearance, taste, and smell, the acceptability of the products were determined. When it was clear that these products were well accepted, the nutritive values were calculated. From the calculation it has been revealed that these new food products are quite nutritious.

From the positive feedback received from a majority of the respondents of the sensory panel of this study, it has been concluded that all the five new food products have been established as accepted foods for human consumption. By this way these new food items made from pumpkin seeds can be incorporated in our daily diets as a valuable addition.

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