DEVELOPMENT AND NUTRITIONAL EVALUATION OF BROWNIES INCORPORATED WITH PUMPKIN SEEDS FLOUR

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Abstract
Pumpkin seeds are one of the under-utilized crops. Generally it is considered as an agro waste. Now a days pumpkin seeds have received considerable attention due to its health protective and nutritional benefits. The competing demands of taste and health pose a dilemma for consumers as well as the food industry. Consumers are looking for tasty, healthy food based products which might not harm, but may prove to be beneficial for their health. Healthy foods may be formulated with addition of various functional foods, in order to make it palatable and frequently consumable. In this research work, an attempt was made to popularize the seeds of cucurbita maxima as food and nutritious brownies, by formulating brownies with incorporation of roasted pumpkin seed flour. Pumpkin seed flour was processed into powder and used to substitute wheat flour in production of brownies. Brownies were prepared from different blends of wheat flour and pumpkin seed flour in the ratios of 100:0, 90:10, 80:20, 70:30, 60:40 and 50:50 respectively. The brownies were analysed for organoleptic and nutritional properties. The organoleptic evaluation showed that brownies made from 40% of pumpkin seeds flour were highly acceptable and they are more nutritious than control brownies. The developed brownies were rich in energy, protein, fat, carbohydrate, fibre, iron, calcium and ash.

Keywords: Pumpkin Seed Flour, Formulation, Brownie, Nutritional Property

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INTRODUCTION

Pumpkin seeds have gained in depth attention in current times due to the good nutritional properties and health shielding values. Pumpkin seeds are small, flat, green, edible seeds and also called as pepitas. These seeds are the most important part of pumpkin and are discarded after the pre-processing of the fruit. But nowadays, it is commonly commercialized as a savory appetizer.[1]Pumpkin seed may be small but they are the little power house of nutrients and health benefits. Pumpkin seeds are a complete protein source because it contain all essential amino acids including good amount of energy, fibre, iron, calcium, ω-3 fatty acid, phytosterols and β- carotene. It contain innumerable nutritive properties, which are known to defend against chronic and serious illness like heart ailments and cancer.Pumpkin seed acts as a weapon for fighting diseases such as arthritis, inflammation, prostate cancer etc. They can be consumed regularly without causing any side effects on human health.The extracts of *Cucurbita maxima* seed shows the properties of anti-diabetic, anti-hyperlipidemic lowering each sterol and lipoid and also increases HDL-cholesterol in streptozotocin induced diabetic rats.[2]

Pumpkin seeds are cheapest and nutrient dense food. Tryptophan existing in these seeds aids in milk production in lactating mothers.[1]Pumpkin seeds have a good amount of fiber. They contain 31.48 % crude fiber. Fiber present in pumpkin seeds can prevent constipation, diabetes, prolong intestinal transit time, lower cholesterol level and provide satiety, that is beneficial for obese people to control the body weight. Another fascinating benefit of pumpkin seed flour is that it is gluten-free, therefore it can be recommended to

the patients suffering from gluten intolerance or celiac disease.[3]

The less awareness about pumpkin seeds nutritional values among people and pumpkin seed based food products are less in market help to carry out this study in successful way. So, in this research work an attempt was made to popularize the seeds of *Cucurbita maxima* as a food product by formulating the brownies as well as to improve the nutritional value of brownie by incorporating pumpkin seed flour with wheat flour. Brownies usually contain less balanced nutrients, therefore, it is regarded as food that contains a less nutritional value that can be utilized by the body.[4] Keeping the above information in view, the present study has been designed to evaluate the brownies incorporated with pumpkin seeds.This research work will favour for children and adolescent to eat a nutritious food products like brownie incorporated with pumpkin seed flour. This study may guide the researcher, scientist for future research work and also for food industries to make innovative food products using pumpkin seeds.

OBJECTIVES OF THE STUDY

- To develop the Brownie incorporated with *Cucurbita maxima* (Pumpkin) seeds flour with different proportions.
- To analyse the Sensory and Nutritional properties (Energy, Carbohydrate, Protein, Fat, Fiber, Iron and Calcium) of Brownie incorporated with *Cucurbita maxima* (Pumpkin) seeds flour.

PHASE-I

SELECTION OF INGREDIENTS

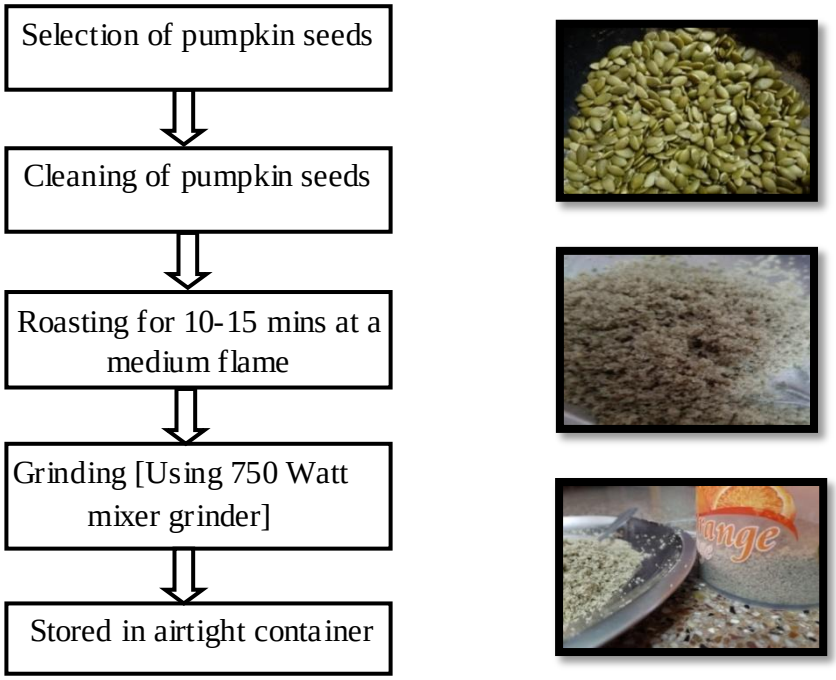
The ingredients for the preparation of brownie were purchased from the local supermarket in chennai.

PHASE-II

PREPARATION OF PUMPKIN SEED FLOUR

The collected pumpkin seeds were dry roasted till moisture goes off, cooled and powdered using mixer grinder (750 Watt) as given by Kaur Manpreetet. al (2018).[5] The flow chart in **(Fig 1)** shows the preparation of pumpkin seed flour.

Fig 1.FLOW CHART FOR THE PREPRATION OF PUMPKIN SEED FLOUR



FORMULATIION OF PUMPKIN SEED FLOUR INCORPORATED BROWNIES

The product brownie was prepared in the food laboratory of Department of Home Science, S. D. N. B Vaishnav College, Chennai. Brownie is first prepared with wheat flour, standardised and kept as control. The pumpkin seed flour is incorporated in five different levels (10%, 20%, 30%, 40% and 50%) with the wheat flour and brownies were prepared and standarised.
The flow chart for the preparation of brownies was given in **Fig 2** followed from the method revealed by Selvakumaran et al (2017)[6]. Variations of pumpkin seed flour incorporated brownie is given in **Table 1.**

CONSUMER ACCEPTABILITY

The consumer acceptability was carried out by evaluating, one control and five experimental samples by 20 subjects from the Department of Home Science, S. D. N. B Vaishnav College. Each preparation was served to the subjects with one control and five experimental samples. They were asked to score the brownies for appearance, color, texture, flavor, taste and overall acceptability using a score card of 9- point hedonic rating scale. Each product was tested and mean scores were calculated. The highly scored sample is selected for further studies.

Fig 2: FLOW CHART FOR THE PREPARATION OF BROWNIE

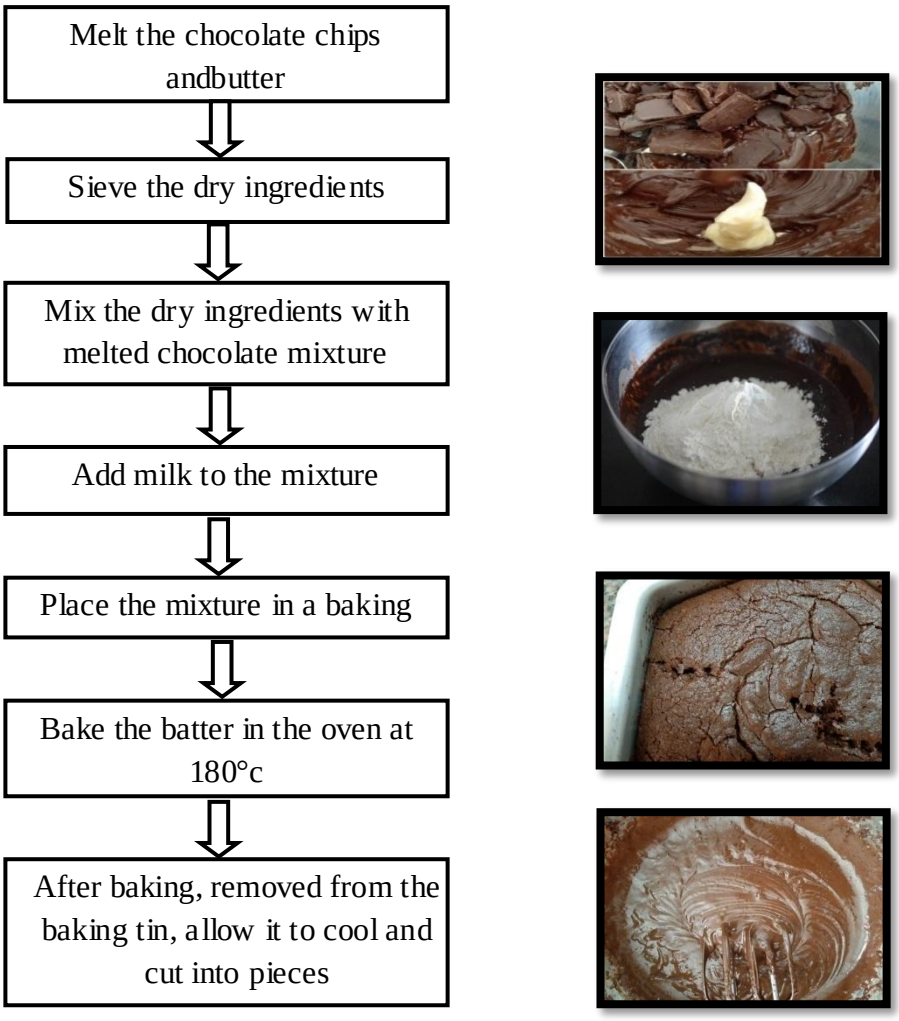


Table 1. INGREDIENTS FOR BROWNIE PREPARATION

Name of the recipe	Ingredients	Control (gm)	Sample I (gm)	Sample II (gm)	Sample III (gm)	Sample IV (gm)	Sample V (gm)
Brownie	Wheat flour	100	90	80	70	60	50
	Pumpkin seed flour	-	10	20	30	40	50
	Dark chocolate	30	30	30	30	30	30
	Cocoa powder	20	20	20	20	20	20
	Butter	100	100	100	100	100	100
	Sugar	75	75	75	75	75	75
	Milk	150	150	150	150	150	150
	Baking powder	2.5	2.5	2.5	2.5	2.5	2.5
	Salt	1.5	1.5	1.5	1.5	1.5	1.5

NUTRIENT ANALYSIS

After the development and organoleptic evaluation of products, the highest acceptable brownie along with its corresponding control weretested for nutritional evaluation. Estimation of proximate composition i.e.energy, protein, fat, fiber, carbohydrate and estimation of minerals i.e. iron, calcium was done by using AOAC (2000) standardized methods.

STATISTICAL ANALYSIS

The data obtained are interpreted by using descriptive statistics (mean and standard deviation). The obtained data are further graphically or diagrammatically represented.

RESULTS AND DISCUSSION

ORGANOLEPTIC EVALUATION OF THE DEVELOPED BROWNIES

The developed products were organoleptically evaluated by 20 subjects using 9- Point Hedonic Rating Scale. The different attributes like Appearance, colour, flavour, texture, taste and overall acceptability were considered for the evaluation.Brownie prepared using wheat flour was kept as control and test samples were prepared by incorporating roasted pumpkin seed flour at 5 different levels i.e. 10%, 20%, 30%, 40% and 50%.

From the below Table 2 and Fig 3, it was clear that the maximum mean scores for all the parameters were obtained by sample IV (40% pumpkin seed flour) and was ranged between 8.6 to 8.9 followed by sample III (30% pumpkin seed flour) and sample V (50% pumpkin seed flour). The overall acceptability of control was 7.85 which was lower than all the samples. Hence, control and sample IV were selected for further analysis.

Table 2. MEAN ACCEPTABILITY SCORES OF BROWNIES

Sensory attributes	Control	Sample I	Sample II	Sample III	Sample IV	Sample V
Colour	7.55±0.65	7.75±0.43	8.05±0.49	8.7±0.55	**8.9±0.30**	8.3±0.71
Taste	7.6±0.58	7.45±0.49	7.9±0.62	**8.75±0.43**	**8.75±0.43**	7.85±0.85
Flavour	7.95±0.49	7.45±0.49	7.9±0.70	8.65±0.47	**8.8±0.40**	7.95±0.73
Texture	7.4±0.73	7.3±0.55	7.85±0.72	8.65±0.47	**8.65±0.65**	7.8±0.74
Appearance	7.55±0.58	7.65±0.72	8.0±0.63	8.7±0.45	**8.7±0.55**	7.9±0.83
Overall acceptability	7.85±0.47	7.45±0.49	7.95±0.58	8.65±0.47	**8.75±0.43**	8.05±0.80

Note: Values are expressed with mean and standard deviation
Inference: 9-Extremely good, 8-Very good, 7-Good
Samples: Sample I- 10% Roasted pumpkin seed flour, Sample II- 20% Roasted pumpkin seed flour, Sample III- 30% Roasted pumpkin seed flour
Sample IV- 40% Roasted pumpkin seed flour, Sample V- 50% Roasted pumpkin seed flour

NUTRIENT ANALYSIS

The nutrient analysis of control and sample IV brownies was explained detailed in below and **Table 3** contains the values of nutrients.

- **Energy**- The nutritional evaluation of developed product revealed that the energy content of sample IV (40% of pumpkin seed flour) i.e. 324.13 Kcal/100gm was found to be higher than control (155.77 Kcal/100gm). The values were found to be double the value of control brownies. This may be due to the addition of pumpkin seed flour (40%) which has high energy value.
- **Carbohydrate**- The carbohydrate content of sample IV (40% of pumpkin seed flour) was found to be higher (13.43gm/100gm) when compared to that of control sample (10.35gm/100gm) with wheat flour alone. This may be due to the ingredients present in the brownies especially pumpkin seed flour.

Fig 3.ORAGANOLEPTIC SCORE CHART OF CONTROL AND SAMPLE BROWNIES

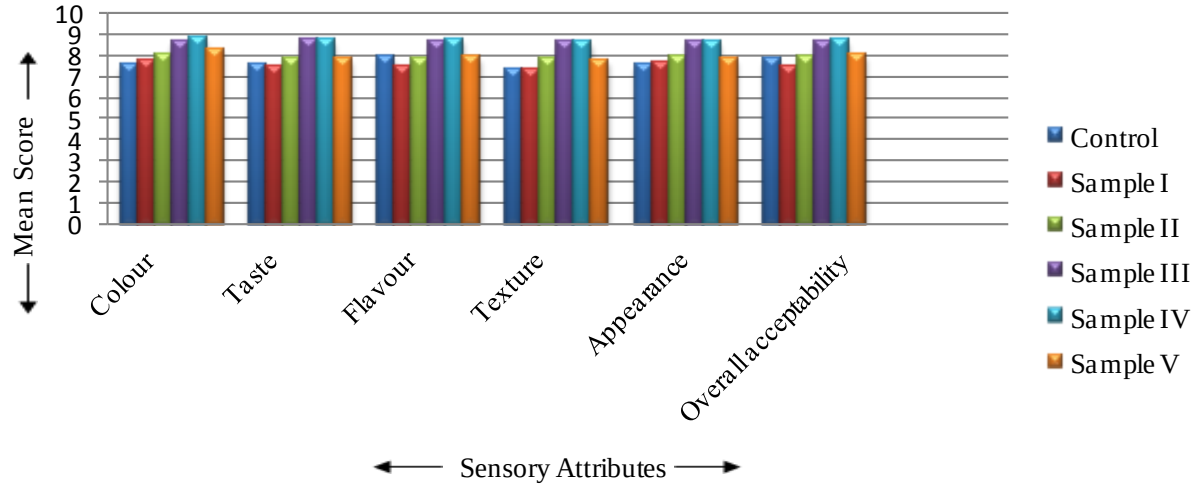


Table 3. PROXIMATE COMPOSITION OF BROWNIES

Product	Energy (Kcal/ 100gm)	Carbohydrate (gm/ 100gm)	Protein (gm/ 100gm)	Fat (gm/ 100gm)	Dietary fibre (gm/100gm)	Iron (gm/ 100gm)	Calcium (gm/ 100gm)
Control	155.77	10.35	8.056	9.13	3.89	9.13	9.13
Sample IV (40% of PSF)	**324.13**	**13.43**	**16.64**	**22.65**	**5.35**	**22.65**	**22.65**

PSF-Pumpkin Seed Flour

- **Protein**- The selected sample IV (40% of pumpkin seed flour) protein was 16.64gm/100gm which is comparatively higher than the control sample i.e. 8.056gm/100gm.
- **Fat**- The fat content of sample IV (40% of pumpkin seed flour) was 22.65gm/100gm which is higher than the control sample i.e. 9.13gm/100gm.
- **Dietary Fibre**- The dietary fibre found in sample IV (40% of pumpkin seed flour) was 5.35gm/100gm which was higher than the control 3.89gm/100gm. The values are found to be doubled the amount of control.
- **Iron**- The result showed that the iron content of control brownies (1.14 mg/100gm) was lower than the sample IV (40% of pumpkin seed flour) i.e. 8.056 mg/100gm. Naturally, pumpkin seeds are rich in iron content.
- **Calcium**- The amount of calcium present in sample IV (40% of pumpkin seed flour) was 7.97mg/100gm which is higher than the control 1.86mg/100gm, it may be due to the presence of pumpkin seed flour in sample brownies.

The result revealed that incorporation of pumpkin seed flour (40%) will improve the nutritional composition of brownie as compared to the control brownie made with wheat flour. It was concluded that pumpkin seed flour incorporated brownie was rich in energy, protein, fibre, iron, ash and calcium.

CONCLUSION

From the above results, it was observed that pumpkin seed flour incorporated in brownies is highly acceptable than the control brownie. The nutrient like energy, protein, fat, carbohydrate, iron and calcium was increased in the brownie (sample IV) incorporated with roasted pumpkin seed flour than the control. Thus, it can be concluded that the consumption of pumpkin seed flour fortified products should be encouraged in routine diet so as to improve the nutritional status of the individuals.

SUGGESTION

- The nutritious brownie is a healthy and innovative snack which is fit for consumption by children and adolescent.
- The brownie enriched with energy, protein, iron, calcium, which makes it as a healthy alternative for the regular brownies consumption.
- The product can not be recommended for diabetes because of sugar content present in it. We suggest that add any other sugar substitute like dates, palm sugar to make the brownies more nutritious and fit for diabetes people consumption.

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