

Development and Nutritional Evaluation of Laddoos Low in Sodium

Research Article

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Article Information: Submission: 11/07/2022; Accepted: 10/10/2022; Published: 14/10/2022

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Abstract

The study was taken up with the objective of development of food products low in sodium to find out their acceptability, nutritive value, proximate composition and mineral content of most acceptable low sodium products. Five recipes in total were evolved. Sensory evaluations of these recipes were done by selected panel of 10 judges based on a 9-Point Hedonic Scale. Product low in sodium content were being developed, namely Sunflower seed laddoo, Flex Seed laddoo, Chia seed laddoo, Sesame seed laddoo, and Pumpkin seed laddoo. These were standardised in the laboratory after several trials. Result showed that among the low sodium product. Sunflower seed laddoo and Chia seed laddoo were highly acceptable as they scored 8 and 8.4 respectively.

Keywords: Low Sodium, Hedonic scale, Sensory evaluation, Overall acceptability, Nutritive value

Introduction

Hypertension, defined as systolic blood pressure >140 mmHg or diastolic blood pressure > 90 mmHg. Hypertension is commonest chronic non communicable disorder found all over world. It is also called as silent killer because in this patient remain mostly asymptomatic, but on the other hand it causes target organ damage it is also a major risk factor for Coronary vascular diseases like Stroke and myocardial infarction. It is a global health problem affecting the people of different ethnicity and ages around the world. In modern medicine the aim of the treatment for hypertension is to prevent the risk of coronary heart disease & cardiovascular disease. Hypertension is responsible for 57% of stroke deaths and 24% of coronary heart disease deaths in India. As per the statistics of Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, the overall prevalence of hypertension in India by 2020 will be 159.46/1000 population. Hypertension will be the major cause of death and disability by the end. The prevalence of hypertension is increasing in both rural and urban communities (1-3).

Materials & Methods

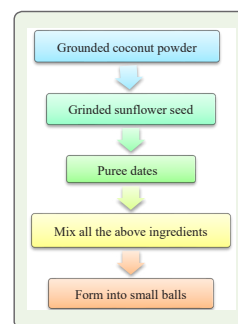
Standardisation and development of product low in sodium

The selected recipes were cooked in the laboratory of Food

and Nutrition, Government Home Science College Sector 10 D, Chandigarh. After cleaning and removing inedible portion, ingredients required for each recipe were weighed on an electronic food balance. The products were developed as per the details given below:

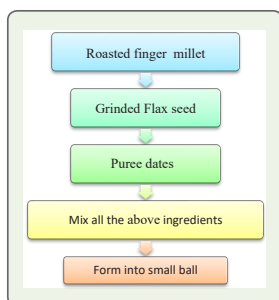
Sunflower Seed Laddoo: Methods and list of ingredients used for the preparation of the sunflower seed laddoo.

List of food products	Amount used
1. Grounded coconut powder	130 gram
2. Grinded sunflower seed	5 gram
3. Puree dates	4-5 dates



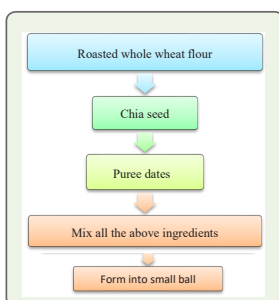
Flax Seed Laddoo: Methods and list of ingredients used for the preparation of the Flaxseed Laddoo.

List of food products	Amount used
1. Roasted finger millet	130 gram
2. Grinded flax seed	5 gram
3. Puree dates	4-5 dates



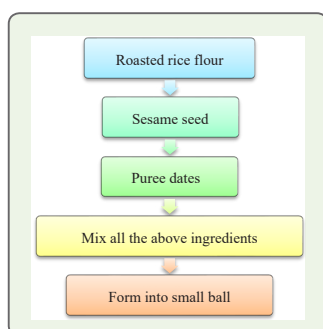
Chia Seed Laddoo: Methods and list of ingredients used for the preparation of the Chia Seed Laddoo.

List of food products	Amount used
1. Roasted whole wheat flour	130 gram
2. Chia seed	5 gram
3. Puree dates	4-5 dates



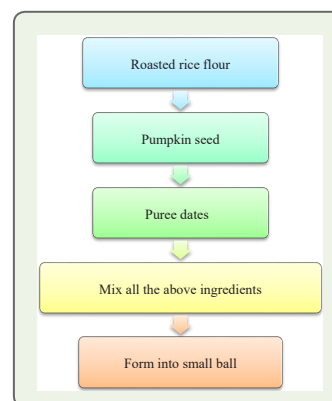
Sesame Seed Laddoo: Methods and list of ingredients used for the preparation of the Sesame Seed Laddoo.

List of food products	Amount used
1. Roasted rice flour	130 gram
2. Sesame seed	5 gram
3. Puree dates	4-5 dates



Pumpkin Seed Laddoo: Methods and list of ingredients used for the preparation of the Pumpkin Seed Laddoo.

List of food products	Amount used
1. Roasted rice flour	130 gram
2. Pumpkin seed	5 gram
3. Puree dates	4-5 gram



Sensory evaluation: Acceptance or rejection of food is largely based on the stimulus of the sense organs of an individual. The sense sight, smell, taste and touch are used in the appraisal of food product. Judges were invited for the sensory evaluation of standardised recipes based on a 9-Point Hedonic Scale. The sensory qualities were evaluated by the panel of 10 judges for ensuring the acceptance of the products. The degree to which a product was liked graded as: liked extremely-9 points, liked very much-8 points, liked moderately-7 points, liked slightly-6 points, neither liked nor disliked-5 points, disliked slightly- 4 points, disliked moderately-3 points, disliked very much-2 points, disliked extremely-1 point.

Statistical analysis: The collected data was analysed with the help of various statistical methods such as mean and standard deviation.

Nutritive value of food products: Nutritional values of all the developed food products were calculated using Diet Cal Software.

Proximate composition and mineral content

Moisture: Moisture content was determined by employing the standard method of analysis

Ash: It was estimated by employing the standard method of analysis

Protein: The total nitrogen was estimated by a standard method of the crude protein was calculated by using the conversion factor of 6.25.

Fat: Crude fat was estimated by a standard method of using the soxhlet extraction

Carbohydrate: Carbohydrate content was determined by adding up all the values of moisture, crude protein, crude fat, and ash and subtracted from 100. The difference gave the value of available carbohydrate [1].

Sodium and potassium: Sodium and potassium in the sample was determined by standard method of atomic absorption spectrometry ASS [3-5].

Results

Sensory evaluation of developed products

Mean score for appearance, colour, texture, flavour, taste, and overall acceptability of the types of products are presented in (Table 1, Figure 1).

Mean score of overall acceptability for all the laddoo are in between 'like very much and like moderately'. Mean scores for taste, texture, appearance, aroma and overall acceptability for sunflower seed laddoo were 8.2 ± 0.8 , 8.2 ± 0.7 , 8.2 ± 0.6 , 7.9 ± 0.8 and 8 ± 0.6 , flax seed laddoo score were 7.9 ± 0.9 , 7.9 ± 0.8 , 7.7 ± 0.9 , 7.7 ± 1 and 7.8 ± 0.8 , chia seed laddoo score were 8.2 ± 0.8 , 8.4 ± 0.6 , 8.3 ± 0.6 , 8.3 ± 0.7 and 8.4 ± 0.6 , sesame seed laddoo score were 7.4 ± 0.6 , 7.7 ± 0.4 , 7.7 ± 0.4 , 7.6 ± 0.6 and 7.6 ± 0.6 and pumpkin seed laddoo score were 7.1 ± 1.3 , 7.3 ± 1.6 , 7.5 ± 1.4 , 7.6 ± 1.2 and 7.2 ± 1.2 respectively.

Nutritive value of developed food products

The data with respect to the nutritive value of the developed food product calculated according to the amount used for standardisation are depicted in (Table 2, Figure 2).

It was observed that sunflower seed laddoo contains 1.02 gram protein, 6.8 gram fat, 2 gram fibre, 4.26 gram carbohydrate, 82 kcal energy, 92.9 mg potassium, and 1.7 mg sodium. Flax seed laddoo contains 0.96 gram protein, 0.56 gram fat, 1.7 gram fibre, 10.18 gram carbohydrate, 50.8 kcal energy, 65.3 mg potassium, and 0.8 mg sodium. Chia seed laddoo contains 1.286 gram protein, 0.48 gram fat, 1.8 gram fibre, 10.15 gram carbohydrate, 51.23 kcal energy, 49.55 mg potassium, and 0.44 mg sodium. Sesame seed laddoo contains 1 gram protein, 0.57 gram fat, 0.72 gram fibre, 11.45 gram carbohydrate, 55.71 kcal energy, 29.93 mg potassium, and 0.42 mg sodium. Pumpkin seed laddoo contains 0.93 gram protein, 0.26 gram fat, 0.78 gram fibre, 11.76 gram carbohydrate, 54.44 kcal energy, 34.44 mg potassium, and 0.49 mg sodium.

Table 1: Organoleptic Scores of Developed Food Product.

Types of laddoo	Taste	Texture	Appearance	Aroma	Overall Acceptability
Sunflower Seed Laddoo	8.2 ± 0.8	8.2 ± 0.7	8.2 ± 0.6	7.9 ± 0.8	8 ± 0.6
Flax Seed Laddoo	7.9 ± 0.9	7.9 ± 0.8	7.7 ± 0.9	7.7 ± 1	7.8 ± 0.8
Chia Seed Laddoo	8.2 ± 0.8	8.4 ± 0.6	8.3 ± 0.6	8.3 ± 0.7	8.4 ± 0.6
Sesame Seed Laddoo	7.4 ± 0.6	7.7 ± 0.4	7.7 ± 0.4	7.6 ± 0.6	7.6 ± 0.6
Pumpkin Seed Laddoo	7.1 ± 1.3	7.3 ± 1.6	7.5 ± 1.4	7.6 ± 1.2	7.2 ± 1.2

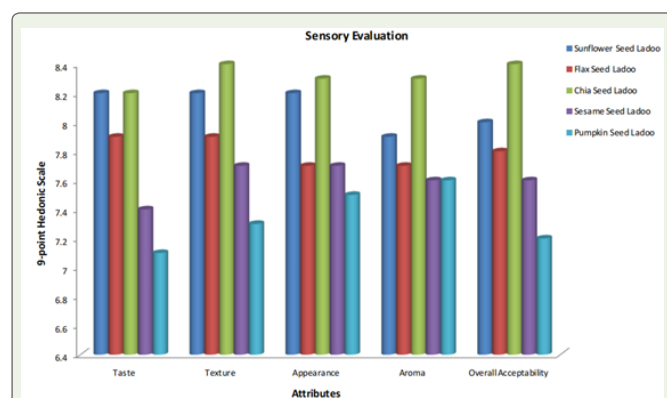


Figure 1: Mean scores of Sensory Evaluation of Laddoo.

Table 2: Nutritive Values of Laddoo.

Nutritive value	Protein (g)	Fat (g)	Fibre (g)	Carbohydrate (g)	Energy (kcal)	Potassium (mg)	Sodium (mg)
Sunflower Seed Laddoo	1.02	6.80	2.00	4.26	82.00	92.90	1.70
Flax Seed Laddoo	0.96	0.56	1.70	10.18	50.80	65.30	0.80
Chia Seed Laddoo	1.29	0.48	1.80	10.15	51.23	49.55	0.44
Sesame Seed Laddoo	1.00	0.57	0.72	11.45	55.71	29.93	0.42
Pumpkin Seed Laddoo	0.93	0.26	0.78	11.76	54.44	34.44	0.49

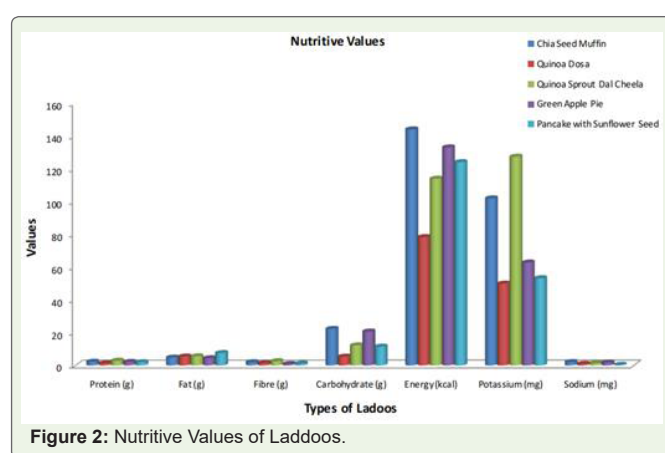


Figure 2: Nutritive Values of Laddoo.

Table 3: Proximate composition and mineral content of developed food product.

Proximate Composition	Sunflower seed Laddoo	Chia seed Laddoo
Moisture (%)	21.00%	28.00%
Ash (g)	0.60%	2.80%
Carbohydrate (g)	59.15 %	50.15 %
Protein (g)	10.20 %	11.9 0%
Fat (g)	14.8 0%	16.70%
Mineral content		
Sodium (mg)	45.00 mg	33.00 mg
Potassium (g)	30.00 mg	18.00 mg

protein, 0.57 gram fat, 0.72 gram fibre, 11.45 gram carbohydrate, 55.71 kcal energy, 29.93 mg potassium, and 0.42 mg sodium. Pumpkin seed laddoo contains 0.93 gram protein, 0.26 gram fat, 0.78 gram fibre, 11.76 gram carbohydrate, 54.44 kcal energy, 34.44 mg potassium, and 0.49 mg sodium.

Estimation of proximate composition and mineral content of most acceptable food product

The data with respect to proximate composition and mineral content of most acceptable food product are calculated with 100 grams of product as shown in table 3.

It was observed that moisture, ash, protein and fat are high in Chia seed Laddoo whereas carbohydrate, sodium and potassium are high in Sunflower seed Laddoo.

Conclusion

Findings reveal overall acceptability of laddoo range from 7.2-8.4 on 9-Point Hedonic Scale. Result show that Sunflower seed Laddoo and Chia seed Laddoo has scored maximum overall acceptability. The nutritive value of each recipe was being calculated. As stated that hypertension is the leading cause of coronary heart disease deaths in India. These recipes were standardised being low in sodium content. Energy value of the laddoo ranged from being 50-80 kilocalories, protein values ranged from 0.93-1.2 gram, carbohydrate ranged from 4.2-11.3 gram, fat values ranged from 0.2-6.8 gram, fibre value ranged from 0.7-2 gram, sodium ranged from 0.4-1.7 milligram and potassium values ranged from 29-92 milligram. Estimation of proximate composition and mineral content of most acceptable laddoo was observed that moisture, ash, protein and fat are high in Chia seed Laddoo whereas carbohydrate, sodium and potassium are high in Sunflower seed Laddoo.

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