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Studies on technology development of Nutra gum laddoo

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Abstract

The present investigation was aimed to development of Nutra gum laddoo with incorporation of different proportions flaxseed and amaranth seed. To standardize the processing technology and analyze the characteristics of Nutra gum laddoo viz., chemical and sensory characteristics of Nutra gum laddoo. The formulation was carried out using flaxseed, amaranth seeds, jaggery, acacia gum, honey and moth bean in preparation of Nutra gum laddoo. Shelf life study included sensory evaluation by scoring method based on hedonic scale. Evaluation was done on sensory attributes like color, taste, texture and overall acceptability of the product. Microbial analysis was done for its shelf life.

Keywords: Nutra-gum laddoo, processing technology, flaxseed, sensory evaluation.

Introduction

Laddoo is a well known Indian traditional sweet which is made with different types of flours and sweetener with other ingredient which changes according to the recipe. The ball shaped laddoo is highly acceptable in various forms and often served in festivals. Besan (chickpea-flour), rava (wheat semolina) and ground coconut are common flours used for preparation of laddoo (Razan Baker, 2006) [9].

Nutra- gum laddoo is made up of different ingredients such as flaxseed, moth beans, amaranth seeds, acacia gum and jaggery. Nutra- gum laddoo is good source of proteins and fats due to presence of different flours of pulses and pseudo- cereals. Adequate amounts of minerals and fibres are also present. The objectives of the study are to standardize an innovative nutritious product for consumer acceptance, to study the shelf life of the product using sensory evaluation and for commercialization of the product in effective way.

Flaxseed contains proteins like arginine, aspartic acid and glutamic acid in high amount as well as lysine, methionine and cystine in limiting amounts (Ganorkar and Jain, 2013) [4]. Flaxseed is enriched in α - linolenic acid (ALA) and lignans. It also content notable quantities of dietary fibers (Anon, 2003) [11]. Flaxseeds have higher amounts of polyunsaturated fatty acid and lower amount of saturated fatty acid. Amaranth contains high values of calcium, magnesium, iron and vitamin B5. It also has high level of tocotrienols which is a vitamin E form. Tocotrienols aid to reduce cholesterol level in human body. Amaranth is good source of carbohydrate with absence of gluten which is suitable for consumption of celiac and gluten intolerant people (Brenner, 2010). About 20.5% of protein present in moth bean is easily digestible and good source of tryptophan and lysine. The consumption of acacia gum majorly reduces the fasting blood glucose levels in human body. Also reduces the blood uric acid and protein concentrations (Nasir et al., 2010) [6]. Jaggery provides about 38 calories from consumption in 10 grams.

The flaxseed and amaranth seeds incorporated with acacia gum and moth bean can be used to prepare Nutra-gum laddoo which raise up values of protein, fiber content, polyunsaturated fatty acids and minerals. It helps to reduce risk of heart disease and encourage health benefits of laddoos. Nutra-gum laddoos contains more proteins and energy values than the other ones. Incorporation of flaxseed with amaranth seeds in laddoos helps to increase the mineral content of the product.

Materials and methods

Nutra- gum laddoo was made with different ingredients mainly moth bean for its protein content, flaxseed for its fatty acids content, amaranth seeds for minerals, acacia gum for its polysaccharide content to provide high energy values and jaggery and honey for binding for providing satiety value.

Sources of raw materials

Ingredients required for Nutra-gum laddoo preparation such as flaxseed, moth bean, amaranth seeds, acacia gum, jaggery and honey was obtained from local village market, Parbhani. The proposed research was carried out in Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani.

Preparation of Nutra-gum laddoo

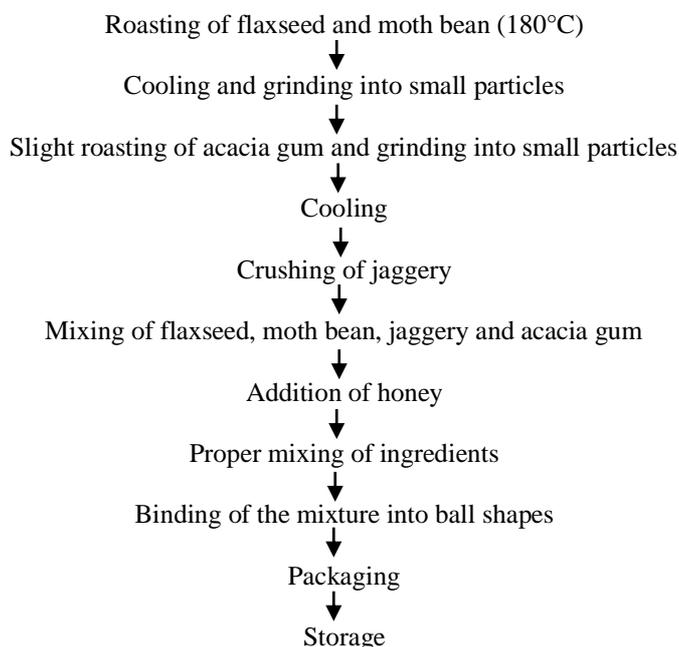
Raw materials such as flaxseed and moth bean were roasted at the optimum duration 10 minutes in open iron pan also the acacia gum is slightly roasted. This heat roasting of raw material helps in easy crushing of raw materials and good flavor development then cools the flaxseed and moth bean at room temperature.

After proper cooling of moth bean, flaxseed and acacia gum grinding is done in the domestic mixer making it small particle size. Simultaneously jaggery was crushed into the small sized portions. The powdered flaxseed, acacia gum and moth bean were mixed properly with jaggery. Later, the popped amaranth seeds were added into mixture. Honey was added into the mixture and bound the mixture into ball shape.

Table 1: Standardized recipe for preparation of Nutra gum laddoo

S. No.	Ingredients	Quantity (g)
1.	Flaxseed	30
2.	Jaggery	30
3.	Amaranth seed	10
4.	Moth bean	10
5.	Acacia gum	10
6.	Honey	10

Flowchart 1: Process flowchart for preparation of Nutra gum laddoo



Sensory Evaluation for Standardized recipe

Scoring test was done with the help of trained panellists. Attributes to be considered were colour, texture, taste and overall acceptability which were scored on a 9 point hedonic scale.

Proximate analysis

Different chemical properties of samples were analysed for moisture content, ash, fat, protein and total carbohydrate using AOAC methods. All the determinations were done in triplicate and the results were expressed as the average value.

Sensory Evaluation for Shelf Life Study

The sensory evaluation of products was done by 10 semi-trained panel members comprised of academic staff members of the College of Food Technology, Parbhani; using 9 point Hedonic scale. Judgments were made through rating the products on a 9 point Hedonic Scale with corresponding

descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely'.

Microbial testing for shelf life study

The microbial examination of samples was carried out as per the method cited in Indian standard institute (ISI) (1969). The results obtained for each count was recorded as colony forming unit per ml of sample i.e. CFU/g.

Result and discussion

Development of the Nutra gum laddoo

After assessing the drawbacks of the nutra gum laddoo the final product was made by adding flaxseed, amaranth seeds and moth bean in proper ratio. Jaggery, acacia gum and honey was added in adequate amount.

Sensory evaluation of Nutra gum laddoo

The sensory evaluation of the Nutra gum laddoo was shown in figure 1.

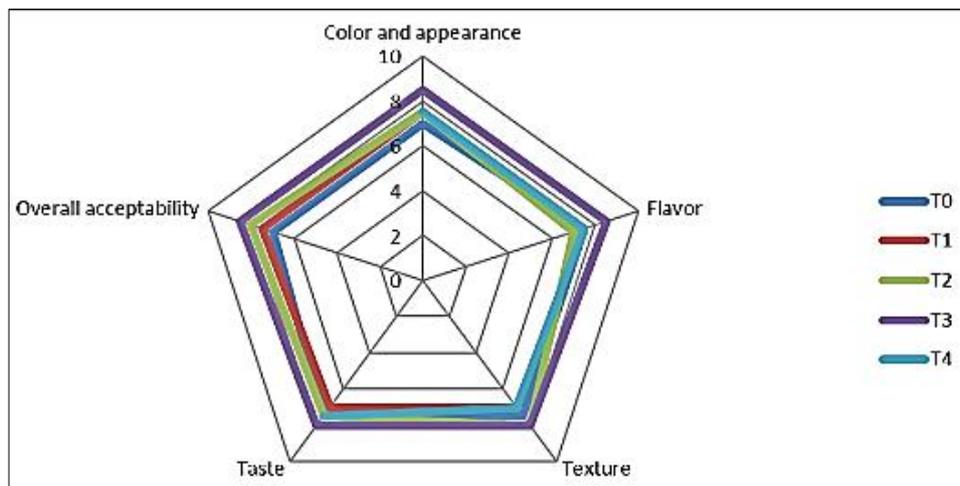


Fig 1: Sensory analysis of Nutra gum laddoo

Color is dominant attribute for acceptance of the food product. It helps to increase the attraction of consumers towards the product. The evaluation results indicated that nutra-gum laddoo (T₃) was highest score. The T₃ variation found to have 8.5 i.e. highest score whereas lowest score was found to have 7.0 to the sample T₀ i.e. control sample. Texture is the characteristics of touch and mouth feel. The results from figure 1 shows that the texture of nutra gum laddoo T₃ secured maximum score (8.0) and lowest score found in T₀ (7.0). T₃ sample contained the proper flaxseed level which enhance and improve its texture to more acceptable level.

Overall acceptability is the overall score of the sensory evaluation, it was observed that nutra gum laddoo T₃ secured the maximum score (8.5) and it was cleared from the sensory evaluation that T₃ have maximum acceptability. Overall acceptability of T₀ and T₄ were lower than rest of the other samples. Significant deviation was analyzed by statistical method among the obtained results. All the samples of nutra gum laddoo were found to be statistically significant with each other.

It was thus observed from figure 1 that variant T₃ scored highest in attributes of flavor, texture, taste and overall acceptability for nutra gum laddoo. The variant T₃ was accepted well with a total score of 8.5. Overall, the T₃ of nutra gum laddoo was acceptable and tasted good.

It can be observed that color, texture, taste, flavor and overall acceptability of sample T₃ scored very well. Thus the product had a good overall acceptability and was finalized to continue the shelf life study.

Proximate analysis

Table 2 shows that the proximate analysis of the nutra gum laddoo.

Table 2: Chemical composition of Nutra-gum laddoo.

Chemical composition	Mean value
Total protein (g)	20.2
Crude fat (g)	28.3
Total carbohydrate (g) Energy (kcal)	31.9 463.1

Table 2 evaluated the chemical composition of nutra gum laddoo. The crude fat content was recorded as 28.3 per cent. The average value of total carbohydrates and total protein of nutra gum laddoo was found to be 31.9 and 20.2 per cent respectively. Nutra gum laddoo found to have energy values for selected sample T₃ as 463.1 Kcal/100g.

Microbial testing for shelf life study

Microbial testing was done to study the shelf life of Nutra gum laddoo using pour plate method.

Table 3: Microbial quality of nutra gum laddoo stored at room temperature

S. No.	Storage period (days)	Microbial quality	
		Total plate count (cfu/g)10 ³	Yeast and mold count (cfu/g)10 ³
1	Fresh	0.90	ND
2	15	1.34	0.85
3	30	1.45	1.43
4	60	1.62	1.54
5	90	1.71	1.65

ND - Not detected

It is evaluated from table 3 that total plate count observed in nutra gum laddoo sample was 0.90 (cfu/g) 10³ and yeast and mold count was found to be zero on the day of production. From the 15th day the elevation in total plate count and yeast and mold count was observed. The results obtained on 15th day were 1.34 (cfu/g) 10³ for total plate counts whereas 0.85 (cfu/g) 10³ for yeast and mold count. On the 60th day results found to be 1.62 (cfu/g) 10³ for total plate count and 1.54 (cfu/g) 10³. The highest value are obtained after each increased storage period as 1.71 (cfu/g) 10³ and 1.65 (cfu/g) 10³ for total plate count and yeast and mold count

respectively. The data collected found similar to reports of Pandey and Sangwan (2016)^[7].

Conclusion

On the basis of evaluation of Nutra gum laddoo it was concluded that flaxseed, amaranth seed, moth bean incorporated laddoo could be consider the best from nutritional aspect as well as from sensory point of view. The Nutra gum laddoo was good in terms of fats and proteins along with 31.9% of carbohydrates. The addition of amaranth seeds increases the mineral content as well as mouth feel of Nutra

gum laddoo. The product, Nutra gum laddoo provides of 463.1Kcal/100g energy and supply protein at 20.2%, fat at 28.3% and carbohydrates at 31.9%. The prepared Nutra gum laddoo could be able to maintain good quality at room temperature for 28 days without any nutritional as well as sensory losses. Hence it was concluded that low cost high protein energy Nutra gum laddoo could be develop at a commercial scale providing health benefits to the consumers.

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