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Quality evaluation and preparation of low GI salty biscuits for type 2 Diabetes

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Abstract

Low-GI foods have been demonstrated to improve glycemic management in type 2 diabetes mellitus patients. Low-glycemic foods like Pearl millet (*Pennisetum glaucum* L.), Oats (*Avena sativa*), Barley (*Hordeum vulgare*), Soybean (*Glycine max*), Bengal gram dal (*Cicer arietinum*), Flax seeds (*Linum usitatissimum*), and drumstick leaf powder (*Moringa oleifera*), were used to develop salty biscuits for diabetic patients. The product was evaluated by a panel of semi trained judges for sensory characteristics like colour, appearance, texture, aroma, taste and overall acceptability on nine-point hedonic scale. The sensory evaluation of salty biscuits showed an overall acceptability score of 8.7 on 0 days, decreasing non-significantly with the storage period, indicating satisfactory product quality. The developed product “liked very much” on the organoleptic parameter.

Keywords: Diabetes, Low GI foods, organoleptic evaluation, sweet biscuits

1. Introduction

Low GI food choice is very important in the management of type 2 diabetes. Low glycemic food like Pearl millet, Oats, Barley, Bengal gram dal, Soybean, Flax seeds and Drum stick leaves which may be helpful in maintaining the blood glucose level. Pearl millet is found significantly rich in resistant starch, soluble and insoluble dietary fibers, minerals and antioxidants. Phenolic compounds from pearl millet grains showed potential anti diabetic effects (Truswell, 2002) [6]. Oats contain an anti-inflammatory compound called Avenanthramide, which may reduce the inflammation in diabetes. Saponin, a hormone like substance also found in oats, helps the pancreas to regulate the production of insulin (Hou *et al.*, 2015) [2]. High fibre content in Bengal gram dal contributes to better blood sugar level. It has both soluble and insoluble fibre. Soybean is rich in bioactive compounds known as isoflavones. These compounds are responsible for lowering the risk of diabetes and heart diseases. Barley is a rich source of magnesium, a mineral that acts as a co-factor for more than 300 enzymes, including enzyme involved in the body’s use of glucose and insulin secretion. Flaxseed contains omega-3 to omega-6 fatty acids, is high in fiber and provides a phytoestrogen called lignan, which may have antioxidant properties that improve glycemic control and reduce the incidence of diabetes and/or delay the development of diabetes (Maritim *et al.*, 2003) [3]. Moringa leaves have anti-inflammatory and antioxidant properties. Research also showed that plant compounds such as isothiocyanates in drum stick leaves can help improve glucose tolerance and insulin signaling.

2. Materials and Methods

2.1 Procurement of Food stuffs: For present investigation processed Pearl millet, Oats, Barley, Soybean, Bengal gram dal, Moringa leaves powder and Flaxseed were procured for the purpose of standardizing low glycemic foods from the local market of the Bikaner city.

2.2 Method of evaluation: Threshold test was used for selection of the panel member (Potter, 1987) [4]. Convenience, experience, knowledge, willingness, interest and sincerity were the criteria for consideration of panel members. Ten members were enlisted in the panel comprised of staff of the College of Community Science, SKRAU, Bikaner. Nine-point hedonic ranking scale was provided to the judges for scoring as suggested by Ranganna (1986) [5]. Standardization of the developed product was carried out through organoleptic evaluation. The developed product evaluated for their sensory characteristics like colour, appearance, aroma, texture, taste and overall acceptability by selected panel of ten semi trained panel members.

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3. Statistical analysis: The data of the organoleptic acceptability and shelf life study was statistically analyzed to fine out significance of the results (Chandel, 1997) ^[1]. Differences were considered statistically significant at 1% and 5% level of significance.

4. Results and Discussion

4.1 Shelf Life Study of Developed Salty Biscuits: The shelf life of a salty biscuits indicates its ability to be stored without deteriorating quality. The present study evaluated the shelf life of developed product by analysing organoleptic evaluation at 15-day intervals during a 60-day storage period.

4.2 Organoleptic Evaluation: The stimulation of a person's sensory organs has a big role in determining whether they

accept or reject food. The sensory tests always remain the most useful tests in food. To verify the wholesomeness and purity of the following item developed and standardized during the study, an expert panel of judges evaluated the sensory quality such as colour, appearance, flavour, texture, taste, and overall acceptability at intervals of 15 days. Organoleptic evaluation of salty biscuits indicated that the mean overall acceptability scores on the nine-point hedonic rating scale obtained 8.7, 8.5, 8.4, 8.1 and 7.8 on 0, 15, 30, 45 and 60 days. The sensory scores presented in Table 1 depicted that the product was found to be well accepted by the panelists. Analysis of data at a 1 percent level determined the difference due to storage was non-significant, indicating that the sensory quality of the product remained unaffected up to 60 days of storage period.

Table 1: Organoleptic mean scores of the salty biscuits during the storage period

S.No.	Storage period (Days)	Mean scores of sensory characteristics on a nine-point hedonic ranking scale					
		Colour	Appearance	Aroma	Texture	Taste	Overall acceptability
1	0	8.7 ± 0.48	8.7 ± 0.48	8.5 ± 0.70	8.4 ± 0.69	8.6 ± 0.51	8.7 ± 0.48
2	15	8.6 ± 0.51	8.3 ± 0.67	8.4 ± 0.69	8.2 ± 0.78	8.5 ± 0.52	8.5 ± 0.52
3	30	8.5 ± 0.52	8.1 ± 0.56	7.8 ± 0.78	8.1 ± 0.56	8.4 ± 0.69	8.4 ± 0.69
4	45	8.4 ± 0.53	7.9 ± 0.87	7.6 ± 1.26	8.0 ± 0.81	8.0 ± 0.94	8.1 ± 0.56
5	60	8.0 ± 0.66	7.8 ± 0.88	7.6 ± 1.26	7.8 ± 0.63	7.9 ± 0.73	7.8 ± 0.88
	F Value	2.43	2.20	1.99	1.00	1.96	1.76
	S.Em±	0.24	0.31	0.43	0.31	0.31	0.28
	CD	NS	NS	NS	NS	NS	NS

5. Conclusion

Salty biscuits was developed by processed Pearl millet, Oats, Barley, Soybean, Bengal gram *dal*, Flaxseed and *Moringa* leaves powder. Developed product was “liked very much” on the Hedonic Ranking scale. Result of sensory evaluation of salty biscuits showed an overall acceptability score of 8.5 on 0 days, decreasing non-significantly with the storage period, indicating satisfactory product quality.

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