FOOD SCIENCE RESEARCH JOURNAL;
Volume 1 Issue 2
(October, 2010) Page : 56-59

RESEARCH ARTICLE

Accepted :*May, 2010*

Enhancement of nutritional quality parameters and acceptability scores of soyblended product enriched with lotus stem powder

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ABSTRACT

Good health is an asset in this modern scientific world. For fit and fine health, it is necessary to have a diet sufficient in quantity as well as quality. Due to inadequate nutritional awareness, macro as well as micronutrient deficiencies affect the lives of most citizens of western nation less dramatically than those in developing countries. The grave situation brought about by over population and under production of food on an international level is well documented. Therefore, the present study was undertaken in an attempt to overcome the ill effects of nutrition related problems with improving the quality of life by the judicious use of lotus stem powder and defatted soy flour in conventional preparation. The main aim of study was to develop value added soyblended product like, *Khakare* with the incorporation of lotus stem powder and defatted soy flour at different levels. The results of sensory appraisal revealed that among different proportion of ingredients used with the combination of 20% defatted soyflour and 5% lotus stem powder was most acceptable and received the highest ratings.

Key words : Wheat flour, Lotus stem powder, Defatted soyflour, Standard sample of khakare

INTRODUCTION

Health is a birth right of every individual. Health and longevity of people are much influenced by nutrition. Millions of world citizens cannot secure enough energy or protein to meet minimal requirements. In a country like India, protein energy malnutrition could be tackled by judicious use of cereals and pulses in staple food. National Family Health Survey Report III (2005-2006) indicated that the rate of malnutrition is about 42% of the total population in India. For alleviating malnutrition (Sukhatme, 1972), is the production of semi-conventional, inexpensive locally available foods. Gopalan (1999) is of the opinion that we should look to our "*farms*" not to our "*pharmacies*" for the solution of nutritional problems. Soybean is a species of legume native to Eastern Asia.. It is an important source of protein equivalent to animal protein and vegetable oil worldwide (Manay and Sharaswamy (2001). In this study, defatted soyflour was used which was made entirely from defatted soymeal. It was used as an ingredient in conventional recipe and increase the shelf-life of product without being rancid. The use of defatted soyflour increases the quality and the shelf-life of the products (National Institute of Nutrition, 2000). It is also an excellent source of iron, calcium, protein and a good source of thiamine, fibre, folate and manganese. Lotus is used in many ways in ones daily life. It is an important economic aquatic crop. Every part of the plant has nutritional as well as medicinal value. It is a rich source of iron, vitamin-c and also minor constituents-flavonoids, xanthophylls and many minerals. The endeavour involves preparing soyblended product like- *Khakare* with the incorporation of lotus stem powder in different concentrations with defatted soyflour. They provide a healthy and nutritious snacks which will be helpful in fulfilling the demand supply gap between nutritional deficiencies and healthy status.

MATERIALS AND METHODS

In present study, lotus stem and defatted soyflour were used. Lotus stem was purchased from the local

Chaudhary, Ruchi and Pareek, Navita (2010). Enhancement of nutritional quality parameters and acceptability scores of soyblended product enriched with lotus stem powder, *Food Sci. Res. J.,* **1** (2) : 56-59.

Table 1 : Per cent incorporation of defatted soyflour and dehydrated lotus stem powder in *Khakare* with basic ingredients

Sample of *Khakare*	Different proportions of defatted soyflour(DSF), lotus stem powder(LSP) and wheat flour(WF)
Std. of *Khakare* = SK	100% WF
Test sample of *Khakare*	
KA1	20% DSF + 5% LSP + 75% WF
KA2	20% DSF + 10% LSP + 70% WF
KA3	20% DSF + 15% LSP + 65% WF
KB1	30% DSF + 5% LSP + 65% WF
KB2	30% DSF+ 10% LSP + 60% WF
KB3	30% DSF + 15% LSP + 55% WF
KC1	50% DSF + 5% LSP + 45% WF
KC2	50% DSF + 10% LSP + 40% WF
KC3	50% DSF + 15% LSP + 35% WF

market. Defatted soyflour was purchased from "Ambika Solvent Plant" from Akola in Maharastra in the form of cakes. Defatted soyflour was obtained from solvent extracted flakes and contained less than 1% oil which increased the shelf-life and reduced the rancidity of the product. Defatted soy cakes was grinded and sieved to get a fine flour. After purchasing the lotus stem, the prelimary preparation was done like cleaning and washing. Then, lotus stem was cut into fine round shaped pieces and kept in open sun drying for three days. After drying, pieces were also grinded in mixy and made a fine powder.The recipe was selected for product development which are based on locally available food and should be low cost (Fig.1).

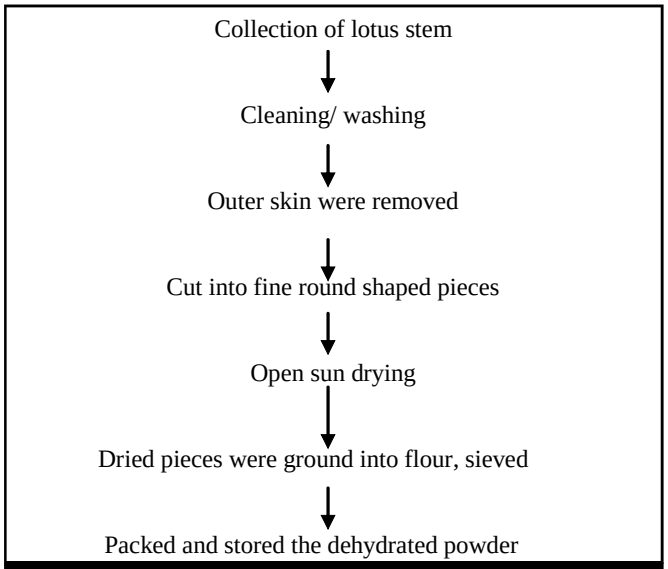

Fig. 1 : Flow chart for the preparation of lotus stem powder

Khakare was prepared with different proportions of defatted soyflour (20%,30% and 50%) and lotus stem powder (5%,10% and 15%).Standard recipe was made with wheat flour. Sensory evaluation was conducted to evaluate the acceptability of all different proportions of the recipes on the basis of 9 point hedonic scale by 25 semi-trained panel members to get the most acceptable level from these recipes. Proximate analysis of nutrients of the most acceptable form of recipe *i.e.* protein, fat, fibre, ash, carbohydrate and iron content was done by using standard procedure(AOAC). Data obtained were subjected to the analysis of Mean, Standard Deviation and bar diagram (Table 1).

RESULTS AND DISCUSSION

The results obtained from the present investigation are presented below :

Sensory evaluation:

The average results of sensory evaluation of different proportions of *Khakare* are listed in Table 2. According to the results, the KA1 sample (20% DSF + 5% LSP) showed the highest over all acceptability scores, where as KC1 sample (50% DSF + 5% LSP) showed low acceptability scores. As the level of defatted soyflour increased, the sensory scores for different attributes decreased in all samples of *Khakare*. Mridula and Wanjari (2006) observed that the flavour and taste of full fat soyflour incorporated biscuit at 5% level was obtained higher scores as comparable with the biscuits prepared from refined wheat flour only.

Quality parameters:

Nutrient analysis (Table 3) was done with the most acceptable sample of *Khakare* which had received the highest scores in terms of all attributes and overall acceptability. In that sample of *Khakare*, the proportion of ingredients was 20:5:75 for defatted soyflour, lotus stem powder and wheat flour, respectively. The values of protein and iron found in that sample of *Khakare* were 19.6g/ 100g and 6.9mg/100g, respectively. Incorporation of

Table 2 : Mean scores obtained by standardized recipes of *Khakare* using different proportion of defatted soyflour and lotus stem powder

Sample of *Khakare*	Ratio of ingredients	Sensory attributes						
Std. of Khakare	WF	Colour	Appearance	Texture	Taste	After taste	Aroma	Overall acceptability
SK	100	8.9	8.8	8.3	8.2	7.8	7.8	7.9
Test sample of *Khakare*	DSF:LSP:WF							
KA1	20:5:75	8.2	8.1	7.5	7.3	7.0	7.2	7.3
KA2	20:10:70	7.0	7.0	7.0	7.0	6.9	6.7	6.9
KA3	20:15:65	6.4	6.6	6.3	6.5	6.6	6.7	6.5
KB1	30:5:65	6.4	5.9	6.1	6.9	6.4	6.6	6.3
KB2	30:10:60	7.2	6.8	6.6	6.8	6.5	6.3	6.7
KB3	30:15:55	6.0	5.8	6.4	6.4	6.1	6.4	6.1
KC1	50:5:45	5.8	5.8	6.2	5.9	5.6	5.7	5.8
KC2	50:10:40	5.6	5.4	5.5	5.8	5.9	6.4	5.7
KC3	50:15:35	6.6	6.6	6.3	5.9	5.6	6.0	6.1

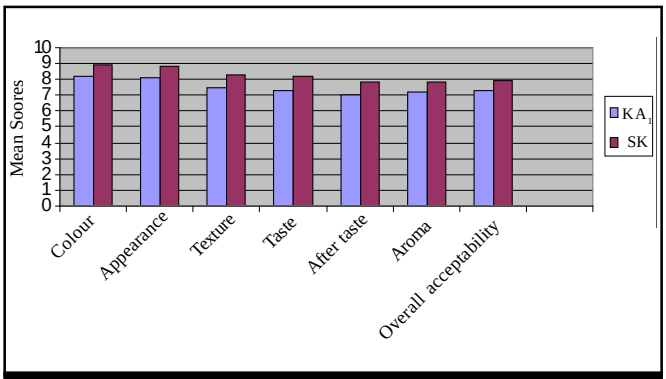

Fig. 2 : Mean scores in *Khakare* using defatted soyflour and louts stem powder

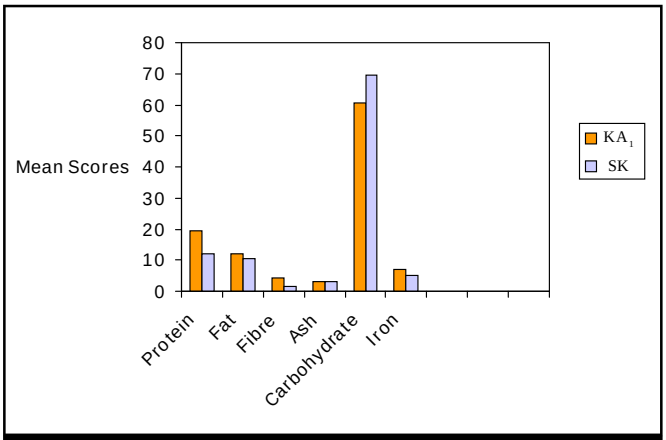

Fig. 3 : Nutrient analysis of *Khakare*

defatted soyflour in a small quantity will improve the protein quality of cereal based products without causing significant difference in the acceptability of the developed product observed by Mridula and Gupta (2008). Results revealed that *Khakare* containing 20% defatted soyflour fortified with 5% lotus stem powder showed the possibility of incorporation could be used on commercial level. The results obtained are depicted in Table 3 and Fig. 2.

Table 3 : Nutritional analysis of *Khakare* prepared by incorporation of defatted soy flour and dehydrated lotus stem powder

Nutrient content of the sample of *Khakare*	SK	KA1
Protein (g) %	12.1	19.6
Fat (g) %	10.5	11.9
Fibre (g) %	1.65	4.1
Ash (g) %	3.1	3.0
Carbohydrate (g) %	69.4	60.6
Iron (mg) %	4.9	6.9

Conclusion:

Value added product namely, *Khakare* was formulated using defatted soyflour and lotus stem powder in proportion of 20%,30% and 50% and 5%,10% and 15% levels, respectively. Product developed with 20% defatted soyflour and 5% lotus stem powder received highest acceptability scores when evaluated by a panel of judges on the basis of 9 point hedonic scale. All the sensory attributes were analyzed in fresh sample. Most acceptable proportions of *Khakare* were analyzed for their nutritional composition *viz.*, protein, fat, fibre, total ash ,carbohydrate and iron. Nutrient content of the snack item increased at all the levels of incorporation Thus, it can be concluded from the present study, that defatted

soy flour and lotus stem powder incorporated with value added *Khakare* can be a good source of iron and protein product like these are beneficial for combating the nutritional deficiencies with improving the nutritional status and quality of life.

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