

DEVELOPMENT OF HEALTH FOOD PRODUCTS

S. Mohamed and A. Hamid

Faculty of Food science and Biotechnology
Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor,
Malaysia

Keywords: health food, low calorie, high fibre, nutritious food, low fat.

Introduction

Accumulating evidence favours the view that increased intake of dietary fibre in an otherwise low-fibre diet can have beneficial effects, which include prevention or alleviation of maladies such as cardiovascular disease, diabetes, diverticulosis and colon cancer in both human and experimental animals. Rice bran consisted of almost 27% dietary fibre and have positive effects such as laxative and cholesterol lowering ability and can be a good fibre source that can be added to various food products. Dietary fibres prepared from defatted rice bran have great potential in food applications especially in development of functional foods. The objective of this research was to develop nutritionally healthy and delicious locally consumed food products, to test the functional properties of various ingredients in local food products and to improve the variability and availability of convenience local food product. Specifically, work was done to extract soluble and insoluble fibres from various sources, with emphasis on beta glucan from rice bran, and enrich local food products with these fibres, and formulate low calorie convenient foods from them.

Materials and Methods

Rice bran was obtained by milling brown rice and sifted through a 600µm sieve. Defatting using n-hexane was crucial to prevent off flavour development. Dietary fibre was extracted using a modified AOAC enzymatic-gravimetric method. Functional properties of dietary fibre determined included water binding capacity, fat binding capacity, emulsifying capacity and stability, viscosity and baking tests were carried out. 5% and 10% of dietary fibre preparation were added into bread and biscuit formulations. A simple formulation was used to reduce additional effects of other ingredients consisting of wheat flour, water, sugar, butter, dry activated yeast, sodium chloride and bread improver. Loaf volume was determined using volume displacement method. Firmness or texture of one-day-old bread and biscuits were determined. Sensory evaluation of the products were conducted by 30 panellists consisting of Faculty of Science and Biotechnology staff and students., using a nine-point hedonic scale for six attributes (colour, taste, odour, softness, chewiness and overall acceptability). Data were analysed statistically.

Results and Discussion

Rice bran is high in protein (14.6%), mineral (7%), mostly unsaturated fat (17%) and dietary fibre (27%). Defatted rice bran has 65% total dietary fibre (9% soluble dietary fibre), 17% protein and 18% ash. The water binding capacity WBC of Rice Bran fibre (RBF) were five times its weight and in-

significantly different from FIBREX, but better than wheat bran. RBF exhibited 3 times the fat binding capacity and 4 times the emulsifying capacity of FIBREX with stability index less than 50%. FIBREX had higher viscosity than RBF. Fibre reduced loaf volume by diluting gluten content and changing crumb structures, which impaired carbon dioxide retention. All dietary fibre -supplemented breads except 5% FIBREX had significantly firmer texture than control bread. Sensory Evaluations scores showed crumb colour was positively related to fibre content. For taste and odor ratings, bread with 10% RBF have appealing nutty rice flavour. Softness and chewiness of the breads were all acceptable, comparable to currently available high-fibre breads. Overall acceptability of the breads added 5% and 10% dietary fibre were significantly different from the control, nevertheless all the breads are acceptable. Dietary fibre contents in the end products were less than amount that was added, since some may be hydrolysed by the yeast or lost due to high baking temperature (200°C), but appreciable amounts still, remains in the incorporated breads. The effect of fat, sugar, leavening agents (baking powder and ammonium bicarbonate), protease and emulsifiers (lecithin and monoglycerides) on the hardness, expansion, and sensory characteristics of biscuits were studied. Multiple regressions analysis of biscuits made from wheat, rice and cornflour showed that crispiness (y1), vertical expansion (y2) and spread (y3) are correlated ($r^2=0.90, 0.92, \text{ and } 0.56$, respectively) to amylose (x1), amylopectin (x2), protein (x3) and fat (x4). Doughnuts made with protein other than gluten reduced oil absorption compared to the control. Doughnuts made with total substitution of whole egg with egg white had good texture and low oil absorption. Ovalbumin did not affect the crispiness but significantly reduced the oil absorption of the frying batters (Mohamed et al. 1998). Addition of proteins other than whey and ovalbumin, increased the oil absorption of frying batters. Using Random Centroid Optimisation Programme, the optimum formulation for leavened rice cakes are formed from rice flour, glutinous rice flour, water, sugar, salt, margarine, emulsifier, egg white and skimmed milk in the ratios of 94:6:94:30:0.8:25:3:3:4 respectively (Mohamed and Abd-Hamid, 1998).

Conclusions

The use of dietary fibre from defatted rice bran in bakery products, showed they had comparable water binding capacity. Higher fat binding and emulsifying capacity, but less viscous than FIBREX, a commercial fibre from sugar beet. Addition of 5% and 10% dietary fibre preparation reduced loaf volume significantly and increased the firmness of the breads and biscuits. Sensory evaluations revealed that bread and other bakery products with 5 and 10% RBF were comparable to high-fibre products available in the market.

References

- Mohamed, S and Abd-Hamid, N. 1998. Factors affecting the characteristics of leavened rice cakes (Apam). *J. Sc Food Agric.* 76: 464-468.
- Mohamed, S, Abd-Hamid, H. and Abdul-Hamid, M. 1998. Food components affecting the oil absorption and crispiness of fried batter. *J. Sc Food Agric.* 78: 39-45.