Development of low Glycemic Index bread using a composite flour mixture

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Introduction

Composite flour technology is initially referred to process of mixing wheat flour with cereal and legume flour for making bread and biscuits. However, the term can also be used with regard to mixing of non-wheat flours, roots and tubers or other raw materials (Singh and Raguvanshi, 2011).Bread is a product obtained by baking yeast leavened dough prepared from wheat flour and with or without the addition of ingredients and permitted additives (SLS 141: 1992). The Glycemic Index (GI) of a food refers to the effect the food has on the body's blood sugar levels. Modern day people seek to avoid wheat flour bread, due to health risk. There is growing interest about nutrients content in bread using composite flour technology. Therefore, this research was carried out to develop low Glycemic Index bread as a solution for various health effects occurred due to the consumption of wheat bread.

Methodology

The current study was carried out at Food Research Unit, Gannoruwa. Six experimental trials with different treatments were conducted during this study. Finally three treatments were prepared and evaluated on sensory and microbial analysis. 10%, 12% and 14% finger millet incorporated, treatments were used for sensory evaluation. The sensory evaluation was done using 15 semi trained panelists. In chemical analysis, proximate composition was determined for moisture content, fat, crude protein, ash, fiber, total carbohydrate and calcium. Specific volume was measured in selected three bread dough and bread samples using Modified Rapeseed Displacement Method. Texture was measured using a penetrometer for selected bread sample from sensory evaluation. Microbiological analysis was done for Escherichia coli, Total Plate Count (TPC), yeast and mould. Self-life determination was done by stored normal temperature with polythene wrap and without polythene wrap. Glycemic Index was measured using ten healthy volunteers in Food Research unit

Result and Discussion

According to the sensory evaluation, the 12% finger millet incorporated bread was selected as best bread sample by giving good texture, taste, aroma and colour.

According to the figure 01, just after baked mean pressure become 0.83 kg. Then texture was soft. The pressure gradually increased with the time. With the time texture become harder than just after baked. After two hours mean pressure was 16.67 kg. Texture is mainly governed by gluten percentage. High gluten content gives soft texture due to gluten network. In this bread,

Finger millet flour was used. Due to it fibrous content it affects for the texture and it gives more hard texture with the time. High pressure show poor texture.

Figure 01: Mean Pressure Change with the Time

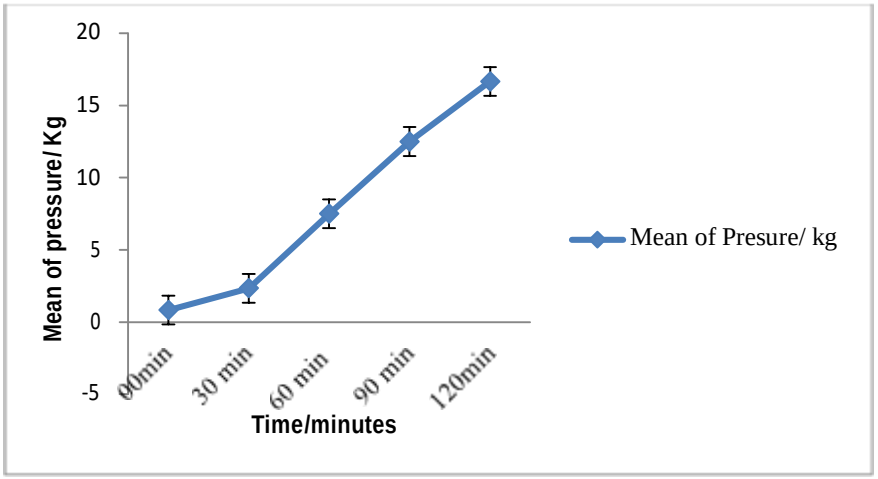

Table 01: Specific Volume of Bread Dough

Finger millet %	Specific volume Time/ kg- m^3		
	00 min	30min	60min
14%	670±104.4	790±61.10	1430±137.4
12%	810±55.07	900±61.3	1600±290.91
10%	820±41.6	1100±110.5	1950±60

Mean ± SD determination in triplicate

According to the Table 02 and table 03, specific volumes of bread dough and bread sample were decreasing when increasing finger millet flour percentage. Initially the highest specific volume obtained by 10 % finger millet flour incorporated bread dough and bread. Lowest specific volume obtained from 14% Finger Millet incorporated bread dough and bread.When increasing Finger Millet flour percentage, the percentage of wheat flour was decreased. Due to that ability of stretch of the dough was restricted. Reason is decrease of gluten and week gluten structure.

Table 03: Specific Volume of Bread

Finger millet %	Specific volume Time/ kg m^3
14%	2150± 51.96
12%	2280± 172.14
10%	2530± 326.54

Mean ± SD determination in triplicate

According to the table 04, Due to soy flour selected bread was containing high protein than wheat bread. Therefore this bread is suitable for vegetarian as a protein supplement. When considering fat content and total carbohydrate content lower than wheat bread. High fiber

content good for the diabetic patients because it helps for low digestibility. This bread contain high amount of calcium. Thus this bread formula gives good supplement of calcium. Finger millet flour content is the main reason for this high calcium percentage.

Table 04: Proximate Analysis

Proximate Composition	Selected bread sample	Wheat bread*
Moisture %	31.2	40
Ash%	3.5	0.1
Crude Protein%	20.3	10.49
Ether Extract (Fat)%	8.6	11.8
Crude Fiber %	2.9	0.25
Calcium g/kg	2.7	0.13
Total Carbohydrate%	33.5	73.5

*****Source: SLS 141: 1992 and Tiimub, 2013

TPC in the samples and presence of yeast and mould in samples complied with the requirement of Sri Lankan Standard (SLS). Zero *E.coli*shows the safe of consumer.There was no detectable moulds growth on breads, Wrapped using 150 gage polythene, during the first 48 hours from baking. There was detectable microbial growth under normal room temperature after 48 hours of baking.GI for the prepared bread sample was 57. Then this bread is included in Moderate Glycemic Index food. Moderate Glycemic Index foods are good for the diabetic patients. Therefore, prepared bread is good for diabetic patients.

Conclusions

Prepared bread has best nutritional profile and it is safe and helps to protect healthiness of consumers with good sensory properties. This bread can be used as balance diet for children and adults.According to the Glycemic Index value prepared bread is good for healthy consumers as well as diabetic patients.

Acknowledgement

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References

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