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PREPARATION AND NUTRITIONAL EVALUATION OF HIGH PROTEIN BREAD AND BISCUITS CONTAINING SOYFLOUR

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Trypsin inhibitor free soy flour was incorporated in bread and biscuits and their nutritional values determined which showed that bread and biscuits containing soy flour were better in all respects than those made out of wheat flour alone.

Key words: Soyflour containing bread.

INTRODUCTION

It is well known that leavened bread is easily digestible for children, invalids and convalescents. Milk and eggs are extensively used for the preparation of high proteins bread and biscuits. In most of the countries of the world, the price and inadequate supply of milk and eggs severely restricts their utility as protein supplements. Legumes and oil-seed proteins offer probably the best alternative to the less developed nations to produce cheap and nutritious bread. Preparation of enriched bread and biscuits with soy protein will be of great value and are considered good not only for young children but also in the diet of diabetic patients. Soy proteins have a good nutritive value and posses a bland taste. Addition of small quantity of soyflour to cereal flours have no deleterious effect on their physical properties. The present paper deals with the preparation and nutritional evaluation of enriched bread and biscuits containing trypsin inhibitor free soyflour.

MATERIAL AND METHOD

Preparation of soyflour. Soybean seeds obtained from Seed Division of Pakistan Ghee Corporation contain 22% oil. The oil was extracted from the cleaned and dehulled seeds by means of oil expeller. The oil expelled cake, which contained 7-8 % oil was ground to 22 mesh size. Four litres of water was added to 1 kg of the soyflour and the slurry was autoclaved at 20 p.s.i. for 30 minutes. The moisture of this treated slurry was evaporated in cabinet dryer and ground to flour of 40-50 mesh size. The flour was stored in air tight containers for use in bread and biscuits. Trypsin inhibitor units of raw soybean, oil expelled cake and soyflour were determined according to the method of Brocher *et al* [1]. The results were shown in Table 1.

Flour prepared as mentioned above was almost free from trypsin inhibitor and was used as cheap source of protein in bread and biscuits.

Preparation of bread. Water (25 ml) was added to Baker's yeast (1.5 g) and a pinch of sugar was added to activate the yeast and the suspension was allowed to stand for 20 minutes at 30-40°. Sugar (12 g) and salt (5 g) were dissolved in another lot of water (170 ml). The remaining dry ingredients i.e. wheat flour (270 g), soyflour (30 g) and ghee (3 g) were mixed together and then above two mixtures were added and made into a dough. The mixed dough was fermented for 2 hours at 30° and then the desired amount of dough was poured to mould pans and placed for another hour at 35°. The dough was baked at 440°F (225°) for 25 minutes. Wheat flour bread was also prepared in the above manner except that soyflour was not incorporated.

Preparation of biscuits. Sugar (300 g), ghee (200 g) and eggs (4 Nos.) were mixed in a blender. Dry ingredients i.e. wheat flour (480 g), soyflour (120 g) and baking powder (6 g) were mixed together and then the above egg mixture was added and mixed gradually to a smooth consistence. The dough was rolled on a pastry board and with the help of biscuit cutter, the shape of the biscuits was made and placed on a tray to bake in an oven at 350°F

Table 1

Material	Inhibition (%)	Trypsin inhibitor units x 10^{-3}
Raw soybean	54.5	2.4
Soy cake oil expelled	30.0	1.3
Soyflour (autoclaved)	7.0	0.32
Bread containing soyflour	Nil	Nil
Biscuits containing soyflour	Nil	Nil

(177°) for 20 minutes. Biscuits were also prepared according to the above procedure except that soyflour was not incorporated.

Nutritional evaluation of bread and biscuits Protein, fat, ash, crude fibre and calories of bread and biscuits were determined according to the method of AOAC. [2] The net protein utilization operative was determined according to the method of Miller *et al* [3] using male albino rats weighing 30-35 g. Then net protein utilization standardized (NPUst) was calculated according to the formula [4].

$$\text{NP Ust} = \frac{\text{NP Uop} \times 54}{54 - \text{Protein Cal\%}} - 8$$

Net dietary protein calories % (NDP Cal %) were calculated by the formula: (5)

NDP Cal % = NP Uop x Protein cals".

Protein efficiency ratio (PER) was determined according to the method described earlier [6].

RESULT AND DISCUSSION

It was observed from Table 2 that enriched bread and biscuits had high content of protein as compared to control i.e. bread and biscuits which were prepared without the addition of soyflour.

It was observed from Table 3 that NP Ust of control bread and biscuits were 45.3 and 46.7 while bread and biscuits containing soyflour gave NP Ust 64.0 and 65.1 respectively. The protein efficiency ratio (PER) of bread and biscuits containing soyflour gave higher value than that of control. These observations conformed the results of NPU determination. It was observed that NDP Cals % of bread and biscuits containing soyflour increased from the value of 5.2 and 4.2 to 7.8 and 7.1 respectively. According to FAO/WHO report, food containg NDP Cals % of about 8 are suitable for feeding infants [7]. Therefore, these bread and biscuits are considered suitable for young children.

Table 2. Analysis of bread and biscuits.

Product	Protein (%)	Fat (%)	Fibre (%)	Ash (%)	Carbohydrates(%)	K Cals/g
Control bread	12.2	3.3	0.5	2.1	81.9	3.7
Bread containing soyflour	15.0	3.8	0.5	2.2	78.5	4.0
Control biscuits	10.7	17.5	0.4	0.8	70.6	4.7
Biscuits containing soyflour	13.4	19.0	0.5	1.0	66.0	4.9

Table 3. Biological values of bread and biscuits.

Product	Protien Cals (%)	NPUop (%)	NPUst (%)	NDP Cals (%)	PER
Control bread	13.0	40.5	45.3	5.2	1.1
Bread with soyflour	15.0	52.0	64.0	7.8	2.0
Control biscuits	9.1	45.5	46.7	4.2	1.2
Biscuits with soyflour	11.1	58.2	65.1	7.1	2.2

On the basis of above results it was concluded that bread and biscuits containing trypsin inhibitor free soyflour are suitable for children and convalescents. These preparations are useful for ameliorating protein malnutrition and have a special value in child feeding programme. These breads and biscuits in which carbohydrates are somewhat restricted and contain higher percentage of protein are suitable for diabetic patients.

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