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Development of Soya Fortified High Protein and Supplementary Biscuits

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Abstract

Soy flour biscuits represent a promising intersection of nutrition and taste, offering a delectable snack option with a robust nutritional profile. This abstract elucidates the nutritional value and health benefits of soy flour biscuits Soy flour, derived from soybeans, serves as the primary ingredient in these biscuits, imparting numerous health advantages. Soy flour is renowned for its high protein content, making it an excellent alternative for individuals seeking plant-based protein sources. Additionally, soy flour is rich in essential amino acids, including lysine, which is often limited in cereal grains. Furthermore, soy flour is a notable source of dietary fiber, aiding in digestive health and promoting satiety. The inclusion of dietary fiber enhances the biscuits' nutritional value, contributing to better weight management and improved blood sugar regulation.Moreover, soy flour contains a plethora of micronutrients, such as iron, calcium, and magnesium, crucial for various physiological functions, including bone health and oxygen transport. These nutrients fortify the biscuits, ensuring they offer a well-rounded nutritional profile. Incorporating soy flour biscuits into one's diet can confer several health benefits. Their high protein content makes them an ideal snack choice for individuals seeking to boost muscle mass or maintain weight. Moreover, the presence of dietary fiber can aid in managing cholesterol levels and promoting cardiovascular health.

INTRODUCTION

Bakery is a traditional activity and occupies an important place in food processing sector. The growth rate of bakery products has been tremendous in the both urban and rural areas. The sector has indicated promising growth prospects and has been making rapid progress. It has been reported that the developed countries are consuming more bakery products because of convenience, availability, hygiene and cost reduction food. In India during recent years, there has been an increasing trend towards the sale and consumption of bakery products due to increase population and lack of time. This phenomenon is more seen in the urban areas of the country. The sector, typically, constitutes cakes, breads and biscuits. The per capita consumption of bakery products like biscuit in India, as it stands today, is between 10 to 50 kg per annum. The bakery products are collected on the basis of price, nutrient content and other desirable qualities.so due to increase eating habit of the population towards bakery product, it should be kept in mind that the bakery products should be fortified with proper nutrient. So that it will helpful for the consumers.

As defined by the World Health Organization (WHO) and the Food and Agricultural Organization of the United Nations (FAO), **fortification** refers to "the practice of deliberately increasing the content of an essential micronutrient, i.e. vitamins and minerals (including trace elements) in a food irrespective of whether the nutrients were originally in the food before processing or not, so as to improve the nutritional quality of the food supply and to provide a public health benefit with minimal risk to health,"

whereas **enrichment** is defined as "synonymous with fortification and refers to the addition of micronutrients to a food which are lost during processing.

Soybean (Glycine max) the miracle bean is the base of healthy life. The nutritive virtues of soybean were intuitively realized in the orient over 4000 years ago. Where it is used in multiple foods. At the turn of last century, the west realized these virtues of soybean but the taste of foods and beverages made from soybeans were unacceptable to western palate that grossly limited their food use. More recently, soybean use is gaining acceptance in the form of textured vegetable protein (TVP), popularly sold as soya vadi and soy nuggets (American Soybean Association, 2004). 100 grams of soybean contains 8.1 g of moisture, 43.2 g of protein, 19.5 g of fat, 20.9g of carbohydrates, 240 mg of calcium, 10.4 mg of iron and 690 mg of phosphorus (Gopalan et al., 2010). Soybean is a versatile plant food that provides high quality protein but only minimal saturated fat. However, recent excitement has focused on soya foods as a rich and essentially unique dietary source of isoflavones and phytoestrogens. Soya protein also directly lowers serum cholesterol levels (Messina, 2004). Soyabean is a rich source of almost all the essential nutrients. The original impetus for research into soybean is to benefit for its high protein content i.e. about 40 percent in bean. Owing to these qualities, soybean has long been used in supplementary foods. Soybean contains isoflavones, which are said to have potential anticancer effects. It contains two primary isoflavones called as Genistein and Diadzein and a minor one called as Glycitein. They retard bone loss in premenstrual and postmenstrual women, soluble fibre in soya foods control blood sugar. Soya foods are quite important to us as they reduce the risk of heart disease. It reduces menopausal symptoms and bone deterioration. Regular soya food consumption delays the process of aging. Soya food every day is protective against many types of cancers especially breast and prostate. Also soya food given to children daily improves mental and physical abilities, memory power and haemoglobin levels. (American Soybean Association, 2004). Soybean was shown to be extremely rich in nearly all the essential amino acids needed by man (Cook and Briggs, 2001). So, soy flour has been used commercially in economy grade biscuit for their water absorption characteristics and their ability to hold moisture during the shelf life of the product. These functional properties and the associated economics have created considerable interest among bakers in use of soy flour as an extender of biscuit flour.

Biscuits have been man's food since a long time. It is a processed convenience food ever produced and is most widely acceptable. It is one of the few universal staples, which is complete in it and requires no additional preparation. Thus, for many, biscuit becomes an important source of high molecular carbohydrates, vegetable proteins and some vitamins and minerals. But it is important to know that, as compared to animal proteins refined wheat flour is deficient in certain essential amino acids, thus has a low nutritional value. The nutritional value of biscuit can be enhanced by fortification and supplementation with a wide variety of protein, vitamin and mineral sources. This work was designed to economically complement and fortify wheat flour and with blanched, baked, roasted ,ground soya flours for biscuit production.

OBJECTIVE-

1. To prepare soya fortified biscuit with different variation.
2. Determine the sensory evaluation and nutritive value of fortified biscuit.
3. To compare the nutritional quality of fortified and un fortified biscuit.

MATERIALS AND METHOD

Keeping all these points in mind, i had developed soya fortified biscuit incorporating soya flour at different

levels. The study was carried out in the Food.sc and Nutrition laboratory of college of Home Science of Assam Agriculture University,Jorhat.

WORK PROCEDURE-

Here I had prepared soyaflour,normal biscuit, soya fortified biscuit(with 2 variation)

PREPARATION OF SOYFLOUR-

Basic preparation of soy flour or grits – wet heat method

Ingredients

water -5 cup
baking soda-a pinch
mature soybeans-250 gm
debris removed-40 gm

METHOD

1. **Blanch the soybeans**: Bring 5 cups water to a boil for each cup of soybeans. Add a pinch of baking soda to the boiling water and then add the soybeans. Cook at a low boil for 20 to 25 minutes. Drain and rinse the soybeans in cool water.
2. **Dry the soybeans**: Spread the beans in a single layer on a baking sheet and dry them in a low oven (about 200 °F or 95 °C), stirring occasionally; this should take an hour or longer.
3. **Grind to grits or flour**: Grind the beans coarsely into grits or more finely into flour. If desired, roast the grits or flour lightly in a dry skillet over moderate heat, stirring occasionally, to enhance the nutty flavour.

Amount of grind soyaflour- 110 gm


Method of preparation of Biscuits: Control and experimental samples

CONTROL / NORMAL BISCUIT-

- ✓ **INGREDIENT-**
- ✓ **Maida – 100 gm**
- ✓ **Dalda – 60 ml**
- ✓ **Egg- 1 no**
- ✓ **Sugar – 40 gm**
- ✓ **Vanilla – 2 drops**
- ✓ **Baking powder – 1.25 gm**

PROCEDURE

- The flour was sieved with baking power.
- Sugar was ground properly.
- The margarine was taken in a bowl and ground sugar was added for cream preparation.
- Beat the margarine and sugar until it became floppy.
- Egg was added with vanilla essence and also beat for 5 mins to find out good floppiness.
- Sieved flour was added little by little and blend lightly till well mixed.
- Divided dough in to equal portion shaped into balls and weight them.
- Pat them and shaped them into small size.
- Placed them in a baking trey in a cress - cross way, put trey in a pre-heated oven and baked them for 20 – 25 mins.
- Removed from heat, cooled, served and stored it in a airtight container.



PREPARATION PROCESS

Experimental-

1. Variation- T1 (10%)

SOYFORTIFIED BISCUIT - 10% means 10 gm soyflour

INGREDIENT-

- Maida – 90 gm
- Soyflour-10 gm
- Dalda – 60 ml
- Egg- 1 no
- Sugar – 40 gm
- Vanilla – 2 drops
- Baking powder – 1.50 gm

PROCEDURE

- The wheat flour, soya flour was sieved with baking power.
- Sugar was ground properly.
- The margarine was taken in a bowl and ground sugar was added for cream preparation.
- Beat the margarine and sugar until it became floppy.
- Egg was added with vanilla essence and also beat for 5 mins to find out good floppiness.
- Sieved flour was added little by little and blend lightly till well mixed.
- Divided dough in to equal portion shaped into balls and weight them.
- Pat ,rolled(with butter paper) and shaped them into small size.
- Placed them in a baking trey in a cress - cross way, put trey in a pre-heated oven and baked them for 20 – 25 mins.
- Removed from heat,cooled,served and stored it in a airtight container.

2. Variation- T2 (20%)

SOYFORTIFIED BISCUIT- 20% means 20 gm soyaflour

INGREDIENT-

- Maida – 80 gm
- Soyflour-20 gm
- Dalda – 60 ml
- Egg- 1 no
- Sugar – 40 gm
- Vanilla – 2 drops
- Baking powder – 1.50 gm

PROCEDURE

- The wheat flour, soya flour was sieved with baking power.
- Sugar was ground properly.
- The margarine was taken in a bowl and ground sugar was added for cream preparation.
- Beat the margarine and sugar until it became floppy.
- Egg was added with vanilla essence and also beat for 5 mins to find out good floppiness.
- Sieved flour was added little by little and blend lightly till well mixed.
- Divided dough in to equal portion shaped into balls and weight them.
- Pat ,rolled(with butter paper) and shaped them into small size.
- Placed them in a baking trey in a cress - cross way, put trey in a pre-heated oven and baked them for 20 – 25 mins.
- Removed from heat,cooled,served and stored it in a airtight container.

PRODUCT NAME	NO OF BISCUIT	WEIGHT OF BISCUIT
NORMAL BISCUIT	**30 pieces**	**2 gm**
SOYA FORTIFIED BISCUIT(T1)	**25 pieces**	**1.8 gm**
SOYA FORTIFIED BISCUIT(T2)	**25 pieces**	**1.75gm**


Soya fortified Biscuit(T1) **Soya fortified Biscuit(T2)**

RESULTS AND DISCUSSION

Organoleptic test of the products was done by 5 point hedonic scale scorecard, especially prepared for the purpose. A 10-member trained panellists from staff and students of Halina college of Home Science of AAU, Jorhat. Each attribute was scored based on its intensity scaled on a 5-point hedonic scale (1=dislike a lot, 2=dislike a little, 3=neither like nor dislike, 4=like a little, 5= like a lot) for colour, flavour, mouth feel and texture.

Biscuits were prepared using different levels of soy flour T 1(10 %), T2 (20 %) and analysis of products was done by "PROXIMATE PRINCIPLE: COMMON FOOD"

CALCULATION OF NUTRITIVE VALUE

(all the values are per 100 gms of edible portion).

NORMAL BISCUIT

INGREDIENT	AMOUNT (gm)	PROTEIN (gm)	FAT (gm)	CARBOHYDRATE (gm)	ENERGY (Kcal)	CALCIUM (mg)	IRON (mg)
Refined flour	100	11	0.9	73.9	348	23	2.7
Dalda	60	--	60	--	540	--	--
Egg	60	7.98	7.98	--	103.8	36	1.26
Sugar	40	0.04	--	39.76	159.2	4.8	0.062
TOTAL		19.02	68.88	113.66	1151	63.8	4.002

SOYFORTIFIED BISCUIT-Variation T1 (10 %)

INGREDIENT	AMOUNT (gm)	PROTEIN (gm)	FAT (gm)	CARBOHYDRATE (gm)	ENERGY (Kcal)	CALCIUM (mg)	IRON (mg)
Refined flour	90	9.9	8.1	66.51	313.2	20.7	2.43
soy flour	10	4.32	1.95	2.09	43.2	24	1.04
Dalda	60	--	60	--	540	--	--
Egg	60	7.98	7.98	--	103.8	36	1.26
Sugar	40	0.04	--	39.76	159.2	4.8	0.062

TOTAL		22.24	78.03	108.36	1159.4	85.5	4.792

SOYFORTIFIED BISCUIT-Variation T2(20%)

INGREDIENT	AMOUNT (gm)	PROTEIN (gm)	FAT (gm)	CARBOHYDRATE (gm)	ENERGY (Kcal)	CALCIUM (mg)	IRON (mg)
Refined flour	80	8.8	0.72	59.12	278.4	18.4	2.16
soy flour	20	8.64	3.9	4.18	86.4	48	2.08
Dalda	60	--	60	--	540	--	--
Egg	60	7.98	7.98	--	103.8	36	1.26
Sugar	40	0.04	--	39.76	159.2	4.8	0.062
TOTAL		25.46	72.6	103.06	1167.8	107.2	5.562

DISCUSSION

Taste is the primary factor which determines the acceptability of any product, which has the highest impact as far as market success of product, is concerned. In the present study, overall acceptance was best for variation T2(20% added soy flor). it was observed that the mean scores for all the assessed organoleptic characteristics increased with increase in the soy flour. Organoleptic evaluation indicated that there were little differences between the control treatment , 10% soy flour supplemented biscuits,20% soy flour supplemented biscuit in the organoleptic attributes of taste, texture and flavour but differences were significant in colour and overall acceptability. From the overall acceptance rating, 20% soybean flour incorporated biscuit obtained the highest preference compared to other combinations. so the 20% added soy flour had nutritionally acceptable by all panel member. The finding of this re-search revealed that, the biscuits produced with soy flour substitution, up to 25%, were nutritionally superior to that of the refined flour biscuits. It might be because highest percent of soy flour was added to T2(20%) and has high protein, fat, CHO, calorie, iron, calcium content. As biscuit consumption in whole world is very high, soy fortified biscuits will help in increasing intake of protein, fat, calories, and calcium also.

CONCLUSION-

By the use of soya flour in the bakery industry, one can achieve nutritional improvement, water absorption, control emulsification, structure builders, shelf life extension, texture improvement and of bakery products without disturbing the physical and sensory qualities. As soy flour rich in protein, fat, calorie it can be taken by all age group except old age group(those who are suffering from arthritis. because soya flour is contain purine which can cause further problem due to consumption.).special protein energy malnutrition children are most recommend for this product. In conclusion, soy flour biscuits present a nutrient-dense snack option that combines taste with health benefits. Their rich protein content, coupled with essential micronutrients and dietary fiber, makes them a wholesome addition to any diet, catering to individuals seeking nutritious and satisfying snacks.

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