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High protein cookies made up of (soya flour) and Fibre (Banana Peel Powder)

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Abstract
The bakery industry in India plays an important role within the industrial map of this country. Bakery products are things of mass consumption because of its low pricing and palatability. Due to moving eating habit of consumer growth of bakery industry has been significantly noticed. This industry, typically, consist of cookies, biscuits, breads cakes etc. Among the bakery products cookies and biscuits constitute to the most popular group.

Keywords: Banana Peel Powder, Refined Wheat flour, cookies, microbiological

Introduction
Cookie is defined as a small thin crisp cake made from unleavened dough. Cookie are an important baked product in human diet and are usually eaten with tea and are also used as weaning food for infants. Cookie are ideal for their nutritive value, palatability, compactness and convenience. Having low moisture content than cakes and bread, Cookies are generally safer from microbiological spoilage and have long shelf-life.
Cookies can be classified as ready to eat and convenient foods. Traditionally, the process of cookies making are fairly simple with basic ingredients consist of flour, eggs and sugar. Generally, cookies are recognized as flat, hard and crunchy food. Normally, cookies are classified according to their method of preparation such as drop, molded, presses, refrigerated, bar or rolled. Apart from that, the dominant ingredients that been used in the formulation also commonly being used to classify the cookies, for example, nut cookies, fruit cookies and chocolate cookies, Norhidayah 2014 [4].
Cookie is the product consumed from infant to old and now a day's because of health awareness they demanded fortified and enriched products with high nutritional value. Development of fortified cookie or other composite flour bakery products is the latest trend in the bakery industry. Most of bakery products are used as a source of incorporation of different nutritionally rich ingredient for their diversification. With increasing public health awareness worldwide, demand for functional food with multiple health benefits has also increased. The use of medicinal food from folk medicine to prevent diseases such as diabetes, obesity, and cardiovascular problems is now gaining momentum among the public. Consumers are demanding foods that shows two main properties: the first-one deals with traditional nutritional aspects of the food, whereas, second feature, additional benefits are expected from its regular ingestion. These kinds of food products are often called functional foods. Varun Kumar. Here we are making efforts to raise the nutritive value of Cookies by replacing Refined Wheat flour (RWF) with Soya flour and Banana peel powder (BPP).

Main Ingredients
Soya bean
Soybean (*Glycine max* L.) is a species of legume native to East Asia, widely grown for its edible bean which has several uses. The soybean is a valuable legume because it does provide all of the essential amino acids for humans; however it is relatively low in the sulfur containing amino acids, cysteine and methionine. It is one of the few legumes that can be consumed as a complete protein. The soybean is comprised of approximately 37-42% protein, Shukla 2019 [5].

Banana peel

The banana peel is a household and industrial food waste discarded in large quantities in nature. It represents about 35% of the total fresh mass of ripe fruit and there is not further involved in remarkable industrial applications Bananas are one of the fruits most produced and consumed worldwide and the potential use of the peel would be of great relevance. Some researchers have revealed that the banana peel has compounds and nutrients important for food and for food industry. The banana peel is rich in dietary fiber, protein, essential amino acids, polyunsaturated fatty acids and potassium. It also contains antioxidant compounds including polyphenols, catecholamines and carotenoids, Rebello 2014, Spiller [6].

Mohammad A. [11] suggested that soy protein can be used as a source of high-quality protein to help satisfy the higher need for protein during muscle-building by providing the necessary essential amino acids for

Wachirasir [17] shows that important constituent present in banana peels it also suggests. The main purpose of using banana peel is its fiber content. It contents around 50.25±0.2% of Total dietary fibers, Dietary fiber has shown beneficial effects in the prevention of several disease, such as cardiovascular diseases, diverticulosis, constipation, colon cancer and diabetes The fruit fiber has a Better quality than other fiber sources due to its high total and soluble fiber content, water and oil holding capacities, fermentation ability, as well as a lower phytic acid andcaloric value content.

Materials and Methods

This chapter includes the materials required and method adopted in the study. Present study on Development of cookies enriched with protein and fiber was carried out at Food Technology Laboratory, University Department of Agricultare and Food Science, Desh Bhagat University, The banana peel was collected from the local manufacturer of banana chips. The major ingredients for the preparation of products were RWF, Soya flour, Powdered Sugar, Butter, Milk Powder and other chemicals were used from the laboratory store.

Raw materials

1. Refined Wheat flour.
2. Soya flour.
3. Banana Peel Powder.
4. Butter.
5. Milk Powder.
6. Sugar.
7. Egg.

Chemicals

1. Baking Powder.
2. Sodium bicarbonate.
3. Essence.

Proximate analysis

1. Moisture Content

The moisture content was determined as per standard methods (AOAC, 2000) [2] and results were expressed in terms of percentage. The moisture content of as it is practiced in lab. Calibrating the weight of the Petri dish, than weigh of the sample 5 gm was taken. The sample along with the petri dish was placed in the oven for 3 hours and maintained at the temperature at 105 °C, by repeating the process of drying, cooling and weighed at 30 min interval until it become to a constant weight. Then it was transferred to desiccators and weight of each sample as soon as the dishes are cool. Weight losses were calculated in each samples and get the average moisture content of sample. The percent moisture content was calculated as:

Moisture (%) = Weight loss/Weight of the sample *100
Total solid % = 100-moisture.

2. Ash content

The ash content was determined with the help of muffle furnace as per standard methods (AOAC, 2000) [2] and results were expressed in terms of percentage. The ash content is a measure of the total amount of minerals present within a food, whereas the mineral content is a measure of the amount of specific inorganic components present within a food, such as Ca, Na, K and CL. Water and other volatile materials are vaporized and organic substances are burned in the presence of the oxygen in air to CO_2, H_2O and N_2. Ash contents of fresh foods rarely exceed 5%, although some processed foods can have ash contents as high as 12%. Some necessary apparatus include:

- Crucible (or similar porcelain or metal dishes).
- Muffled Furnace.
- Hot Plate.

To perform Ash content analysis product sample is powdered and weight is measured up to 110 gm, after weight of the crucible is measured. Required amount of sample is introduced in crucible and the crucible is place in Muffle furnace at 550-600 °C for 4 to 5 hrs. The food sample is weighed before and after ashing to determine the concentration of ash present. The ash content can be expressed on either a *dry* or *wet* basis:

% ash (Dry basis) = (Weight after ashing ÷ Weight before ashing) *100

3. Protein Content

The protein content was determined with the help of Kjeldahl apparatus method as per the standard method (AACC, 2006) [1] and results were expressed in terms of percentage. 0.5 gm. of ground sample by digesting with concentrated sulfuric acid at 100 ºC. Then it was distilled with 40 per cent NaOH liberated ammonia was trapped in 4% boric acid, using mix indicator (Methyl Red: Bromocresol Green 1:5). Then titrate it with 0.1 NHCL, the percent of nitrogen was estimated and protein percentage was calculated by multiplying percent nitrogen with factor 6.25 Calculation:

% nitrogen = (S-B) normality of HCL × 14× 100 ×100
Weight of the sample ×10×1000.....1
% protein = % N2 ×(6.25)

4. Fat content

The fat content was determined with the help of Soxhlet apparatus as per the standard method (AOAC, 1995 [20]) and results were expressed in terms of percentage. Fat contribute to the flavor of food as well as it gives texture and also mouth feel to the food. It give us maximum energy 9 Kcal

energy per gram. To measure the amount of fat present in the food because extra intake of fat mostly leads to obesity and below the level lead to malnutrition. Soxtronis a solvent extraction method is more pronouncedly known as Soxhlet method.

Calculation

Fat (%) = (W2-W1)/W ×100

Where,
W2 = Weight of flask with oil.
W1 = Weight of empty flask.
W= Weight of initial sample.

5. Fiber content

About 5 g of moisture and fat free sample was boiled in 500 ml beaker containing 200 ml boiling 0.255 N (1.25 w/v) H_2SO_4. The mixture was boiled for 30 min keeping the volume constant by addition of water at frequent intervals. At the end of this period, the mixture was filtered through a filter paper and the residue was washed with hot water till free from acid. The material then transferred to the same beaker and 200 ml of boiling 0.313 N NaOH solution added. After boiling for 30 min, the mixture was filtered through filter paper. The residue was washed with hot water till free from alkali. It was then transferred to crucible and dried in oven for overnight at 80-100 °C and weighed. The crucibles were heated in a muffle furnace at 550-600 °C for 4-5 hrs then cooled and weighed again. The difference in the weights represented the weight of the crude fiber (AOAC).

Results

The results obtained in the present investigation entitled "Development of cookies enriched with protein and fiber" summarized here with and discussed for their significance. The whole data obtained on various aspects of study is categorized under the following headings and subheadings.
Effect of level of addition of Soya Flour and Banana Peel Powder on physicochemical properties of cookies.

Table 4.1: Shows results regarding moisture, ash, protein and fat which are discussed below in their respective sub-headings

Parameters	Level of soya flour and BPP				
	Control	T_1	T_2	T_3	T_4
Moisture (%)	3.6	3.8	4.0	4.1	4.3
Carbohydrate (%)	68.9	68.1	68.0	67.8	67.6
Protein (%)	7.26	8.06	9.01	10.35	10.59
Fat (%)	21.61	21.59	21.64	21.42	21.40
Fiber (%)	0.12	0.78	1.52	2.49	3.21
Ash (%)	0.64	0.71	0.76	0.98	1.02

4.1 Proximate composition of cookies

Moisture Content: Moisture content is the amount of moisture present in given food sample. When the food is baked the moisture present in food is evaporated increasing keeping quality and reducing moisture levels. Cookies should have less than 5% moisture so that it appears crispy. In baking there is loss of moisture. From the above table it represents the moisture content at different levels of Soya flour and BPP. Control sample has 3.6% moisture content. Moisture content increase with increase in replacement of flour. Moisture content is lowest in the control sample as compared to other samples.

Estimation of carbohydrate: As shown in the fig and table below the carbohydrate of prepared sample is found to be higher in control (68.9%) followed by other, in sample T1 (68.1%), sample T2 (68.0%), sample T3 (67.8%) and sample T4 (67.6%). Carbohydrate is higher in control as compared to other samples.

Protein content: Protein content is nothing but amino acids present in sample. Control sample has 7.26% protein content. From table 4.1 it is shown that protein content increases with the addition of soya flour. Protein content is highest in biscuits prepared by adding soya flour at levels of 20% followed by 15%, 10%, 5%. Protein content is found out by finding out nitrogen content and then multiplying by its factor 6.25. Protein content of T3 was 10.35%.

Fat Content: Cookies are made with "shortening". The fat was rubbed into the flour. The molecules of fat surround the flour particles and exclude water. This prevents the development of gluten in the dough. The fat is said to shorten the dough. Any increase in water in the mixture will tend to encourage development of gluten, which will make biscuits hard. Fat content was calculated by Soxhlet extraction method. 5 g samples were mixed with about 90 ml of n-hexane. The mixture was vigorously shaken with the separation flask knob opened at intervals to release the accumulated air pressure, which may burst the flask if left there. The fat in spirit was evaporated to dryness over a Soxhlet extraction, which extracts n-hexane from its solution of fat. Control sample has 21.61% fat. From the table 4.1 it is shown that fat content increases with increase in levels of addition of Soya flour. Fat content is highest in cookies with 20% replacement followed by 20, 15, 10, 5% fat content respectively.

Fiber Content: Fiber content is highest in cookies prepared by adding 12% of BPP (T_4) followed by 9%, 6% and 3%. Fiber content increased with addition of BPP.
This study shows that BPP addition in cookies is accepted to certain levels beyond it damages the overall acceptability of product. T_3 found to be 2.49% fiber.

Ash content: Ash content refers to the amount of minerals present in the food. As the level of incorporation of BPP flour increases the ash content increases. The main reason of increment of ash content with increase of BPP is the fibers are rich in minerals. Ash content was determined by using muffle furnace. Sample in crucible were kept in furnace at 500-550 °C for 5-6 hrs. and cooled in desiccators and calculated. It found that Ash content was maximum in T4 sample followed by T_3, T_2, T_1 and control sample.

Microbial Analysis: Cookies are classified under low moisture food categories which has shelf of more than 3 months and could be extended to year. Due to low Availability of moisture cookies are not prone to bacterial growth easily but sometimes fungal infection can occur. Fungal colonies (CFU/gm) was calculated for control and selected sample T_3.

Table 4.2: Microbial count in the samples

Group	Control	Sample T3	Permissible
Fungal count(CFU/gm)	11	22	50

Dilution factor = $1x10^3$

Results and Conclusion

Summary

The experiment was carried out with the different level of Soya Flour and BPP to check the increase in nutritional level of cookies. The cookies were prepared by adding Soya flour at the levels of 5%, 10%, 15%, 20% and Banana Peel Powder at 3%, 6%, 9% and 12% respectively. Cookies were evaluated for its various physicochemical, nutritional and organoleptic quality parameters, and then study revealed that biscuits prepared by adding Soya flour at level 15% and 9% BPP gave a better acceptable taste, texture and flavor.

There was gradual increase in medicinal properties and organoleptic tests gave best results for level of T3 addition of samples. Cookies enriched with soya flour and BPP are rich in protein and fiber, antioxidants along with certain medicinal properties

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