

## A STUDY ON THE PROXIMATE ANALYSIS OF HYDROGENATED FAT IN BAKERY PRODUCTS

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### ABSTRACT

Margarine is an important functional ingredient for several bakery and confectionary products. It plays a major role in the organoleptic attributes of these bakery products. This article contextualizes on "Bakery Products" available in Indian market. It is analyzed and tested through laboratory using various methods of test such as phytochemical screening, proximate analysis, and elemental analysis which are the major laboratory test done. In that subcategory test such as flavonoids, tannis, alkaloids, polyphenols etc. In that, each product is sampled, analyzed, and tested by chemical to know the exact quantity and the quality of various ingredients of the product and to know how much it is important for that packet products manufacturer.

**Keywords:** Proximate analysis, Margarine, Hydrogenated fat, Lipids, Bakery products.

### INTRODUCTION

Hydrogenated fat is used in the process of preparing margarine [1]. It comprises an emulsification of a blend of fats and vegetable oils. These can be altered using fractions of hydrogen gas with small quantities of skimmed milk cooling compositions to solidify and working to enhance its texture, though similar compounds are found in vegetable and animal fat, they comprise varying melting temperatures. Oils are fats that remain liquid of room temperatures. The presence of carbon bonds in the fatty acids can be subjected to its relation to the melting point of the fats. It may be further understood that higher the double bonds, lower the melting point. Removal of carbon compound in the double bonds may elevate the melting point of the products. Usually, hydrogen gas is infused into natural oils under controlled conditions using nickel catalyst [2]. Saturated carbon compounds are developed by the infusion of hydrogen gas which increases the melting point of the oil, thus solidifying it. However, due to certain health implications, the number of unsaturated molecules may be omitted to make it fit for consumption. The use of palladium in certain oils may help the development of hydrogenated fat what is called margarine. Partial hardening may occur in the absence of insufficient hydrogenation. However, trans fat may be formed when there is a fluctuation in the temperature of hydrogen gas that is incorporated to produce margarine. These varying results may have certain risk factors to individuals with cardiovascular diseases. Hence, hydrogenated fats are used in the baking industry nowadays. A mixture of skimmed milk, salt, and emulsifiers is used in preparing modern forms of margarine with the presence of 10–90% fat. The texture of margarine may be influenced by the quantity of hydrogen infused into the oils. A variety of baked products are thus produced depending on the different textures of these fats [3]. Lecithin is a major component along with salt and preservatives. When added to water, it helps disperse the water evenly throughout the oil. This emulsion is blended, heated, and cooled to form margarine. Lesser the hydrogen presence, softer the margarine and vice versa.

### Varieties of margarine

Many people are found confused when to use margarine instead of butter as both comprise huge levels saturated of trans fat which can risk the increase of chronic diseases hence should be used sparingly [4]. It can be confusing to know which margarine is suitable for spreading, cooking, or baking due to the presence of its different forms. A good quality margarine may generally comprise 80% oil and rest with milk and water which is lesser than 80% oil. It may be turned as vegetable oil spread. The higher solid the margarine which may have more trans-fat. The same may apply to butter. Traditional stick margarine is

considered to be least healthy of all these forms. Regular tub margarine is generally turned into a spread as it may contain 61–79% vegetable oils, calcium at 100 milligrams for tablespoon is added to certain value recommendation. This may indirectly help boost calcium levels in one's body. Spreads are different forms of margarine and thus should be avoided in use in baking. The use of spreads when compared to margarine may result in baked products of lesser rise and denser crumb. Light and low-fat spreads are of higher preference as they present 0% (fat free/non-fat)–40% vegetable oil (light/lower fat). The presence of large quantities of water affects its usage sometimes [5]. Spreads when allowed to sit remain static for longer periods can result in soggy of the products. Spreads as compared to margarine when using eggs in cookies or cakes will be dense and have a tougher crumb; hence, it is not suitable for baking purpose. Plant stanol and sterol ester spreads. The use of 2–3 tablespoons daily has proven to lower blood cholesterol and also adds calories to one's diet. Brand names Britannia spreads, Amul Masti, and Nestle cheese spread these may be suitable for spreads and not for baking purpose due to similar factors as light spreads. Spray/pump products best suited for use as topping or in sautéing due to their liquid nature. These have extremely low saturated trans fats.

### Advantages of margarine to health

Most margarine are 80% fat and a combination of saturated and unsaturated fats [6]. These facts can range from 7 to 86% depending on the kind of vegetable used. Vitamins A, D, E, I, and K are food in margarine. Sunflower and canola oil has higher amounts of fat as compared to coconut and palm kernel oil. Omega 3 and alpha-linoleic acid can be found in margarine. These have shown to decrease inflammations and lower cholesterol levels. Flaxseed oil or fish oil has been found to be added into certain margarine to increase omega B fatty acids. Plant sterol is also added to oils in many commercial margarine brands. This has shown to lower cholesterol level.

### Adverse aspects of margarine

Trans fats are harmful to the body and this can be caused by the excessive hydrogen compounds [7]. It has been observed to increase bad cholesterol, low-density lipoprotein levels, lower good cholesterol, and HDL and also increase of the increase of risk of diseases and chronic illness.

### Margarine in cookery

Butter is the most commonly used medium as an alternative to margarine in baking or cooking. However, in certain cases, margarine

may be used as a condiment in cookies, small breads, muffins, and also as a spread.

### Role of margarine in bakery products

In view of the lower price and higher nutritional value, bakery products are in demand for mass consumption. Bakery products have gained popularity over the years. Due to the changing trends in eating habits and the rapid growth of economy, around 82% account for the total production of baked products in the country, of which bread and biscuits are in large demand [8]. The bakery industry caters to the palette of many Indians across the country with biscuits in different flavors and forms such as digestive cream, milk, and crackers. An estimate 50,000 small- and medium-sized products dominate the Indian bakery industry. The industry is further dispersed due policies of the government pertaining to the small-scale industries [9]. The evolving trends and changes in eating habits have placed the Indian bakery industry on the industrial map of the country. The constant lifestyle changes and healthy eating trends ask for a continuous development for new products of novelty and high quality to withstand the competition in the bakery industry [10]. The progressive Indian is offering high and significant opportunities to wholesalers and retailers to stock up more bakery ingredients. Manufactures are in a constant demand to innovate and improve the quality of enzymes, flavorings, and shortenings, to meet and enhance productivity and business outcomes [11].

## METHODS

### Phytochemical screening

#### Preparation of extract

The collection of food sample extracted with hydroalcoholic (70%) (70 ml of ethanol and 30 ml of water) for 24 h, after filtrate extract using phytochemicals test. Chemical tests were carried out on the alcoholic extract and on the powdered specimens using standard procedures to identify the constituents as described by Sofowara (1993), Trease and Evans (1989), and Harborne (1973 and 1984).

#### Experiment for tannins

About 1 ml of sample is boiled in 20 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride is added and observed for brownish-green or a blue-black coloration.

#### Experiment for flavonoids

About 5 ml of dilute ammonia solution were added to a portion of the aqueous filtrate of each plant extract followed by addition of concentrated  $H_2SO_4$ . A yellow coloration observed in each extract indicated the presence of flavonoids. The yellow coloration disappeared on standing.

#### Experiment for steroids

About 2 ml of acetic anhydride is added to 1 ml of extract of each sample with 2 ml  $H_2SO_4$ . The color changed from violet to blue or green in some samples, indicating the presence of steroids.

#### Experiment for alkaloids

Mayer's test: To a few (1) ml of the extract, a drop of Mayer's reagent is added by the side of the test tube. A creamy or white precipitate indicates that the test is positive.

### Experiment for polyphenols

Ethanol (4 ml) is added to each extract (1 ml) and the resulting solution is transferred in test tubes and warmed in a water bath (15 min). Three drops of freshly prepared ferric cyanide solution were added to the extract solution. Formation of a blue-green color indicated the presence of polyphenols.

### Proximate analysis

#### Analysis of moisture content (loss on drying)

The powdered material (2 g) was placed in a moisture dish and dried to a constant weight in an oven at 100–105°C. The loss of weight (in mg/g) of air dried was calculated as follows:

$$\% \text{ of moisture content} = \frac{\text{Initial Weight of sample} - \text{Final Weight of sample}}{\text{Weight of sample}} \times 100$$

### Determination of crude fiber

#### Reagents

1. Sulfuric acid
2. Sodium hydroxide
3. Methanol.

#### Procedure

About 2 g of dried sample of fruit was boiled with 200 ml  $H_2SO_4$  for 30 min with bumping chips. Then, it was filtered through muslins cloth and washed with boiling water until washings were free of acid. Then, the residue was boiled with 200 ml of for 30 min. Again, it was filtered through muslin cloth and washed with 25 ml of boiling  $H_2SO_4$ , three 50 ml portion of water, and 25 ml of alcohol. Then, residue was removed and transferred to pre-weighed ashing dish (W1 g). The residue was analyzed for 2 h at 130°C, cooled in desiccator, and weighed (W2 g). It was ignited for 30 min at 600°C. After cooling in desiccator, it was again reweighed (W3 g). The percentage of crude fiber was calculated using the following formula:

$$\text{Crude fibre content (\%)} = \frac{\text{Loss in weight on ignition}}{\text{Weight of sample}} \times 100$$

$$= \frac{(W2 - W1) - (W3 - W1)}{\text{Weight of sample}} \times 100$$

Where,

- W1 = Pre-weighted ashing dish,  
W2 = Ashing dish with dry residue,  
W3 = Ashing dish with ash.

## RESULTS AND DISCUSSION

In the present study, Frito Lay cheese puffs, Kurkure corn puffs, Baker street biscotti, Britannia wonder cake, and Harvest whole wheat bread were investigated. The proximate, analysis of food sample examined and the results represent in Table 2.

The major constituents in the edible portion are water, protein, carbohydrate, lipid (fat or oil), and fiber. Analysis of these basic constituents is often referred to proximate analysis. Proximate analyses of food sample play a crucial role in assessing their

Table 1: Phytochemicals analysis of sample

S. No.	Test analysis	Frito lay cheese puffs	Kurkure corn puffs	Baker street biscotti	Britannia wonder cake	Harvest whole wheat bread
1	Tannin	+	-	-	+	+
2	Flavonoids	+	+	+	+	+
3	Steroids	-	-	-	+	+
4	Alkaloid	-	-	-	-	-
5	Polyphenol	+	-	+	+	+

+: Presence, ++: Moderately present

Table 2: Proximate composition of powder

Parameters	Frito lay cheese puffs	Kurkure corn puffs	Baker street biscotti	Britannia wonder cake	Harvest whole wheat bread
Carbohydrate (%)	4.20	3.20	57.30	48.20	12.50
Protein (%)	23.50	18.30	6.40	17.50	15.20
Fat (%)	61.20	58.62	36.20	10.50	5.75
Crude fiber (%)	4.12	6.32	3.70	2.10	16.30

Table 3: Qualitative analysis of inorganic elements in samples

Inorganic elements	Frito lay cheese puffs	Kurkure corn puffs	Baker street biscotti	Britannia wonder cake	Harvest whole wheat bread
Calcium	++	++	+	++	++
Magnesium	+	+	+	+	+
Sodium	++	++	+	+	++
Potassium	++	+	+	+	+
Iron	++	++	+	+	++
Sulfate	-	-	-	-	-
Phosphate	++	+	+	++	+
Chloride	+	+	+	+	+
Nitrate	-	-	-	-	-

nutritional significance and help to access the quality of the sample (Pandey et al., 2006).

Carbohydrates are the body's preferred source of energy providing four calories per gram [12]. Depending on their chemical makeup, carbohydrates are classified as either simple or complex. Health experts recommend that 55–65% of your daily calories come from carbohydrates, mainly complex carbohydrates [13]. Muscle, bone, and connective tissue, as well as teeth, skin, blood, and vital organs all contain protein. Like carbohydrates, protein contains four calories per gram with any excess unused calories being stored as body fat. Complete proteins are foods that contain all essential amino acids that the body needs in proper amounts. These sources include animal products such as, fish, meat, poultry, eggs, milk, cheese, yogurt, and many soybean products [14]. During each of the normal period of marked growth infancy, childhood, adolescent, and pregnancy – amino acids build new body tissues. Throughout life, new proteins form constantly to replace damaged or worn out body cells.

### CONCLUSION

The only possible food items that are readily available when in demand are bakery products. They are largely comprised cookies, loaves, cakes, pastries, dairy products, and milk. Many people prefer bakery products due to time constraint and its easy availability. There is a constant demand for products of better appeal, flavor, and convenience from the manufacturer. In the study carried out phytochemical, proximate elements were considered for analysis in Frito Lay cheese puffs, Kurkure corn puffs, Baker street biscotti, Britannia wonder cake, and Harvest whole wheat bread. These were further investigated, it was concluded that Britannia wonder cake had larger presence of phytochemicals as compared to Baker street biscotti. Significant elements were observed in all the bakery products. Britannia brand was considered good among the other products.

### CONFLICTS OF INTEREST

The author declares no conflicts of interest.

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### ETHICAL CLEARANCE

Nil.

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