

Effect of Supplementation with Flaxseed Powder on Roti Quality

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Abstract: *The present study was incorporated with flaxseed into roti as influenced by different levels of flaxseed powder and to determine sensory evaluation. Flaxseed powder incorporated roti were prepared by using flaxseed powder in different levels to the wheat flour, whereas roti prepared out of without adding flaxseed powder were served as control. Among the different treatments, 60 percent incorporation of flaxseed powder was recorded highest scores for the overall acceptability.*

Keywords: Flaxseed powder, lignans, alpha-linolenic acid

1. Introduction

Diet is one of the most important factors that are necessary for the better health of an individual. Provision of diet for the maintenance of physical and mental health is a basic right of an individual and the outcome of factors related to diet on health has been matter of concern since ancient times. The emphasis on health and nutrition increased in the late twentieth century which provided a tremendous opportunity to the food manufacturers for marketing healthy food products. At present functional foods play a significant role in the development of functional foods. The functional foods are considered to play a key role in disease prevention and the maintenance of good health [1]. These foods contain several components which were thought to be non nutritive in the past. All the foods are considered functional because they provide aroma, taste or nutrition. However, during the last decade the meaning of term functional foods have changed and defined as those foods which provide health benefits.

Flaxseed (*Linum usitatissimum*) are a rich source of micronutrients, dietary fiber, manganese, vitamins, and the essential fatty acid Alpha Linolenic Acid, also known as ALA or omega-3 fatty acid. It is considered as one of the oldest fiber crop in the world known to have been cultivated in ancient Egypt and China. Canada is the largest producer of flaxseed in the world, representing about 40 per cent of world production. When combined, China, United States and India account for another 40 per cent of world production [2].

The texture of flaxseed is crisp and chewy possessing a pleasant nutty taste. Flaxseed is one of the richest vegetarian sources of alpha-linolenic acid (omega-3 fatty acid) and soluble mucilage. It is small, flat, oval, brown or fawn or yellow coloured, glossy in appearance with mucilaginous taste and oil nature [3]. The chief constituent of flaxseed is 30-45 per cent of fixed oil. It also contains about 6 per cent mucilage which resides in seed coat and about 25 per cent of protein together with wax, resin, sugar, phosphates and xanthophylls, vitamin viz. thiamin, riboflavin and niacin and small quantity of cyanogenic glucoside linamarin [4]. Being rich source of alpha linolenic acid it improves immunity and lowers risk of stroke and other cardio vascular diseases.

According to the USDA Nutrient Database (2006) the nutritional value per 100gram of flaxseed constitutes of energy 534kcal, protein 18.3g, fat 42.2g, carbohydrate 28.9g, dietary fiber 27.3g. Vitamin includes thiamine 1.7mg, riboflavin 0.2mg, niacin 3.1mg and pantothenic acid 0.9mg. Minerals such as calcium 255mg, iron 5.8mg, magnesium 392mg, phosphorous 642mg, potassium 813mg and zinc 4.4mg.

Brown and yellow or golden colors are the two varieties of flaxseeds are available. Both have similar nutritional characteristics and equal numbers of short-chain omega-3 fatty acids. Seed coat color is determined by the amount of pigment present, a feature that can be changed through normal plant breeding practices. Consumers can prefer either brown or yellow flaxseed based on price and appearance of the flaxseed containing food product, since the nutritional value of brown and yellow flax is similar [5].

Flaxseed is the richest source of the mammalian lignan precursor Secoisolariciresinol DiGlycoside (SDG). It is the predominant lignans in flaxseed with minor amount of pinoresinol and matairesinol. The lignans of flaxseed are phytoestrogens and serves as precursors in the production of mammalian lignans [6]. Flaxseed lignans convert to mammalian lignans enterolactone and enterodiol by intestinal flora. The lignans present in flaxseeds improve the appearance of the skin by reducing the levels of DHT in the body. The lignans present in flaxseeds have antigenic properties. They prevent the tumors from forming new blood cells [7]. The seeds contain anti-inflammatory factor that inhibits tumor incidence and interferes with the growth and spread of cancer.

The flaxseed is also an excellent source (about 28%) of dietary fiber. About two third of the total fiber in flaxseed is insoluble which increase the bulk indigestive system, thus aids in digestion and prevent constipation. These properties of fiber provide great protection against cancers. Whereas, remaining fiber portion of the flaxseed is soluble having the ability to lower cholesterol levels in the body [8]. The soluble fibers also optimize the blood sugar concentrations.

The high amounts of lignans, soluble fiber, and alpha-linolenic acid, along with other phytochemicals found in flaxseed, offer many health benefits. The protein and soluble

fiber known as flaxseeds mucilage have been shown to have cholestromic, hypolipidemic, and atherogenic effects, as well as to have positive effects on blood glucose metabolism [9]. Other phytochemicals present in flaxseed such as phytates and phytic acid have been shown to have cholesterolemic effects, aid in glucose metabolism, prevent cancer, and act as antioxidants. An important phytochemical present in flaxseed is alpha-linolenic acid, which alone has been shown to reduce abnormal heart rhythms and prevent blood clots [10].

Due to health promoting properties and excellent nutrient profile of flaxseed, it has been becoming a popular candidate for incorporation in human diet. Flaxseed is being used extensively for the development of functional food. The components of flaxseed, identified to exhibit the health benefits are fiber, lignans and linolenic acid. Moreover flaxseed is a good source of high quality protein, soluble fibers and phenolic compounds [11].

2. Materials and Methods

Flaxseed was purchased from the Departmental Store for the preparation of the flaxseed powder. Flaxseed was slightly roasted and grinded in a mixer or coffee bean extractor. Allow the powder to cool for few minutes. Finally incorporate the flaxseed powder into roti. The treatments for preparation of flaxseed powder incorporated in roti were as follows:

Treatment Details

- T1- Wheat flour (control)
- T2- Wheat flour + 20% flaxseed powder
- T3- Wheat flour + 40% flaxseed powder
- T4- Wheat flour + 60% flaxseed powder
- T5- Wheat flour + 80% flaxseed powder

The flaxseed powder incorporated roti was prepared by mixing the wheat flour with specified amount of flaxseed powder as mentioned treatments. All the ingredients such as wheat flour, salt, water and oil were used and allow the dough to set for one hour to obtain a smooth texture.

Organoleptic evaluation of flaxseed powder incorporated in roti were carried out by 10am among a panel of 30 semi-trained members including staff and post graduate students, Department of Home Science, Mother Teresa Women's University, Chennai and Professor Dhanapalan College, Chennai. The cooked roti were placed for sensory evaluation. The sensory attributes of roti in terms of sensory characteristics like Appearance, Texture, Flavor, Color, Taste, Softness, Moisture, Roll ability, Layers of separation, Overall acceptance were determined by rating scale. The mean scores given by thirty members were used for statistical analysis.

3. Results and Discussion

The organoleptic properties of roti were evaluated in terms of nutritional parameters like Appearance, Texture, Flavour, Colour, Taste, Softness, Moisture, Roll ability, Layers of separation and Overall acceptability. The data pertaining to the organoleptic evaluation was influenced by different

treatments were presented in Table 1. The overall acceptability and rating scale score was higher for the 60% level of incorporation of flaxseed powder incorporated roti. The data reveals that there were significant differences at the level of 1% significances among 60%.

Table 1: Organoleptic evaluation of flaxseed powder incorporated roti

| Sl.No | Level of Incorporation | Mean \pm SD | t-value | Level of Significance |
|-------|------------------------|-----------------|---------|-----------------------|
| 1 | Control | 77.0 \pm 3.61 | 1.52 | Not Significant |
| 2 | 20% | 78.5 \pm 4.77 | 1.35 | Not Significant |
| 3 | 40% | 84.2 \pm 3.56 | 7.68 | 1% Significant |
| 4 | 60% | 87.8 \pm 2.37 | 13.68 | 1% Significant |
| 5 | 80% | 74.5 \pm 6.55 | 1.78 | Not Significant |

4. Conclusion

Flaxseed is emerging as one of the nutritive and functional ingredient in food products. It is considered as a functional food producing metabolic and physiological health benefits in addition to its nutritional properties. Flaxseed powder incorporated roti contains a unique package of alphaslinolenic acid and it can be introduced to a community to prevent from various health hazards particularly prostate cancer in men and breast cancer among women.

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