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EFFECTS OF MULTIGRAIN CHIPS ON CARDIO VASCULAR DISEASE (CVD)

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ABSTRACT

Multigrain chips were made by modifying traditional Crispy Chips for Cardiovascular disease individuals. Traditional Chips were modified by adding Bajra, Jowar, Soyabean, Rice, Flaxseeds and Dried Fenugreek which are beneficial for CVD. It altered sodium, fiber and fat content of the traditional recipe. Soyabean helps to reduce hypercholesterolemic effects in CVD individuals. After designing this product; sensory evaluation was conducted by 14 naïve panel members and 4 expert panel members by using 5 pint ranking scale. The product initially scored 3/5 hence further modifications were done and the product scored 4/5. The product was standardized. The product provides upto 17 g of fiber and low in Sodium i.e. 22 mg.

Keywords: Multigrain chips, Crispy Chips, Baked and CVD.

INTRODUCTION

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels and they include; coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis, pulmonary embolism, hypertension and heart failure. The diseases are interrelated and often coexist. The most important behavioral risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. Behavioral risk factors are responsible for about 80% of coronary heart disease and cerebrovascular disease.

Multigrain Chips were finalized based on the results of sensory evaluation and was modified by adding functional food i.e. Flaxseed. Chips were modified on the bases of Traditional Crispy Chips in order to improve fiber content and lower sodium and fat content. Antioxidants present in Tomato helps to enhance immunity and lower total cholesterol levels of an Individual suffering from Cardiovascular Disease.

MATERIALS AND METHODS

DEVELOPING THE FOOD PRODUCT

- Maida was replaced by Bajra, Jowar, Rice, Soyabean and Moong Dal to improve its fiber content.
- Flaxseeds were added to balance n3 & n6 fatty acid necessary to prevent CVD.
- Dry Mango powder was added to reduce the salt content.

- Tomato powder was added to provide antioxidants.
- Modified product was baked to reduce the fat content.

TRADITIONAL PRODUCT

CRISPY CHIPS

INGREDIENTS

- | | | |
|-----------------------|---|----------|
| ▪ Plain flour (Maida) | : | 60 gm |
| ▪ Raw cooking oil | : | 25 gm |
| ▪ Kala jeera(Kalonji) | : | 5 gm |
| ▪ Salt | : | To taste |
| ▪ Oil to fry | : | 90 gm |

MODIFIED PRODUCT

MULTIGRAIN CHIPS

INGREDIENTS

- | | | |
|--------------------------|---|--------|
| ▪ Bajra Flour | : | 20 gm |
| ▪ Jowar Flour | : | 30 gm |
| ▪ Rice Flour | : | 20 g |
| ▪ Soya Flour | : | 30 gm |
| ▪ Dried Fenugreek leaves | : | 15 gm |
| ▪ Flax Seeds | : | 10 gm |
| ▪ Tomato powder | : | 5 gm |
| ▪ Red Chilli powder | : | 5 gm |
| ▪ Dry Mango Powder | : | 5 gm |
| ▪ Salt | : | 2.5 gm |

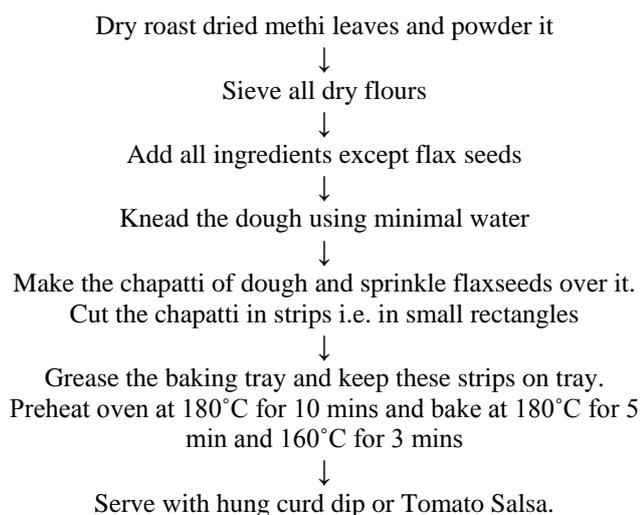
For Comparison refer Table 1 and Graph 1 to graph 7

STANDARDIZATION OF PRODUCT

INGREDIENTS

▪ Bajra Flour	:	20 gm
▪ Jowar Flour	:	30 gm
▪ Rice Flour	:	20 gm
▪ Soya Flour	:	30 gm
▪ Dried Fenugreek leaves	:	15 gm
▪ Flax Seeds	:	10 gm
▪ Tomato powder	:	5 gm
▪ Red Chilli powder	:	5 gm
▪ Dry Mango Powder	:	5 gm
▪ Salt	:	2.5 gm

METHOD OF PREPARATION



NUTRITIONAL ANALYSIS

The nutritional evaluation of supplementary foods i.e. moisture content, fat content, protein content, ash content, crude fiber, fatty acid was carried out by A.O.A.C method.

SENSORY EVALUATION OF PRODUCTS

Prepared multigrain chips were subjected to sensory analysis based on 9-point hedonic scale for color, taste, texture, flavour and overall acceptability using a panel of 10 members who are familiar with the product since childhood. Panel members were advised to use verbal descriptions and convert them into scores. The scores were based on the following criteria: Like extremely: 9; Like moderately: 7-8; like slightly: 5-6; dislike slightly: 3-4; and dislike extremely: 0-2. The scores were averaged and rounded to the nearest whole number.

EVALUATION OF THE PRODUCT

Sensory evaluation was done to find the acceptability of the product on the basis of ranking scale with the characteristic of color, texture & aroma, concept, taste and after taste. This test was done by 14 naïve panel members and 4 expert panel members.

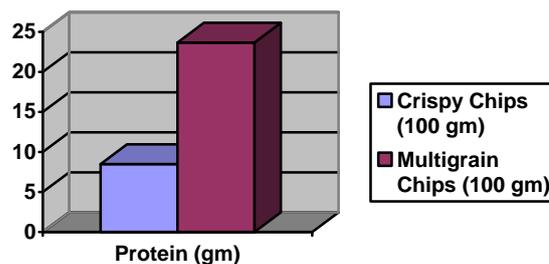
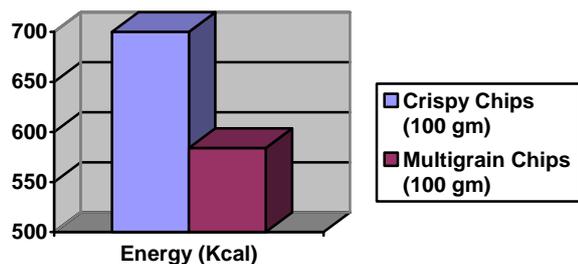
RESULTS AND DISCUSSION

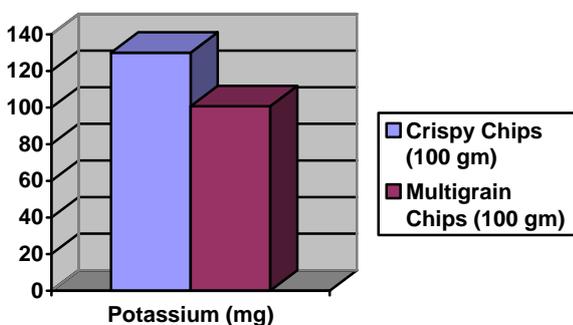
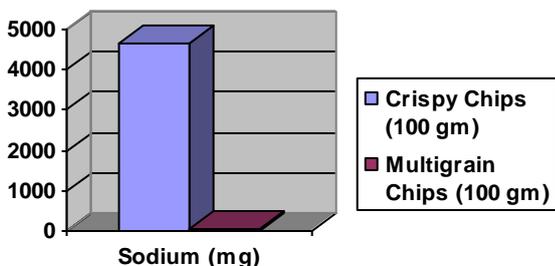
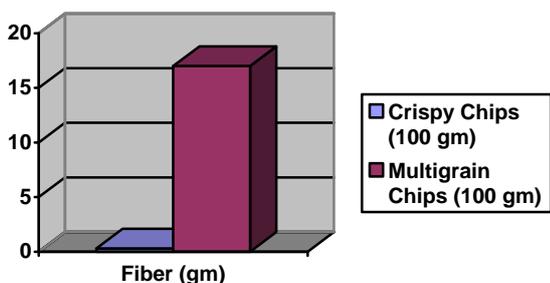
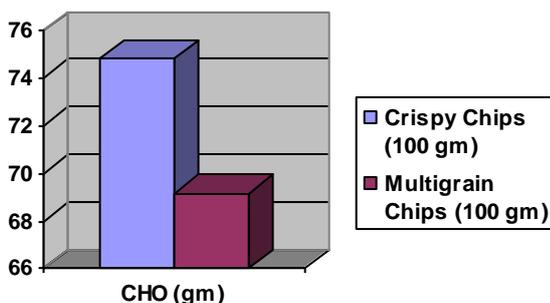
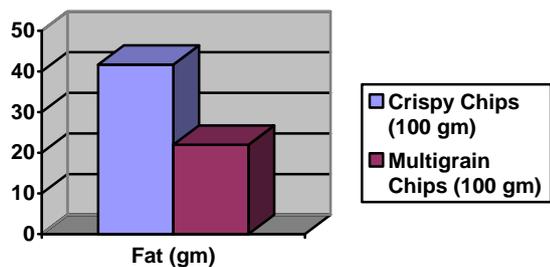
The modified food product has lowered the total energy and carbohydrates as compared to traditional recipe. Modified product contains complete protein and has good amount of total dietary fiber and low sodium unlike traditional recipe. High fat content of traditional recipe is altered by modified product by baking and adding flax seeds; a good source of n3 & n6 fatty acid. In sensory evaluation the product was ranked “very good” from both the panel members. The product was accepted.

Table -1 - Nutrient Composition

Nutrients	Traditional Product (100 gm)	Modified Product (100 gm)
Energy	700 Kcal	584 Kcal
Protein	8.5 gm	23.68 gm
Fat	41.7 gm	21.97 gm
CHO	74.8 gm	69.18 gm
Fiber	0.3 gm	17 gm
Sodium	4650 mg	22 mg
Potassium	130 mg	100.7 mg

*Nutritional values- NIN- Gopalan





SENSORY EVALUATION

The product was ranked “good” during first sensory evaluation (Table 2). Furthermore improvements were done and sensory evaluation ranked the product “very good” (Table 3) by both the panel members and the product was then standardized.

Table -2 – first sensory evaluation

Characteristics	Naive panel members (average)	Expert panel members (average)	Out of
Color	3	3	5
Texture & aroma	3.5	3.5	5
Taste	4	4	5
After Taste	4	4	5
Concept	4	5	5

Table -3 – Second sensory evaluation

Characteristics	Naive panel members (average)	Expert panel members (average)	Out of
Color	4	4	5
Texture & aroma	4	4	5
Taste	5	5	5
After Taste	4	4	5
Concept	5	5	5

DISCUSSION

A meta-analysis (an analysis of multiple studies on a topic) of 41 clinical trials found that 20 g to 61 g of soy protein can significantly reduce total blood cholesterol levels, LDL cholesterol levels and triglycerides. The results also showed that soy protein supplementation slightly increased HDL cholesterol levels. It is not known whether the phytoestrogens or the soy proteins (or both) or the other characteristics of soy (including high-fiber content and low saturated-fat content) are responsible for these health benefits. However, studies have shown that eating soy protein without isoflavones results in only small cholesterol reductions and isoflavone supplements alone have minimal cholesterol lowering effects. The cholesterol-lowering benefits of eating soy foods may be improved if the total diet is high in carbohydrate. This seems to help with the breakdown of the isoflavones. In 1999, the United States Food and Drug Administration acknowledged the heart health benefits of including at least 25 g soy protein daily in a diet low in saturated fat and cholesterol. This equates to approximately four servings of soy daily.

Dried fenugreek leaves are an herbal medication that is under investigation as a treatment for high cholesterol and diabetes. Studies involving diabetic rats have shown that methi leaves act as an antioxidant and reduce levels of oxidative stress caused by diabetes,

reports an article published in the Fall 2005 issue of the "Journal of Medicinal Food." An early study from the same researchers found that methi leaves reduced levels of lipids, an indicator of cardiovascular disease, in diabetic rats, as reported in the summer 2004 issue of the same journal.

Tomatoes contain phytochemicals, including carotenoids and polyphenols. These phytochemicals are thought to contribute to the reduced risk of human ailments such as cardiovascular disease (CVD).

Flaxseed has multiple modes of action. The three primary beneficial compounds are:

- Omega-3: Known as alpha-linoleic acid, this dietary fatty acid, is essential to human metabolism, and has been the subject of thousands of studies, many of which indicate its value in reducing risk factors for heart disease.
- Soluble Fiber: Flaxseed is a rich source of soluble fiber, one of the benefits of which is that it binds to bile acids (which include oxidized cholesterol and other fat-soluble waste products like toxic hormone metabolites, and other bile constituents) and help to pull them out of the body.
- Lignan: Lignans are a class of plant compounds with both estrogen-like and antioxidant properties. The major lignan found in flaxseed is known as secoisolariciresinol diglucoside, is metabolized into enterodiol and enterolactone within the human body, which can affect a wide range of bodily tissues, including the reproductive and the cardiovascular systems.

Recent study states that flaxseed and its components may improve cardiovascular health (Prasad K., 2009). Jowar and Bajra are millets. Millets are good source of fiber. A mixture of different types of fibers for CVD prevention.

CONCLUSION

Multigrain Chips prepared with various grains and dried fenugreek leaves are high in fiber, provide complete protein and also have capabilities to lower total cholesterol, LDL (Low Density Lipoprotein) and TG (Triglyceride) levels which are beneficial for CVD.

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