Research Paper

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Formulation of Cereal Based Nutricookies Prepared Incorporating Garden Cress Seeds (Lepidium Sativum) – A Protein And Iron Rich Snack

Home Science

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ABSTRACT

Globalization, industrialization, increase in purchasing power and the general enhancement in the standard of living have led to vast and drastic changes in the choice of foods and eating patterns among all age groups of the Indian population in the past few decades. This has led to the effortless adoption and inclusion of foods eaten in the western world in our daily diet. It has therefore become imperative to enhance the nutrient content of the much preferred western snacks with nutrient dense ingredients. In the present study, a sincere effort was made to enhance the protein and iron content of a common western snack called the 'cookies'. Incorporation of cereals rich in protein such as oats, wheat flour and wheat germ, pulses such as soya (in the form of flour) and oilseeds such as garden cress seeds was adopted as an innovative and easy way to improve the protein and iron content of the cookies.

INTRODUCTION

Amongst the various snack foods available, cookies seem to be the most widely eaten snack food around the world. However, cookies are basically high in calories and fat and at the same time deficient in proteins and iron since only refined flour and sugar are used in the preparation. There have been several studies reported thus far in which cookies have been prepared using other cereals. However, an attempt has not been made thus far in incorporating garden cress seeds (*Lepidium sativum*) which is an excellent source of iron.

This study explored the nutrient microbial and organoleptic quality of cereal based cookies prepared using garden cress seeds which is a rich source of iron. Cookies were prepared using oats, wheat flour, wheat germ, soybean flour and garden cress seeds. Variations in the cookies were brought about by incorporating three different quantities (10g, 20g, and 30g) of garden cress seeds which is rich in iron. The control was prepared excluding the addition of garden cress seeds. The newly formulated cookies were periodically assessed for its nutrient content, microbial quality and sensory quality. The cookies were baked and stored for a period of 14 days after subjecting them to two types of packaging. The packaging included storage in zip lock covers and pearl pet jars. Carbohydrate, protein, fat, energy, moisture, iron and calcium were analyzed using standard techniques. The standard plate count and yeast count were analyzed and sensory evaluations of the cookies were conducted. A panel of 30 untrained judges evaluated the organoleptic quality of the cookies using the 5 to 1 hedonic rating scale.

Cookie is an all time favourite snack irrespective of age. Providing nutrient-dense snacks along with a healthy diet can help reduce nutrient deficiency (Whitney, 2002).

The scope of the present study would be the following.

1. Preparation of cookies incorporating oats, wheat germ soya flour, whole wheat flour and garden cress seeds will provide a nutritious snack especially in terms of protein and iron content for all ages at an affordable cost.
2. Consumption of this nutritious cookie may aid in improving the micronutrient status of the consumers.
3. When these cookies are prepared hygienically, packaged and sold, they can be a source of income for women entrepreneurs.

MATERIALS AND METHODS:

Aim of the study

The present study was conducted to formulate and assess the nutrient, microbial and sensory qualities of the protein and iron rich cookies prepared incorporating oats, wheat germ, wheat flour, soybean flour and garden cress seeds. These cookies were called nutricookies. These were evaluated before and after a storage period of 14 days.

Specific objectives of the study

1. To estimate the nutrient content (carbohydrate, protein, fat, iron and calcium) in 100g of nutricookies.
2. To determine the microbial quality of cookies on the 1st and 14th day of storage.
3. To evaluate the sensory quality of the cookies on the 1st, 7th and 14th day of storage.

Study design

The design of the present study was pre-test, post test experimental research design with control group. In a pre-test, post test design, a single group of participants is measured on the dependent variables both before and after the manipulation of the independent variables. In this type of design, measurements are taken before and after the intervention so the researcher can subsequently correct for extraneous factors that may not be equally distributed across groups (Kothari, 2004).

Sampling method

The sampling method adopted in the present study was judgemental sampling.

Sample size

Variations were brought about in the formulation based on the quantity of garden cress seeds added (Samples A, B & C - 10g, 20g and 30g of garden cress seeds were added to the basic cookie dough). The cookies were baked and stored for a period of 14 days.

Due to the bitter aftertaste of garden cress seeds, the addition of this ingredient to the basic cookie dough was avoided in the preparation of control. This was done on deliberation to check if the sensory qualities of the experimental group matched that of the control group especially with respect to the taste aspect. The control and experimental groups were stored for 14 days and were analyzed for their microbial and sensory qualities.

RESULTS AND DISCUSSION

Nutrient analysis

The carbohydrate content of the control was comparatively lesser when compared to the samples. However, the carbohydrate content increased in accordance to the amount of garden cress seeds added to the samples which ranged between 65 to 75 g per 100g on an average.

The protein content ranged between 17 to 22g per 100 g. The protein content of all the samples was very much higher than the commercially available cookies.

The fat content did not show much difference between the control and samples and was within a narrow range of 13 to 14.8g per 100g

The calcium content of all the samples was significantly higher than the control. The control provided 87.33 mg of calcium whereas the samples provided more than 120 mg. The iron content of the control was 14.58 mg. Samples with 10g, 20g and 30g garden cress seeds provided 24.58, 34.58 and 44.58 mg of iron per 100g.

The energy provided by the control and samples was between 472.3 and 506.11 kcal per 100g with the samples showing a progressive decline in the energy value as the amount of garden cress seeds increased.

The moisture content ranged between 2.75 and 3.76 per cent per 100g.

It was observed that one third the RDA for (Indians – adults, NIN, 2009) protein and calcium was provided by 100 g of nutricookies. The iron content in the control was around 14 mg whereas the samples which had garden cress seeds in them provided a minimum of 24 mg / 100 g. This was nearly 90 percent of the RDA for Indian adults (NIN, 2009). The moisture content ranged between 2 and 4 per cent in all the samples which was well within the acceptable range for cookies. Fat present in the cookies was slightly higher due to the addition of butter and oil from the garden cress seeds. However, this was better compared to the hydrogenated vegetable fat. The nutritive value of the cookies is presented in table 1

Table 1
Nutrient content of cookies
GC – Garden cress seeds

Nutrient content per 100g	Sample A +10g GC	Sample B + 20g GC	Sample C + 30g GC	control
CHO (g)	68.99	72.32	75.62	65.72
Protein (g)	20.28	19.15	17.06	22.42
Fat (g)	14.22	14.69	14.85	13.9
Energy (kcal)	506.11	494.84	483.55	472.3
Moisture (per cent)	3.76	3.57	3.55	2.75
Calcium (mg)	124.33	162.03	199.7	87.33
Iron (mg)	24.58	34.58	44.58	14.58

Microbial analysis
Microbial quality of any food product is important for human consumption. The prepared cookies were free from threatening microbes. Due to the low moisture content, there was only limited microbial growth. The product was therefore microbiologically safe for 14 days.

Sensory analysis
Sensory aspects such as appearance, taste, colour, texture, flavour and overall acceptability of the were evaluated by 30 untrained judges who graded the cookies as good. The panelists also expressed that though different quantities of garden cress seeds were used in the preparation (10, 20 and 30 g), none of the samples had a bitter after taste and their taste was as acceptable as the control cookies that did not contain any garden cress seeds. However, they spelt out that the texture of the cookies was a little hard in samples that contained 30 g garden cress seeds than the ones that contained 10 g. The colour of the control and experimental group was almost the same (Light brown).

CONCLUSION
Thus it can be concluded from the present study that the cereal and garden cress based cookies are an excellent source of protein and iron. These cookies when prepared at home would be a hygienic and cost effective alternative when compared to expensive commercial cookies. The study also showed that no bitter after taste was sensed in the cookies up to the addition of 30 g of garden cress seeds per 100 g of cookie dough. Therefore, this amount can be safely added to the cookie dough. However, the quantity of garden cress seeds that can be added to the formulation depends on individual preferences.

Besides this, consumption of these cookies can prevent or treat protein and iron deficiency. Therefore, it can be a very suitable snack for enhancing the iron and protein status of not only undernourished children but also for all age groups except pregnant women. Appearance, colour, texture, taste, flavour and overall acceptability were rated as good.

Therefore, it can be concluded that this nutricookie prepared using oats, wheat flour, wheat germ, soy flour and garden cress seeds could serve as a smart and healthy snack option for all age groups with an exception of pregnant women.

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