Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(1): 1802-1804
Received: 19-11-2018
Accepted: 21-12-2018

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Value addition and quality evaluation of dietary fibre rich, multigrain cookies

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Abstract
The aim of this work was to Value addition of dietary fiber rich, multigrain cookies; with by-product utilization of ripe banana peel powder and date powder. To prepare cookies with respect to nutritive value, quality and sensory attributes. Optimized formulations for wheat-based cookies incorporated with multigrain flour (oats, figure millet, barley), banana peels powder and date powder. Various blends of wheat and multigrain flour like 100:00, 80:20, 70:30 and 60:40 was prepared, to determine adequate level of multigrain flour with help of sensory evaluation in which 70:30 ratio was found acceptable. Incorporation of banana peel powder and date powder in ratio of 2.5% to 10% that is 100:00:00, 65:30:2.5:2.5, 60:30:5:5 and 50:30:10:10 with shortening, powdered sugar, milk, vanilla essence and baking powder resulted in nutritionally rich cookies compared to control in the manner of protein, crude fiber and carbohydrate. Data obtained from sensory evaluation clearly indicated that significant higher score was observed for appearance, taste, color, flavor, texture and overall acceptability in cookies (T_5) containing 60:30:5:5 ratio of wheat flour: multigrain flour: banana peel powder: date powder. The effect of storage time was sustainably significant on cookies quality parameters, indicating that cookies were acceptable up to 1-2 months stored in polyethylene bags without any preservative under ambient conditions.

Keywords: Banana peel, cookies, date, dietary fiber, multigrain, protein.

1. Introduction
Wheat (*Triticum* spp.) is the second most important winter cereal in India after rice. Bread wheat contributes approximately 95% to total production while another 4% comes from *durum* wheat and *Dicoccumsharein* wheat production remains only1%. Wheat crop contributes substantially to the national food security by providing more than 50% of the calories to the people who mainly depend on it. India has witnessed a significant increase in total food grain production to the tune of 233.88 million tonnes with a major contribution of wheat with 80.58 million tonnes (34.5%) during 2008-09 (Singh 2010). Wheat is consumed in various forms by more than 1000 million human beings. It is used for various food purposes after grinding wheat kernel into flour. The wheat flour is major ingredient in chapatti, bread and bakery products such as cakes, cookies, crackers, doughnuts, sweet rolls, biscuits etc. Wheat flour is basic ingredient in bakery products due to their inherited property to form dough and retain gases. Wheat (*Triticum aestivum*) is staple food crop which occupies important place next to rice in India. India stands second in wheat production in the world next to China. India's wheat production is estimated to be 93.90 million tonnes in the year 2012 (Anonymous 2012).
The bakery industry is among the few processed food segments whose production has been increasing steadily in the country in the last couple of years. There is growing demands for wheat based products in India and it is estimated that expected market growth in biscuit production in the year 2012-13 will be 35.3 Lakh tonnes (Singh and Wright 2010). In India, diabetic friendly biscuits (especially designed for diabetes patients) prepared by incorporation of multigrain is becoming popular. One of such commercially available product includes oat biscuits. Whole grains include all there parts of grain kernel, fibre rich bran, starchy endosperm and nutrients packed germ. Foods that claim to be “Multigrain” and “high fibre” are not necessarily whole grains. Whole grain food can play important role in reducing risk of chronic disease. The wheat flour mill is used by bakeries to manufacture bread, cookies, and biscuits etc. Proteins in wheat are low in nutritional quality, as it is limited in lysine. The nutritional value of wheat flour can be improved by addition of combination of flour with other vegetable proteins and also by using minor millets or medicinal plant extract. High fibre ingredients are becoming key component for fortification in bakery products. (Barley (*Hordeum vulgar*), oats (*Avena sativa*) and *Ragi*), are amongst other cereals which are finding wide applications in food fortification due to their nutritional value in particular high dietary fibre content.

Ragi (Finger millet, *Kelvaragu, Muthari, Nachni*) is a *Sanskrit* word. It is a type of millet cultivated from ancient times in India. Proved to be rich in protein, calcium, iron and free from gluten. Banana is one of the most common fruit crops grown in almost all tropical countries, including India. It is an abundant and cheap agricultural product. Banana chip and banana fig are the main products from banana produced by a number of small and medium factories located nationwide.

Objectives

1. To standardize the formulation of value added multigrain cookies,
2. To study the effect of utilising banana peel powder and date powder, by sensory and quality evaluation of VAMC
3. To study the physiochemical properties of value added multigrain Cookies and assess the storage stability of Cookies.

2. Materials and Methods

The present investigation "Value Addition and Quality Evaluation of Dietary Fibre Rich, Multigrain Cookies" was conducted at Department of Food Process Engineering, Vaugh Institute of Agricultural Engineering and Technology, Allahabad

2.1. Material Requirement

2.1.1. Selection of raw material: Raw material for preparation of Multigrain cookies were Wheat flour, barley, *ragi*, oats, banana peel flour, date flour, vanilla essence, shortening,Sodium bicarbonate,Ammonium bicarbonate, sugar which was been purchased from the local market of the Allahabad.

2.1.2. Processing equipment: Sieve, Electronic weighing balance, soxhlet apparatus, micro-Kjeldahl apparatus, muffle furnace, grinder (mixer).

2.1.3. Chemical Analysis: Determination of moisture, protein, fat, carbohydrate, ash, pH by AOAC (2005) [1], AACC (2003) [2] method. The carbohydrates are estimated by using difference method. Mineral content viz. calcium, iron, magnesium, etc, of sweet sorghum grains were measured by the standard methods (Ranganna, 1986).

2.2 Methodology

2.2.1 Formulation of cookies

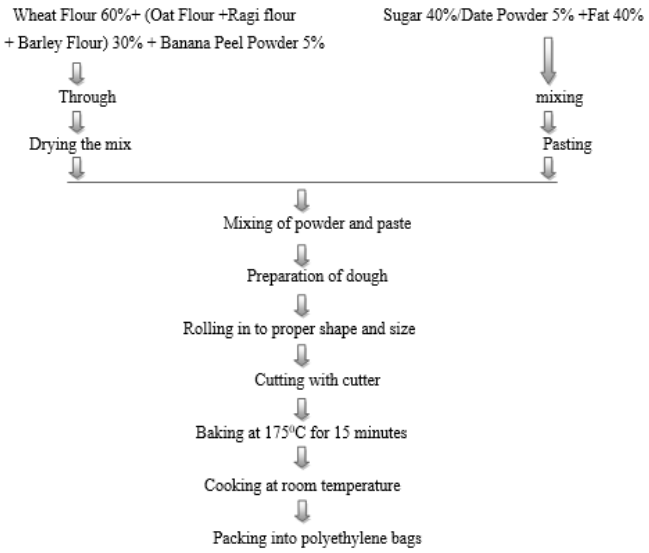
The proportion of ingredients in standardized formula of cookies was given above multigrain flour (0%, 20%, 30%, 40%) was incorporated in standard formula for cookie with slight modification and standardized process.

Sample	Wheat Flour	Multigrain Flour
T_0	100	0
T_1	80	20
T_2	70	30
T_3	60	40

Table 1: Formulation of fruit fibre in the cookie preparation

Sample	Wheat flour	Multigrain flour	Banana peel powder	Date powder
T_4	65	30	2.5	2.5
T_5	60	30	5	5
T_6	50	30	10	10

2.2.3 Experimental procedure



Flow sheet 1: Process flow chart for Preparation of multigrain Cookie

2.3. Statistical analysis: Statistical analysis was carried out by using (CRD) for different treatments as per the methods given by Panse and Sukhatme (1985).

3. Results and Discussion

The experiment was conducted for "Value Addition and Quality Evaluation of Dietary Fiber Rich Multigrain Cookies" The present investigation was undertaken to evaluate the quality as well as acceptability of utilization of multigrain, banana peel flour as well as dates powder for the preparation of cookies.

3.1. Sensory analysis of multigrain Cookie

Sensory analysis of multigrain Cookie sample T_0, T_1, T_2, T_3, T_4, T_5, T_6 was carried out on the basis of color, flavor, taste, and overall acceptability with the help of sensory evaluator on 9-point hedonic scale and the results are depicted in Table-2.

Table 2: Sensory analysis of multigrain Cookie

Sample	Colour	Taste	Flavour	Texture	Appearance	O.A.
T0	8.1	8.6	8.4	8.4	8.2	8.26
T4	8.3	8.7	8.2	8.0	8.2	8.22
T5	8.7	8.8	8.7	8.6	8.7	8.70
T6	8.2	8.6	8.3	8.2	8.3	8.32

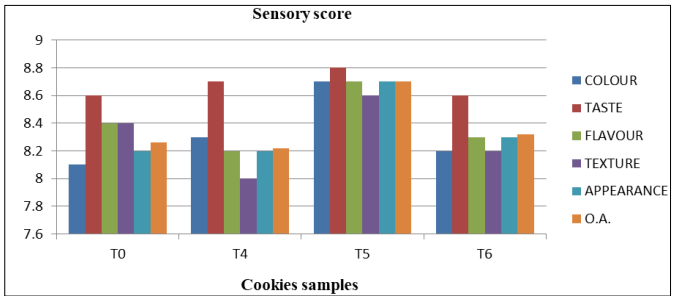


Fig 1: Sensory analysis of multigrain Cookie

Conclusion

Thus in the light of the scientific data of the present

investigation, it is concluded that the cookies prepared with the incorporation of banana peel powder, date powder and multigrain i.e. (barley, finger millet and oats) with wheat flour, at different concentration levels, which were analysed for their physicochemical, cooking qualities and sensory acceptability among those seven samples T_5 was found to be more acceptable with respect to mentioned quality parameters.

The present study showed that the Development and Quality Evaluation of Dietary Fibre Rich Multigrain Cookies is techno-economically feasible and commercial exploitation can be done. In this way, a steady and consistent scientific ground may be attained in order to deliver a satisfactory product to the final consumer**.**

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