iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.53381

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Development of Hazelnut Powder Fortified Ragi Cookies

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Abstract: ***Baking Industry is considered as one of the major part of food processing in India. Bakery products have become popular among different sections of the population due to increased demand for convenience foods. Cookies among the bakery products are most important in the world. These are an important food product used as by children and adults. Cookies differ from other baked products like cakes and breads. Because of low moisture content which ensures that they are free from microbial spoilage and confer long shelf life in the product.***
Keywords: ***Ragi cookies, Hazelnut powder , Health benefits***

I. INTRODUCTION

India is an agricultural country and largest producer of millets. Among all millets, finger millet (Eleusinian caracara) commonly known as ragi is the richest source of Calcium and Magnesium, therefore was considered for the formulation of cookies. With the increase in population of the demand for consumption of bakery products is also increasing. The demand in India is bakery products is increasing at the rate of 11.09% per annum. Bakery product such as; cakes and biscuit or cookies have higher consumer acceptance and important for delivering bioactive compound into the human diet. Ragi is a traditional crop of Odisha also known as ragi, nachni or nageli. It is a good source of carbohydrate, fiber, calcium and iron. Karnataka is the biggest producer of Ragi. Ragi / millet has several health benefits. It is useful in reducing body weight being a good source of fiber. It is used in reducing the cholesterol from the body. Advancement of innovative features in product is the new tactical part of the food industry. Nowadays, due to hectic life style, people have been demanding ready-to-cock foods that are easy to prepare, consumes less time in cooking, are healthy, have a good shelf life, and have a delicious taste. Cookies are processed food that all age group of people highly eat as a stock. Its production is more and available worldwide. In these days customers are expecting, food supplementary health benefits from a single ready to eat food item.

II. MATERIALS AND METHODS

The ragi cookies were prepared in four different formulations to check which among them are tasty and nutritionally have extra health benefit. The flours such as whole wheat flour, Ragi flour and hazelnut flour were taken in different proportions for the preparation of cookies. The other ingredients were kept constant. The formulations for the preparation of cookies are given below:

Table 3.1: Different formulations of Ragi cookies

SL NO.	INGREDIENTS	QUANTITY		
		C1 (gm)	C2(gm)	C3(gm)
1	Ragi powder	50	55	60
2	Hazelnut powder	30	20	30
3	Butter	20	20	15
4	Oil	10	10	10
5	Jaggery	60	60	50
6	Water	20	20	20
7	Refined wheat flour	35	40	40
8	Baking soda	2	3	3
9	Baking powder	3	3	3

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A. Preparation of Cookies

Dry fruits such as almonds and cashews along with the hazelnut powder were grinded powder. All the ingredients such as wheat flour, ragi flour, butter, oil, jaggery powder, ragi powder, baking soda and baking powder were weighed, mixed with distilled water and kneaded properly to form a dough. The standing time given for the dough was 8 minutes as all the flours has high capacity of water absorption. After that, the dough was rolled or sheeted to cut then cookies shape. After cutting then, they were garnished with dry fruits to catch the customer's eyes. Now, the cookies were baked at a temperature of 150°C for about 20 minutes. After baking the cookies were allowed for cooling for 8-13 minutes. Cooling is important for confirming the substantial loss of the moisture in the cookies. After cooling, the cookies were packed and ware housed in a polyethylene. The cookies were taken for proximate analysis. This process is also shown in the flowchart given below.

Flow chart for preparation of cookies:

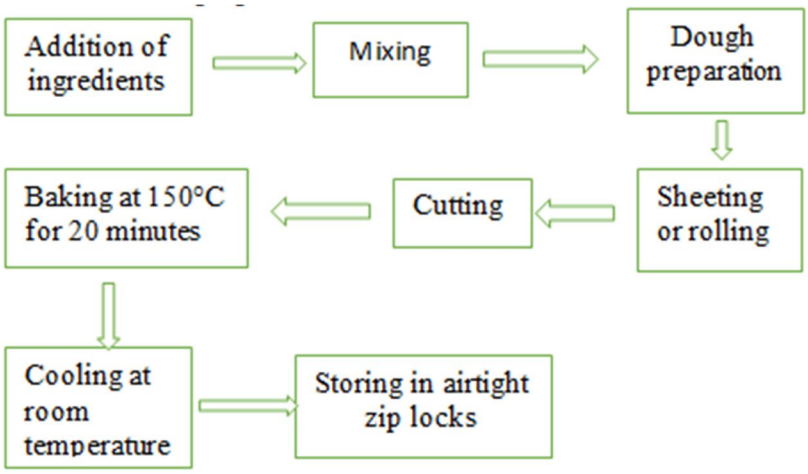

Fig 1; Baking at 150 °C for 20 minutes

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Fig 2; Cookies after baking

B. Shelf-life studies of developed Ragi cookies

Shelf life is a significant asset of any food and is of attention to everybody in food chain right from the makers to customer. Well-arranged and conducted customer suitability tests in the form of proper sensory analysis, is a significant portion of the shelf-life assessment of any of the product. Water vapor and moisture transmission act as main influencing feature for shelf life. Physicochemical variations in food during storing can be the reason for damage of shelf-life resultant to deterioration of its superiority. Water is an essential for food which influences food safety, stability, excellence and physical properties, Amplified moisture of food due to water absorption from the surroundings or by mass conveyance from adjoining components outcomes in a soft texture and soggy. Off-flavors, off-odors and damage to crispiness.

III. REVIEW OF LITERATURE

S. Sahara et al., (2018) found that cookies samples prepared with combinations of malted ragi flour were rich in calcium, iron, phosphorus, and crude fiber. The cookies sample prepared combination of unmalted ragi flour and hazelnut flour are not best quality cookies sample as well as it has not best nutritional value as compared to malted ragi flour cookies.

IV. RESULTS AND DISCUSSION

Hedonic 5-scale rating method was carried out. In this formulation, 20gm of hazelnut flour, 15gm of finger millet flour and 50gm of Ragi flour were added. Among all the attributes aroma was scored high and mouth feel was scored low. The highest score given for the sample was 5 i.e., for appearance and texture. The lowest score given was 2.9. i.e., for mouth feel. Appearance was neither liked nor disliked. Taste was moderately disliked. Mouth feel was moderately disliked. Aroma was moderately liked. Texture was neither liked nor disliked. The overall acceptability for the sample C1 given was 2.5 i.e., the sample was neither liked nor disliked by

Table 4.1: Sensory scores of the formulation of sample C1

Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total sum	Mean
Appearance	4	4	5	5	5	5	5	5	4	4	4	4	4	4	5	67	4.46
Taste	4	4	4	5	3	5	4	4	4	3	4	5	5	5	5	64	4.26
Mouth feel	4	4	4	4	4	4	5	5	5	5	4	4	4	5	5	66	4.40
Aroma	4	4	4	4	4	5	5	5	5	4	4	4	5	4	4	65	4.33
Texture	4	4	5	5	4	4	4	4	4	5	5	5	5	5	5	68	4.53
Acceptability	4	4	4	5	5	5	5	5	5	5	5	4	4	4	4	68	4.53

Hedonic-scale rating method was carried out in this formulation, al the 3 flours were added equally i.e., 20gm of wheat flour, 50gm of ragi flour and 20gm of hazelnut powder flour were added. Among all the attributes texture was scored high and taste was scored low. The highest score given for the sample C1 was 4.9, i.e., for texture. The lowest score given for the sample C1 was 4.9. i.e., for taste. Appearance was extremely liked. Taste was moderately liked. Mouth feel was moderately liked. Aroma was moderately liked. Texture was extremely liked. The overall acceptability for the sample C1 given was 5.2 i.e., the sample C3 was extremely liked by the panelists.

The overall acceptability for the sample C1, C2, and C3 were 2.9, 4.5, 2.8 and 4.7 respectively. Sample CI and sample C3 were neither liked nor disliked by the panelists Sample C2 was moderately liked by the panelists. Sample C3 was extremely liked by the panelists.

Protein content

The protein is estimation was carried out in Kjeldhal apparatus. There are 3 steps in Kjeldhal method which inclused digestion, distillation and titration in the digestion process the polypeptide bonds are broken together and convert them into simpler chemicals such as carbon dioxide, water and ammonia. Here, the nitrogen in the sample is completely converted into nonvolatile ammonium sulphate. At the end of digestion process, it converts into ocean blue color, indicating the completion of digestion process. The amount of HCI consumed to convert it into pink color is noted down. The protein content of the ragi cookies is given in the below table.

Table 4.2: Protein content of the ragi cookies of all the formulations

SL. No	Formulations	Nitrogen (%)	Protein (%)
1	C1	1.842	11.515
2	C2	1.848	11.554
3	C3	2.214	13.848
4	C4	2.185	13.634

The protein content for the multigrain cookies obtained were 11.515 %, 11.554%, 13.848% and 13. They have obtained 10.65% of protein content. In thus study, the multigrain cookies protein content is higher than. The protein content varies from 12% to 13.9%. There is no standard protein content set by the AOAC or FSSAI The protein content usually varies depending upon the raw ingredients they have selected for the preparation of the cookies.

V. CONCLUSION

Hazelnut powder fortified ragi cookies offer a unique and nutritious snack option. The addition of hazelnut powder enhances the nutritional value of the cookies by providing protein, fiber, and healthy fats. Ragi flour is gluten-free, making it a great alternative for people with gluten intolerance. Hazelnut powder is also rich in antioxidants, which can provide health benefits like reducing the risk of chronic diseases. The nutty flavour and crunchy texture of the cookies make them a delicious snack option that can provide a quick energy boost. However, the cost of hazelnut powder is slightly higher than the cookies available in the market. Considering its overall health benefits people will prefer to purchase ragi based hazelnut fortified cookies. Overall, hazelnut powder fortified ragi cookies are a healthy and tasty snack option that can cater to a wide range of consumers**.**

VI. ACKNOWLEDGMENT

We are thankful to our Dr. Sarat Kumar Maharana, Principal, GIFT as well as our department staff for their inspiration and help without which it would have been possible for us to complete the project.

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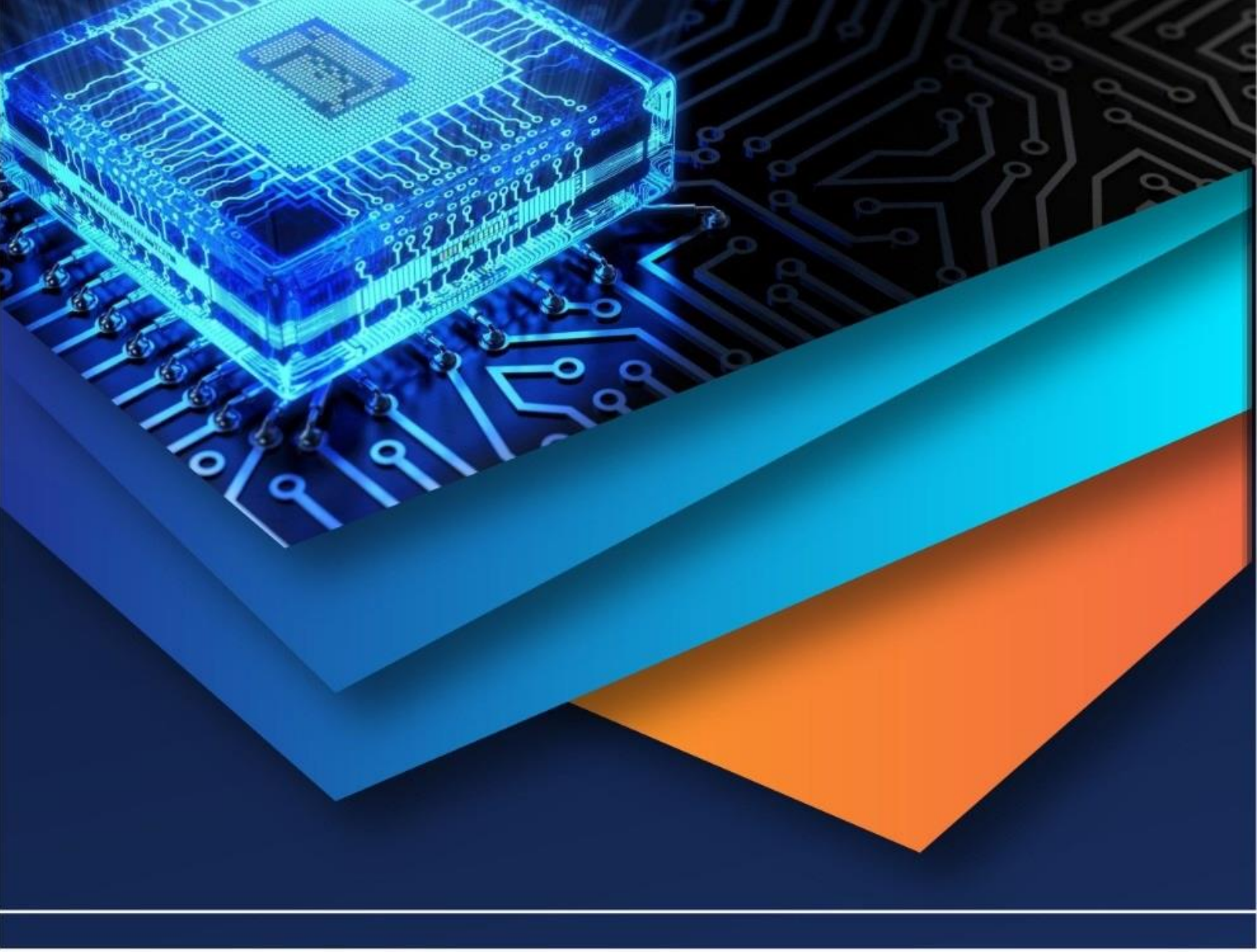

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