FORMULATION AND EVALUATION OF NUTRIENT RICH CHIKKI

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ABSTRACT

Nutrition is the process by which organisms consume and utilize food for growth and maintenance. It involves nourishing the body with essential nutrients needed for survival. The study of food and its impact on human health helps in understanding nutrient sources. A well-balanced diet plays a vital role in preventing and managing various health conditions.

Chikki, a popular Indian sweet made from grains and jaggery, is enjoyed by people of all ages. To enhance its nutritional value, a multigrain nutrient-rich Chikki was developed using ragi, bajra, jowar, oats, and jaggery. Its nutritional composition was analyzed, and its sensory acceptability was assessed using a hedonic scale.

KEYWORDS: Nutraceutical, Chikki, Ragi, Bajra, Jowar, Oats, Jaggery, Vitamins, Minerals, Nutrient.

Introduction

The term "**nutraceutical"** is a combination of "nutrition" and "pharmaceutical." Nutraceuticals are foods or components of foods that significantly alter and maintain the normal physiological processes that support healthy human beings. (Somwanshi S.2022)

The food products used as nutraceuticals can be categorised as dietary fibre, prebiotics, probiotics, antioxidants, polyunsaturated fatty acids and other different types of herbal natural foods.

Fig No 01: - Chikki

The dietary supplements are used to treat a number of illnesses, including diabetes, cardiovascular disease, osteoporosis, obesity, cancer, and cholesterol. (Somwanshi S.2022)

In the global market for nutraceuticals, herbal and dietary supplements are included and expanding quickly. (Somwanshi S.2022)

Chikki is a traditional candy which deliciously created with grains and jaggery and its enjoying by people of all age group in India. An attempt was made to improve its nutritional quality by developing a multigrain Nutra-chikki with ragi, bajra, jowar, oats and jaggery, and the nutritional assessment were evaluated.

Gur (Jaggery) is a natural, traditional sweetener made by the concentration of sugarcane juice and is known all over the world in different local names. It is a traditional unrefined non-centrifugal sugar consumed in Asia, Africa, Latin America and the Caribbean. Containing all the minerals and vitamins present in sugarcane juice, it is known as healthiest sugar in the world. India is the largest producer and consumer of jaggery. Out of total world production, more than 70% is produced in India. (Nath A.2015)

Various Nutraceuticals Used for Various Diseases and Disorder

Ragi shows antioxidant activity. Ragi used for treatment of various diseases such as Diabetes Management (Shobana S. 2007), Osteoporosis and Bone Health (Devi B. 2011), Cardiovascular-Diseases (CVD) (Premavalli S.2017), Anemia Prevention (Chandra D, et.al.

2016), Weight Management & Obesity (Srivastava S, et.al 2018), Digestive Health (Constipation & Gut Health) (Gopalan C, *et.al* 2009). It contains vitamins and Minerals like vitamin C, Vitamin E, Vitamin B complex, Vitamin S, also contain small amount of vitamin B12, calcium, iron, zinc, magnesium, potassium, phosphorus etc. (Yadav K, *et.al* 2019)

Bajra is used in treatments of Diabetes Mellitus, Cardiovascular Diseases, Celiac Disease and Gluten Sensitivity, Anemia, Obesity and Weight Management (Srivastava S, et.al 2018), Digestive Disorders, Polycystic Ovarian Syndrome (PCOS). It contains vitamins and Minerals like Vitamin B1, Vitamin B2, Vitamin B3, calcium, iron, zinc, magnesium, potassium, phosphorus etc. Bajra contain antioxidant property. (Samreen F, *et.al* 2024)

Oats are used to treat Heart disease, Diabetes Management (Shobana S. 2007), Digestive Health, Weight Management (Srivastava S, et.al 2018), Skin Conditions, Asthma Prevention in Children. It also having antioxidant activity. It contains vitamins and Minerals like Vitamin B1, Vitamin B6 calcium, iron, zinc, magnesium, potassium, phosphorus, selenium folate, thiamine etc. (Clemens R, *et.al* 2014)

Jowar shows antioxidant activity and also used to treat some disease like Diabetes Management (Shobana S. 2007), Heart Health, Cancer Prevention, Celiac Disease and Gluten Sensitivity, Obesity and Weight Management (Srivastava S, et.al 2018), Digestive Health (Gopalan C, et.al 2009). It contains vitamins and Minerals like Vitamin B, calcium, iron, zinc, magnesium, potassium, phosphorus etc.

Jaggery also shows antioxidant activity, which is used to treat some disease like Anemia Prevention, Respiratory Health, Detoxification and Liver Support, Digestive Health, Immune Function. It contains vitamins and Minerals like Vitamin A, Vitamin B1, Vitamin B2, Vitamin B5, Vitamin B6, Vitamin C, Vitamin D, Vitamin E, etc. (Movers, *et.al* 2019)

Methodology

Selection of Grain: Selection of grains should be based on their quality, freshness, and nutritional value. The grains found from local areas (shops and farms).

Collection of Grains: Will be collected from local areas of Maregaon and Yedashi (MH).

Formulation of Chikki: -

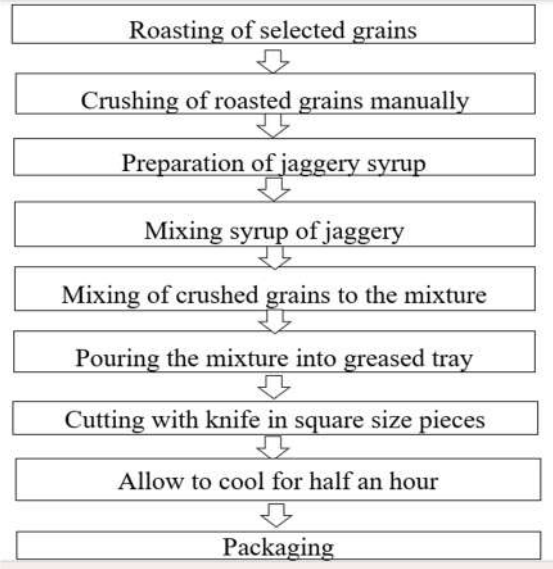

Fig No 02: - Formulation of Chikki (Hirdyani H.2015)

Evaluation parameter (Hirdyani H.2015)

1. PH Determination: By using pH paper: Dip the pH strip into the sample and compare the colour change with the standard pH chart. Note the reading.
2. Ash Value Determination: Firstly, weight the proper amount of sample and take it into the crucible. Transfer the crucible in muffle furance and set at 550°C ± 25°C until a constant weight is obtained. The residue should be grayish-white then Cooled and weighed.
3. Moisture content: Weigh the Empty clean, dry Petri dish and weigh it then weigh the sample and add 1 gm of sample into the dish and weigh again. Place the dish in a hot air oven at 105°C for interval of 5min till the constant weight.
4. Protein content: Protein was determined by using the Folin-Ciocalteu regents, which reacts with aromatic residues of proteins and yields blue colour.
5. Carbohydrates content

   Carbohydrate estimation was done by using the various chemical test such as

A. Molisch's Test: - Take 2 mL of the sample solution in a test tube and add 2-3 drops of Molisch's reagent. Slowly add 1 mL of concentrated H_2SO_4 along the sides of the tube without mixing. Observe the formation of a purple or violet ring at the interface, indicating the presence of carbohydrates.

B. Benedict's Test: -Take 2 mL of the sample solution in a test tube and add 2 mL of Benedict's reagent. Heat the mixture in a boiling water bath for 5 minutes and observe the color change.

The result interpretation is as follows: Green indicates low sugar presence, yellow indicates moderate sugar, and brick red confirms high sugar content.

C. Fehling's Test: - Take 2 mL of Fehling's A ($CuSO_4$) and 2 mL of Fehling's B (NaOH & tartrate) in a test tube. Add 2 mL of the sample solution and heat the mixture in a boiling water bath. Observe the formation of a red precipitate, which indicates the presence of a reducing sugar. A brick red precipitate confirms a strong positive result.

D. Barfoed's Test: - Take 2 mL of Barfoed's reagent in a test tube and add 1 mL of the sample solution. Heat the mixture in a boiling water bath for 2 minutes and observe the formation of a precipitate. A red precipitate within 2 minutes indicates the presence of a monosaccharide, while a red precipitate appearing after 5 minutes confirms the presence of a disaccharide.

E. Iodine Test: - Take 2 mL of the sample solution in a test tube and add a few drops of iodine solution. Observe the color change in the solution. A blue-black color indicates the presence of starch, while no color change confirms the absence of starch.

F. Hydrolysis Test: - Take 2 mL of the sample solution in a test tube and add a few drops of dilute HCl. Heat the mixture for 5 minutes, then neutralize it with NaOH. Perform Benedict's test on the neutralized solution. If Benedict's test now gives a positive result, it indicates that the original carbohydrate was a non-reducing sugar or polysaccharide (such as starch or sucrose).

6. Fat: Rub the food sample on filter paper and then hold the filter paper up to the light. If the paper is translucent (Slightly see- through) thre was fat present on the food.

Formulation Table

Ingredients	F1	F2	F3
Ragi	20 gm	15 gm	15 gm
Bajra	20 gm	15 gm	15 gm
Jowar	20 gm	15 gm	15 gm
Oats	20 gm	15 gm	25 gm
Jaggery	20 gm	40 gm	30 gm

Result and Discussion

The results obtained in the present investigation indicated that good quality nutraceutical chikki would be prepared with 15 gm ragi, 15 gm bajra, 15 gm jowar, 15 gm oats and 40 gm jaggery. These chikki stored in low density polyethylene (LDPE) showed better chemical and

organoleptic properties. Chikki could be stored in good condition upto 90 days in LDPE at ambient temperature.

Morphology (Desai A, *et.al* 2010)

Sr No	Parameters	F1	F2	F3
1	Colour	Light Brown	Light Brown	Light Brown
2	Odour	Aromatic	Aromatic	Aromatic
3	Taste	Little Sweet	Sweet	Medium Sweet
4	Shape	Rectangular or Roughly Shape	Rectangular or Roughly Shape	Rectangular or Roughly Shape
5	Texture	Sticky	Crispy & Crunchy	Crispy & Crunchy

Evaluation Test (Jagati P, *et.al* 2021)

Sr No	Parameters	F1	F2	F3
1	PH	7	7	7
2	Ash	0.34 gm	0.22 gm	0.28 gm
3	Moisture Content	PASS	PASS	FAIL
4	Protein	FAIL	PASS	PASS
5	Fat	FAIL	PASS	FAIL
6	Test For Carbohydrate			
	Molisch's Test	Purple / Violet Ring Form	Purple / Violet Ring Form	Purple / Violet Ring Form
	Benedict's Test	Green Coloured Observed	Green Coloured Observed	Green Coloured Observed
	Fehling's Test	Green To Yellow	Green To Yellow	Green To Yellow
	Barfoed's Test	Disaccharides	Disaccharides	Disaccharides

	Iodine Test	Starch Present	Starch Present	Starch Present
	Hydrolysis Test	Neutral	Neutral	Neutral

Conclusion

The above research paper concluded that the developed chikki was liked by students, teachers and other peoples. The chikki was accepted by both males and females or it can be eaten by any age group except that above the age for 75 to 80. So in this way chikki to consume into the popular Indian traditional sweet-snack and it can be beneficial for health due to the presence of neutraceuticals as well as vitamins.

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