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DEVELOPMENT AND QUALITY EVALUATION OF KHAKHRA INCORPORATION WITH SOYABEAN FLOUR AND DATES

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Abstract : Khakhra is anytime , anywhere snack which mainly used in daily life during breaks, travelling while in office, picnic parties. In this study of making khakhra from nutrition-rich ingredients mainly use soyabean flour, dates, spices, etc. It is ready to eat the product. The process of making khakhra is followed by mixing all ingredients. Proper kneading and careful roasting on hot gridle. After preparation proximate analysis has been done by AOAC 20th Ed2016; chapter no.4 method no. 920.39, 978.10, 954.01 this method. Determine protein, fat, fiber, moisture, ash, the energy value is 24.2, 10.35, 2.6, 1.2, 2.4 and 426.95 respectively. Micronutrients also detected by method AOAC 20th Ed2016; chapter no.3 method no. 985.01. Whereas Ca, Mg, Na, K, Fe is 176.25, 153.95, 20.5, 1280, 6.

The textural property of khakhra determine by use of Brookfield texture analyser CT3. Hardness of khakhra determine through use of TA/18 probe. The calculated value is 1.12 . Evaluation is done by the hedonic scale under the ten expert panel judges. Which is color, flavor, taste, texture, overall acceptability is 7.5, 8.0, 8.5, 9.0 and 9.0 respectively. Khakhra is a consumable product due to that microbial analysis also done by IS 5402:01 method and calculates standard plate count which is absent. The shelf-life of the khakhra is up-to six month.

IndexTerms - Khakhra, Soyabean flour, Dates, Spices, Ready to eat , Texture property.

I. INTRODUCTION

Khakhra, a traditional Indian flatbread, has gained remarkable popularity both within India and across international borders due to its unique culinary characteristics and potential nutritional benefits. This versatile and crispy snack, primarily composed of whole wheat flour and an assortment of spices, exemplifies the rich tapestry of Indian cuisine. Its thin, circular form is achieved through meticulous preparation and expert roasting techniques. The emergence of khakhra from regional kitchens to mainstream markets underscores its cultural significance and widespread appeal. In recent years, it has transcended its origins and found a place in the global culinary landscape, captivating the taste buds of individuals seeking novel and nutritious snacking options. As khakhra continues to gain prominence, it is imperative to delve into its historical and cultural roots, explore its nutritional content, and assess its potential contributions to contemporary dietary practices.

In market people mostly prefer a khakhra used which are made from only wheat based khakhra. As per people acceptance they like to use khakhra which is healthy and nutritious. Some manufacture offer an option of flavoured khakhra. Now-a days people becomes a health conscious they would like to prefer healthy and hygenic and nutritious which is chemical free. We need to minimize the use of wheat based khakhra, consuming only wheat based khakhra can lead to digestive discomfort, bloating etc.

Soybean flour stands out as a plant-based protein powerhouse, containing all essential amino acids necessary for human health (Smith et al., 2017). This makes it a valuable protein source, especially for individuals following vegetarian or vegan diets. The protein quality of soybean flour has been recognized as comparable to that of animal proteins. One of the distinguishing features of soybean flour is its healthy fat composition. Enriched with polyunsaturated fats, including omega-3 and omega-6 fatty acids, soybean flour contributes to heart health by aiding in the reduction of cholesterol levels and supporting overall cardiovascular well-being (Kim et al., 2019). This makes it a heart-healthy alternative to certain animal-based fats. Soybean flour serves as a rich source of essential micronutrients, including iron, zinc, and a spectrum of B vitamins (Wang et al., 2020). These micronutrients play crucial roles in energy metabolism, immune function, and overall well-being. Incorporating soybean flour into the diet contributes to meeting daily nutritional requirements. Rich in dietary fiber, soybean flour contributes to digestive health and helps prevent digestive disorders (Dave & Kulkarni, 2013). The fiber content supports regular bowel movements, aids in weight management, and promotes a feeling of fullness. Regular consumption of soybean flour has been associated with cardiovascular benefits. The combination of high-quality protein and heart-healthy fats may contribute to reducing the risk of heart diseases by improving lipid profiles and supporting overall heart function (Kim et al., 2019). The significant calcium content in soybean flour, along with other minerals, contributes to bone health. Adequate intake of these minerals is crucial for maintaining bone density and reducing the risk of osteoporosis (Messina et al., 2010). This is particularly relevant for individuals seeking plant-based calcium source.

Phytochemicals, such as isoflavones found in soybeans, have demonstrated potential anticancer properties. Research suggests that regular soy consumption may play a role in reducing the risk of certain cancers, including breast and prostate cancers (Messina, 2016). The combination of protein and fiber in soybean flour supports weight management efforts. Including soy-based foods in a balanced diet helps control appetite, regulate calorie intake, and promote a healthy body weight (Wang et al., 2020).

Dates powder is a natural sweetener, comprising glucose, fructose, and sucrose, providing a quick and sustainable energy boost. (Al-Farsi, M. A., & Lee, C. Y. 2008). Dates powder is a significant source of dietary fiber, promoting digestive health, preventing constipation, and contributing to overall gut well-being. (Vayalil, P. K. 2012). Dates powder contains essential minerals like potassium, magnesium, copper, and manganese, supporting bone health, nerve function, and antioxidant defense. (Rahmani, A. H., et al. 2014).The natural sugars in dates powder provide a quick and easily digestible energy source, making it beneficial for athletes and those in need of instant energy. (Saafi, E. B., et al. 2013). Effect of Date (Phoenix dactylifera L.) Dates powder contains antioxidants, including flavonoids and carotenoids, helping neutralize free radicals and reduce oxidative stress.(Eid, N., et al. 2013). The potassium content in dates powder supports heart health by regulating blood pressure and reducing the risk of cardiovascular diseases.(Al-Shahib, W., & Marshall, R. J. 2003).Incorporating dates powder into your diet not only enhances flavor but also provides nutritional benefits, making it a valuable addition to a well-balanced diet.

Wheat flour is rich in complex carbohydrates, offering a readily available source of energy for the body.(Fardet, A. 2010). Whole wheat flour, in particular, is high in dietary fiber, promoting digestive health and aiding in weight management. (Slavin, J. L., & Martini, M. C. 2001). Wheat flour serves as a valuable source of proteins, essential for muscle development, repair, and various metabolic processes. (Wieser, H. 2007). Wheat flour contributes essential vitamins, such as B-complex vitamins, and minerals like iron, zinc, and magnesium. (Shewry, P. R., & Hey, S. J. 2015). The consumption of whole wheat flour is associated with a reduced risk of cardiovascular diseases, attributed to its fiber content and positive impact on cholesterol levels. (Aune, D., et al. 2016). The fiber content in wheat flour promotes satiety, aiding in weight management by reducing overall calorie intake. (Katcher, H. I., et al. 2008).Whole wheat flour, with its lower glycemic index, contributes to better blood sugar control.(Jenkins, D. J. A., et al. 2008). Wheat flour's gluten content enables the formation of a strong and elastic dough, crucial for the production of bread and bakery products. (Shewry, P. R., & Tatham, A. S. 1997). Wheat flour's ability to absorb and bind water is fundamental in creating the desired texture in various food products. (Scanlon, M. G., & Zghal, M. C. 2001). Wheat flour acts as a natural thickening and stabilizing agent in sauces, soups, and other culinary applications. (Cauvain, S. P. 2003).

The khakhra which we are going to make from the ingredients like soyabean flour, dates powder, wheat flour, spices, salt etc. these ingredients having a high nutritional properties. As well as they are rich in protein, iron, fiber, fat, carbohydrates etc. All type age group people can consume it.

Nutritional Importance of Khakhra

We know that in India many children are malnourished. Its is necessary to follow all nutritional diet to maintain the nutritional value in daily value in daily life. We invented khakhra that have nutritional value. Incorporates soybean flour and dates, stands out as a unique and innovative variation. It offers a distinct nutritional profile compared to traditional wheat-based khakhras, providing enhanced protein and iron content, along with natural sweetness and flavor from dates.

This uniqueness not only caters to taste preferences but also addresses important dietary concerns, particularly iron and protein deficiency. khakhra has the potential to be a valuable addition to the food market, offering a more nutritious option for consumers. Furthermore, by incorporating soybean flour and dates are contributing to the diversification of food products, which can be particularly important for individuals with specific dietary needs or those looking to improve their nutritional intake.

II. MATERIALS AND METHODS

A. Processing Methods

Selection of ingredients

Soyabean flour, dates powder, Wheat flour, spices these ingredients are selected on the basis of its nutritional composition. Selected ingredients are good quality material taken from Amazon. They all are purchase in affordable prize.

Clean it properly

Cleaning is done only for soyabean, dates ,wheat and spices. It is done by manually process where separate unwanted material, small particle, stones, waste material are properly cleaned.

Grinding properly

Grind each ingredient into a fine powder individually, ensuring uniform granule sizes. Additionally, finely grind the spices to incorporate into the mixture seamlessly

Mixing properly

Mix the soyabean flour, dates powder and wheat flour and spices properly. Mix these ingredients uniformly. The proportion of the flour should be 5:2:2.Mixing is necessary to avoid a lump formation during kneading. Due to proper mixing of flours mix uniformly and equally.

Making dough

Blend the ingredients thoroughly to create a uniform mixture, then gradually incorporate water into the flour. Add water cautiously, about 2-4 ml for every 10 grams of flour. Ensure proper kneading for a well-formed dough, allowing the flour to absorb the water effectively.

Giving shape with the khakhra maker

After kneading of dough shaping of dough is done. Giving proper shape of khakhra with the help of khakhra maker.

Roasting on gridle

Put these khakhra into gridle. Before put it into over switch on the over for preheat gridle. After placed the Rolled dough on gridle and roast until bubbles appear. Gently press to encourage puffiness**.**

Cooling at room temperature

After roasting cooling is done to remove excess heat present into spoon. Due to which moisture also evaporated from the sample.

Khakhra making Procedure

The preparation of khakhra we follow the simple method which is as follow:

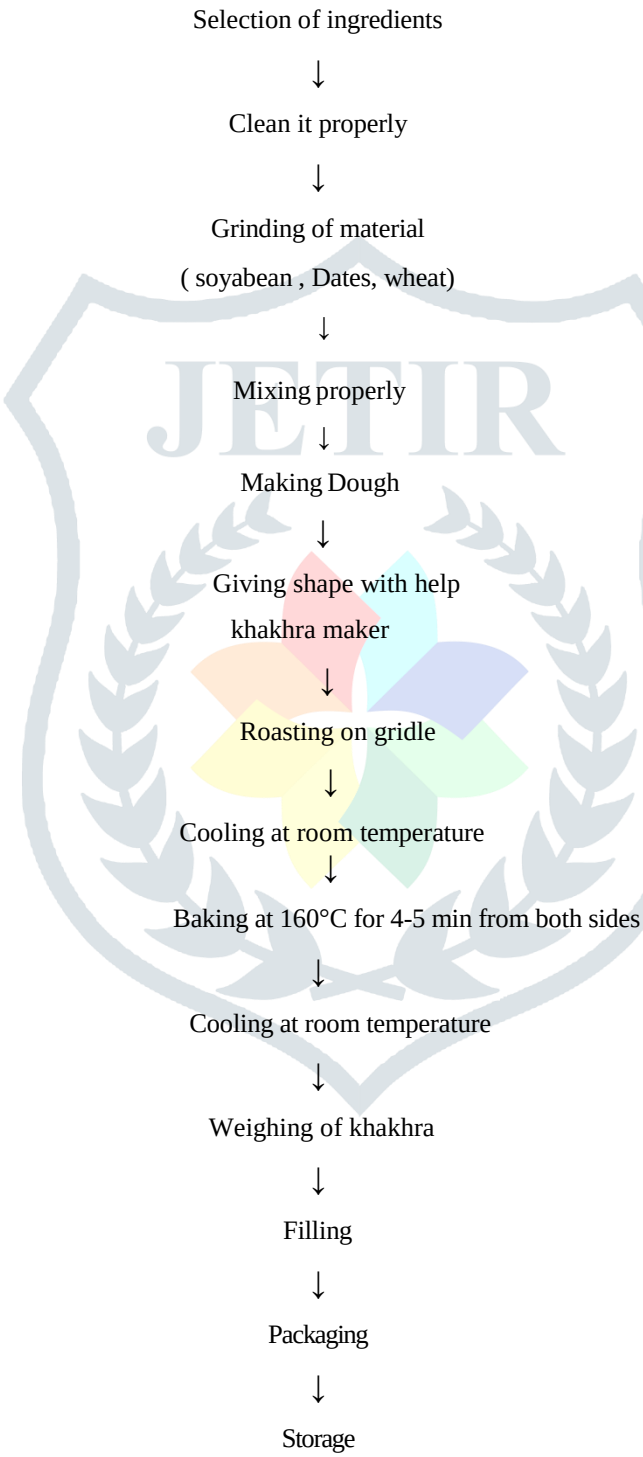

Figure 1.Experimental frame work of the research

Formulation for preparation of khakhra.

The khakhra were prepared with soyabean, dates and wheat. looking to its physical, nutritional and organoleptic characteristic. Composition of flour used in preparation of khakhra was prepared by mixing of all flour in different proportion level. formulation

shown in Table 1 and procedure as shown fig. 1

Table 1.Formulation for preparation of khakhra per 100 gm.

Ingredients	C (Control)	T1(Trial-1)	T2(Trial-2)	T3(Trial 3)
Soyabean	-	50	40	30
Dates	-	20	30	30
wheat	90	5	20	30
Salt	5	5	5	5
Spices	5	5	5	5

III. RESULT AND DISCUSSION

The study, titled " Development And Quality Evaluation of khakhra Incorporation with soyabean flour and Dates" aims to explore the potential use of soyabean, dates, wheat and spices through innovative food development. In this investigation, sincere efforts have been made to study the physical, chemical and nutritional properties of ingredients. Committed to developing khakhra as a new product. In addition, the composition, shelf life and technical and economic feasibility of the developed khakhra were qualitatively evaluated in MIT-CAR'S which is NABL accredited Lab.The results obtained in this survey are tabulated and expressed as graphical, statistical analysis and discussion in the appropriate sub-headings below.

Proximate composition of Nutrient khakhra

The final product depends on the quality of the raw materials used in the preparation process. The used ingredients were nutrition rich and having high content of protein, fiber, fat, carbohydrate, moisture, ash were analyzed and results are reported in Table 1.

Table 2. Proximate composition of Nutrient khakhra

Proximate Analysis	khakhra (%)
Protein	24
Fat	10.35
Fiber	2.6
Carbohydrate	59.45
Moisture	1.2
Ash	2.4
Energy Value (Kcal/100gm)	426.95

* Each value is an average of three determinations

Mineral contain in khakhra.

In daily life the, micronutrients are an important part of our food. In khakhra micronutrient evaluated by method AOAC 20th Ed2016; chapter no.3 method no.985.01. As we know khakhra is a consumable product due to the evaluation of microbial analysis also done by the IS 5402:01 method. All-Nutrient results are shown below Table 3.

Table 3. Mineral contain in nutrient khakhra.

Micronutrients	Mg/100gm
1. Calcium (Ca)	176.2
2. Magnesium(Mg)	153.95
3. Sodium (Na)	20.5
4. Potassium(K)	1280
5. Copper (Cu)	0.644
6. Iron (Fe)	6.2
7. Zinc (Zn)	25.35
8. Manganese (Mn)	0.45
9. Nickel (Ni)	0.0906
10. Lead (Pb)	BDL
11. Cadmium(Cd)	BDL

12. Chromium(Cr)	BDL

* Each value is an average of three determinations.

Sensory evaluation of khakhra

The effects of nutritious ingredients for making at different levels on the sensory parameters of khakhra were analyzed and the results are presented in Table 4

Table 4. Sensory evaluation of khakhra.

Treatments	Color & Appearance	Taste	Flavor	Texture	Overall acceptability
Control	6.5	5.5	6	6.5	5
T1	8	9	8	8	9
T2	7.5	6	6	7	7
T3	7	7	7	8.5	8

* Each value is an average of ten responses.

Colour and Appearance

The average quality score of colour for different spoon treatment is shown in Table 4.8, according to which the score decreasing significantly with increasing percentage soyabean flour. The score was obtained by control sample (6.5) while significantly highest by T1 (8.0). The probable reason for these results could be the percentage of Soyabean flour and dates. Color difference occur due to used different spices into khakhra.

Taste

Taste score for khakhra was significantly influenced due to addition of soyabean flour and dates and different spices. The treatment T1 has got maximum rating (9.0) for taste. It might be due to use of honey for taste purpose. The minimum taste score obtained by control sample (5.5) due to comparatively use wheat flour for making and simple in taste.

Flavor

At moderate level of date flavor into khakhra was found to be appreciable and treatment T1 received highest score (8.0), even more than control. The T3 got highest score (7.0) due to dates flavor

Texture

Texture score values also showed significant variation across the treatments as the level of soyabean flour and dates was increased in khakhra. This might be due to specific textural properties at specific ratios of soyabean flour, dates and wheat. T3 got significantly highest score (8.5) while lowest score was obtained in the control sample (6.5). With respect to the texture, judges accepted khakhra prepared by all treatment and formulation of khakhra.

Overall Acceptability

The overall acceptability of different treatments of khakhra revealed that quality score varied widely for different treatments due to individual preferences and also a change in general trend and acceptability criteria in comparison with whole wheat khakhra. It is observed from above table that overall acceptability of T1 sample i.e. Khakhra prepared with 50% soyabean flour is more (9.0) than other samples. However, moderate addition soyabean flour can produce a qualified product with a score comparable to the control sample.

Microbial analysis of khakhra

The best accepted product on the basis of sensory evaluation i.e. T1 sample was subjected to shelf life analysis.To study the effect of storage for 3 months on microbial analysis of khakhra packed in HDPE Khakhra was observed to be safe up to 3 months by microbial point of view as it was studies for time intervals for microbial count. Due to less moisture content the TPC result for 3 month old sample is 25×10^3 CFU/g = 25000 and for fresh sample microbial count is absent.

IV. CONCLUSIONS

the conclusion from the research work is that, compared to my research project, soyabean flour and Dates powder incorporated into commercial khakhra with low protein content. Studies have shown that khakhra made with soyabean flour and dates powder as the main ingredients. It was found that the use of 5% soyabean flour and 2% dates has higher overall acceptability and good nutritional value. Eating khakhra prepared with soyabean flour and dates will be an important step in reducing protein deficiency in poor countries of the world.

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