International Journal of Food Science and Nutrition
www.foodsciencejournal.com
ISSN: 2455-4898
Received: 11-01-2023, Accepted: 27-01-2023, Published: 13-02-2023
Volume 8, Issue 1, 2023, Page No. 60-62

Studies on development of process technology for formulation and preparation of flaxseeds khakhra

Ranjeet Chunilal Kokani[1*], Namrata Vinayak Bangar[2], Pranit Jaywant Gaikawad[2]

[1] Principal, College of Food Technology, Saralgaon Tq. Murbad Dist. Thane Affiliated to Dr.B.S.K.K.V. Dapoli, Maharashtra, India

[2] Student, College of Food Technology, Saralgaon Tq. Murbad Dist. Thane Affiliated to Dr.B.S.K.K.V. Dapoli, Maharashtra, India

Abstract

Khakhra is a traditional ready-to-eat snack or breakfast item. Khakhra is a crispy version of Roti; it is usually a handmade cracker and roasted to provide crunchiness. Flaxseed, or Linseed (*Linum Usitatissimmum*), popularly known As Alsi, Jawas, Aksebija in Indian languages, is a blue flowering Rabi crop and a Member of family Linaceae. It is well known that flax seeds are a source of high content of polyunsaturated fatty acids. Flaxseed is rich in the essential omega-3 fatty acid, alpha linolenic acid. omega-3 fatty acids have biologic effects that make them useful in preventing and managing chronic conditions. For preparation of Flaxseeds khakhra different formulations were made such as T1, T2 and T3. Sensory evaluation of Flaxseeds khakhra was carried out and score recorded was T3 sample observed higher score of colour, flavour, texture, appearance and taste of the sample significantly affected with addition of various formulation. Proximate analysis was carried out and score recorded was obtained T3 sample observed percent of moisture content, fat, Protein, Carbohydrate, ash and Energy value is (1.693 %), (9.929 g/100g), (5.712 g/100g), (78.153 g/100g), (4.513%) and (424.821 kcal/100g) respectively. Prepared Flaxseeds khakhra packaged by using Aluminum foil and HDPE was found most suitable for packaging with respect to its stability and acceptability. Development of soft texture during storage is the limiting factor for shelf life.

Keywords: flaxseed seeds, formulation, preparation, khakhra, sensory evaluation, proximate analysis, storage

Introduction

Khakhra is a traditional ready-to-eat snack or breakfast item popular in the North Western part of India. This product is very popular in the state of Gujarat. As a convenient snack it is popular during travels because it does not require any further processing at the point of consumption, need minimal packaging and has long shelf-life. A nutritious Indian diet snack. Very crispy, crunchy, mouthwatering tasty nutritious and very light in weight snack. Favorite among children and teenagers. Available in many different flavors.

Khakhra is a crispy version of Roti; it is usually a handmade cracker and roasted to provide crunchiness. It is also a healthy snack, which is a typical recipe in the Rajasthani and Gujarati cuisines. Khakhra constitutes more nutrition in terms of protein, carbohydrates, minerals, and dietary fibers. Khakhra is easily available ready to eat a snack. It should not be too costly.

Khakhra available in the market can be stored for 9 months, since they are usually vacuum packed and contain added preservatives to provide longer shelf life and also low in moisture content. In the present study, Khakhra was not vacuum packed and no added preservatives, however it was acceptable at the end of storage duration (90 days). Khakhra stored in polythene covers. Khakhra were stored up to 90 days at room temperature (25-30°C) and 40 to 60 per cent of relative humidity.

Flaxseed, or Linseed (Linum Usitatissimmum), popularly known as Alsi, Jawas, Aksebija in Indian languages, is a blue flowering rabi crop and a member of family Linaceae. Annual production of flax was 3.06 million tons and Canada is the world's largest producer of flax (about 38% of total production) (Anonymous, 2000). Globally, Flaxseed is grown as either oil crop or a fiber crop with fiber linen derived from the stem of fiber varieties and oil from the seed of linseed varieties. The plant is not a new crop and native to West Asia and the Mediterranean. It is well known that flax seeds are a source of high content of polyunsaturated fatty acids. Flaxseed is rich in the essential omega-3 fatty acid, alpha linolenic acid. he omega-3 fatty acids have biologic effects that make them useful in preventing and managing chronic conditions such as type 2 diabetes, kidney disease, rheumatoid arthritis, high blood pressure, coronary heart disease, stroke, Alzheimer disease, alcoholism and certain types of cancer. Flaxseed has become known as a functional food due to its nutritional composition, which has positive effects on disease prevention providing health-beneficial component Flaxseed is rich in fat, protein and dietary fibre. Chemical analysis of flaxseed averaged 30 to 40% oil, 20 to 25% protein, 20 to 28% total dietary fibre, 4 to 8% moisture and 3 to 4% ash and the oil contains vitamins A, B, D and E, minerals and amino acids. Flaxseed is low in carbohydrate. For this reason, lax contributes little to total carbohydrate intake. Flaxseed contains several water and fat-soluble vitamins. Water soluble-Ascorbic acid / Vitamin C, Thiamin /vitamin B1, Riboflavin/vitamin B2, Niacin/nicotinic acid, Pyridoxine/vitamin B6, Pantothenic acid, Folic acid, Biotin, Fat soluble-Vitamin Eb, Alpha-tocopherol, Delta-tocopherol Gamma-tocopherol, and Vitamin Kc. Vitamin E is present abundantly in lax primarily as gamma-tocopherol. Flax contains a small amount of vitamin K in the form of phyllo

Quinone, Calcium, Copper, Iron, Magnesium, Manganese, Phosphorus, Potassium, and Sodium, zinc. Flaxseed as a source of lignan (Phenolic compounds) Flaxseed is the richest source of plant lignans. Secoisolariciresinol diglucoside (SDG) is the predominant lignan in flaxseed with minor amount of pinoresinol and matairesinol (MAT). lignans have been shown to be protective against breast cancer. The role of flaxseed in cancer prevention. Flaxseed, in particular lignans could influence bone development.

Materials and methods

Ingredients, chemical and equipments

Raw materials required during present investigation were procured from local market of Saralgaon such as Flaxseed, Refined flour, cumin seed, Red chilli powder, Ajwain, Salt etc. Most of the chemicals and equipments used in this investigation were of analytical grade which are obtained from College of Food Technology Saralgaon, Thane.

Physical and chemical analysis

Chemical Analysis such as moisture is determined by using hot air oven, fat is determined by Soxhlet apparatus and protein is determined by using Kjeldahl's method. Acidity is determined by using titration method and pH is measured by digital pH meter. All quality parameters were determined by AOAC (2000).

Organoleptic evaluation

Prepared product were evaluated for sensory characteristics in terms of appearance, color, flavor, aftertaste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9- point Hedonic scale. Judgments were made through rating the product on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely'. The obtained results were recorded in sensory score card.

Statistical analysis

The analysis of variance of the data obtained was done by using completely randomized design (CRD) for different treatments as per the method given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of $p<0.005$ level S.E and C.D. at 5 percent level is mentioned wherever required.

Formulation of flaxseed khakhra

Khakhra prepared with incorporation with Flaxseed were investigated. The formulation was made by varying levels of Flaxseed, Refined flour, Cumin seed, Red chilli powder, Ajwain, Salt respectively.

Preparation of flaxseed flour

Raw material such as Flaxseeds are used for khakhra preparation were Flaxseed first clean than roasted at 50º c for 1min, cool it than flax seeds grind in mixer into fine flour. Store the flour in air tight container for further use.

Preparation of flaxseed khakhra

Cleaning of raw materials for removing unwanted material. Weight all the ingredient accurately, Roast the Flaxseed. Then grind the seeds up to fine flour, after that adding refined flour and mix well then add some spices for improving taste as like cumin seeds, Ajwain, red chili powder and salt as per taste. Making dough by adding some amount of water by manually. Make a thin roles sheet by using Rolling board and pin. After that these rolling sheet roast by using pan at low flame. Then cool it ambient room temperature. Pack the product with suitable packaging material and store it into cool place or ambient condition.

Results and discussion

Table 1: physical properties of flaxseed khakhr

Physical Properties	Selected sample
Color	Brownish
Shape	Spherical
Length	13.3 cm
Breadth	12.2 cm
Width	2.12 mm
Weight	11.2 gm

It was evident from the above tabulated Colour of Khakhra was Brownish which was determine by visual Observation. All the properties measure by vernier caliper and measuring scale. The length (13.3 cm), Breadth (12.2 cm), width (2.12 mm) and weight (11.2 gm) respectively.

Table 2: chemical properties of flaxseed khakhra

Sample	Colour	Flavour	Taste	Texture	Appearance	Overall Acceptability
Control	9	8	8	7	8	8.0
T_1	7	6	5	7	7	6.4
T_2	8	7	7	8	8	7.6
T_3	9	8	8	9	9	8.6

It was evident from the above tabulated the chemical parameters of Flaxseed Khakhra was found Moisture content 1.6 %, Protein 5.7 g, Fat 9.9 g, Ash 4.5 g. Carbohydrates 78.1 and Energy 424.8 kcal respectively.

Table 3: sensory evaluation of flaxseed khakhra

Sample	Colour	Flavour	Taste	Texture	Appearance	Overall Acceptability
Control	9	8	8	7	8	8.0
T_1	7	6	5	7	7	6.4
T_2	8	7	7	8	8	7.6
T_3	9	8	8	9	9	8.6

It was evident from the above tabulated the sensory evaluation report observed that sample T3 has highest score as compared to other samples. The colour of all samples as per graph is 9 point. The flavour of sample T3 (8) was acceptable with 9 point while samples T0 (8), T1 (6), T2 (7). The taste of sample T3 (8) was selected by 9 points while other samples points are T0 (8), T1 (5), T2 (7). The appearance of sample T3 (9) was selected by 9 points while other samples points are T0 (8), T1 (7), T2 (8). The texture of sample T3 (9) was selected by 9 points while other samples T0 (7), T1 (7), T2 (8). The overall acceptability of sample T3 (8.6) was selected by 9 points while other samples points are T0 (8.0), T1 (6.4), T2 (7.6) respectively. Sensory evaluation report conclude that the sample T3 more acceptable and better in all the sensory attributes.

Conclusion

Conclusively, it emerges that the formulation &standardization of recipe for Flaxseed Khakhra was

carried out successfully prepared by using Flaxseed, Refined flour and spices. The health benefit of flaxseed are well know so the product is having some enrichment. As regards the organoleptic qualities, of all the Flaxseed Khakhra processed, Khakhra fortified was excellent followed by Nutritional quality particularly protein, fat, carbohydrates and energy content increased in Flaxseed Khakhra This type of value addition by way of nutrient/enrichment does certainly help to provide good source of Nutrition. So, the product can be satisfy the consumer in accepts& quality.

References

1. A review of the methods used in the determination of flaxseed components Wahid Herchi1*, David Arráez-Román2, Sadok Boukhchina1, Habib Kallel1, Antonio Segura-Carretero2 and Alberto Fernández-Gutierrez2. African Journal of Biotechnology,2012:11(4):724-731.
2. Development and quality evaluation of value added Khakhra using different variety and proportion of flour Solanke GM, Aditya Lal, Samarth AG, Annie Ankita Lal and Parshvika Tiwari Journal of Pharmacognosy and Phytochemistry,2018:7(4):1778-1781.
3. Development of Nutritionally Enriched Khakhra [1] Dr. Anupama N. Devkatte, [2] Deepti N. Chaudhari, [3] Pranjali Korde, [4] Chaitali Kulkarni, [5] Dnyaneshwari Kulkarni © 2019 JETIR May 2019, Volume 6, Issue 5
4. Dietary Flaxseed as a Strategy for Improving Human Health Mihir Parikh 1,2,3, Thane G. Maddaford 1,2,3, J. Alejandro Austria 1,2,3, Michel Aliani 2,4, Thomas Netticadan 1,2,5 and Grant N. Pierce 1,2,3,
5. Effect of Moisture Content on the Physical Properties of Fibered Flaxseed Bo Wang∗ Dong Li† Li-jun Wang‡ Zhi-gang Huang∗∗ Lu Zhang†† Xiao Dong Chen‡‡ Zhi-huai Mao§ International Journal of Food Engineering
6. Effect of Storage on Moisture, Free Fatty Acid and Peroxide Value of Products Developed by Incorporating Modified Rice Starch Gopika C. Muttagi1* and Usha Ravindra1European Journal of Nutrition & Food Safety,2020:12(4):75-85, Article no. EJNFS.56781 ISSN: 2347-5641.
7. Enhancing the nutritional quality of two commonly consumed Indian snacks Khakhra and Ladoo with potassium rich apricots and their quality evaluation Harsha Hirdyani, Ashima Mundeja, International Journal of Home Science,2015:1(3):28-31.
8. Flaxseed – a nutritional punch Ganorkar, P. M. and Jain, R. K. Department of Food Processing Technology, A.D. Patel Institute of Technology, New Vallabh Vidya Nagar, Anand, Gujarat 388121, India International Food Research Journal,2013:20(2):519-525.
9. Flax Seed. A Potential Medicinal Food Charu Katare*, Sonali Saxena, Supriya Agrawal, GBKS Prasad and P.S. Bisen Katare *et al*., J Nutr Food Sci, 2012:2:1.
10. Flaxseed – composition and its health benefits Rajju Priya Soni*, Mittu Katoch, Ashish Kumar and Pramod Verma CSK Himachal Pradesh Krishi Vishwavidyalya, Palampur-176 061, India ISSN: 0974-4908 http://rels.comxa.com Res. Environ. Life Sci.rel_sci@yahoo.com 9(3) 310-316 (2016)
11. Organoleptic, physical, nutritional characteristics and storage stability of value added Kodo masala khakhra Vanishri K Umarji and Vijayalaxmi KG Journal of Pharmacognosy and Phytochemistry,2020:9(5):326-333.
12. Physical and chemical properties of flaxseed K.K. Singh, D. Mridula*, P. Barnwal, and J. RehalInt. Agrophys,2012:26:423-426. doi: 10.2478/v10247-012-0060-4
13. Preparation and Sensory Evaluation of Arrowroot Masala Khakhra Meenu Aggarwal, Priyanka Verma and Dipti Sharma* Intl. J. Ferment. Food. © 2018 IJFF. All rights reserved,2018:7(2):137-142.
14. Quality parameters and shelf stability of millet based 'Khakhra' Sindhu a Divakar and Jamuna Prakash the Pharma Innovation Journal,2021:10(1):272-278.
15. Sensory Evaluation of Khakhra Among Postgraduate Students Dr. Binod Sinha1, Dr. Vimal Bhatt2 1, 2 Professor, Balaji Institute of Modern Management, Sri Balaji University, Pune Maharashtra (India).