



E-ISSN: 2709-9385

P-ISSN: 2709-9377

JCRFS 2025; 6(2): 111-113

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www.foodresearchjournal.com

Received: 13-07-2025

Accepted: 17-08-2025

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Development of nutritious lentil crackers: A healthy and crunchy snack alternative

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Abstract

Why settle for dull, empty-calorie snacks when you can enjoy a crunch that fuels both taste and wellness? Lentil crackers are not just another munch they're a powerhouse of goodness in every bite. Light and crunchy, yet packed with protein and fiber, they satisfy cravings while keeping you energized and guilt-free. Research has shown that lentils are an excellent source of plant-based protein and dietary fiber, contributing to improved satiety and digestive health (Brouns *et al.*, 2013). Each cracker brings together wholesome nutrition with irresistible flavor, turning healthy eating into a fun and enjoyable habit. In fact, lentil-based snacks offer a unique combination of essential amino acids, which can support muscle repair and overall health (Micha *et al.*, 2017).

In a world where quick and nutritious food is in demand, lentil crackers shine as the perfect companion—convenient, nourishing, and delightfully tasty. They redefine snacking with purpose, making every crunch count. Not only do they support a balanced diet, but they also offer an environmentally friendly alternative, as lentils have a lower carbon footprint compared to many other snack ingredients (Kerr *et al.*, 2020).

Keywords: Lentil crackers, plant-based protein, dietary fiber, healthy snacking, satiety, digestive health

Introduction

Procedure for Preparation

The preparation of lentil crackers involves careful selection of nutrient-rich ingredients, accurate formulation, and systematic processing to ensure crispness and taste. The present study was carried out in the department of Food Engineering, K. K. Wagh College of Food Technology, Nashik, Maharashtra. The essential steps include:

- **Ingredient Selection:** The formulation consists of chickpea flour (342 g), moong dal flour (245 g), sunflower oil (100 g), green chili (29 g), garlic (20 g), coriander leaves (27 g), chili powder (20 g), turmeric powder (10 g), coriander powder (20 g), pumpkin seeds (98 g), sesame seeds (49 g), dry onion-garlic powder (20 g), and salt (20 g).
- **Weighing and Mixing:** Each ingredient is measured precisely. Dry ingredients such as flours, seeds, and spices are mixed first, followed by the addition of oil and sufficient water to form a uniform dough.
- **Dough Resting:** The dough is rested briefly to ensure even hydration and enhanced flavor.
- **Sheeting and Cutting:** The rested dough is rolled into thin sheets and cut into cracker-sized pieces.
- **Baking:** Crackers are baked at controlled temperatures until they develop a golden-brown, crunchy texture.
- **Cooling:** Freshly baked crackers are cooled at room temperature to prevent moisture condensation and retain crispness.
- **Packaging:** Final products are packed in moisture-proof materials to preserve freshness (Yadav *et al.*, 2020) ^[6].

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Flow Sheet of Lentil Crackers Production

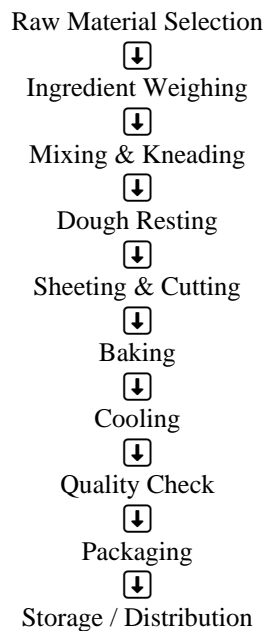


Image of the prepared sample



Health Benefits

- **Protein-Rich:** Enhances strength, muscle repair, and satiety.
- Lentils are a rich source of plant-based protein, which plays a crucial role in muscle maintenance and satiety (Tosh & Yada, 2010) ^[7].
- **High in Fiber:** Promotes healthy digestion, regulates bowel movement, and supports gut microbiota.
- Dietary fiber in legumes like lentils helps improve bowel health and fosters beneficial gut microbiota (Slavin, 2013) ^[8].
- **Heart-Healthy:** Seeds and lentils supply good fats and bioactive compounds that support cardiovascular wellness.
- Lentils and seeds contain phytochemicals and unsaturated fats associated with reduced cardiovascular disease risk (Bazzano *et al.*, 2001) ^[9].
- **Energy Provider:** Delivers long-lasting energy without empty calories, making it ideal for active lifestyles.
- Low-glycemic index carbohydrates in lentils provide sustained energy release (Jenkins *et al.*, 1981) ^[10].

- **Immunity Booster:** Spices like garlic, chili, and turmeric contribute natural antioxidants and anti-inflammatory properties.
- Spices such as turmeric and garlic are known for their immunomodulatory, antioxidant, and anti-inflammatory effects (Arora *et al.*, 2018; Rahman, 2007) ^[11, 12].
- **Guilt-Free Snack:** A healthier option compared to deep-fried or refined flour products.
- Baked snacks made from whole ingredients like legumes are significantly lower in unhealthy fats and refined carbohydrates (Fardet, 2016) ^[13].
- **Low Glycemic Impact:** Lentil-based crackers help in better blood sugar management and reduce sudden glucose spikes.
- Lentils have a low glycemic index and help stabilize postprandial glucose levels (Wolever *et al.*, 1997) ^[14].
- **Nutrient-Dense:** Packed with essential vitamins, minerals, and plant compounds that nourish the body.
- Lentils and seeds are nutrient-dense, offering iron, zinc, magnesium, B-vitamins, and antioxidants (USDA, 2020) ^[15].
- **Weight-Management Friendly:** High satiety value helps control overeating and cravings.
- High-fiber, high-protein legumes increase satiety and reduce subsequent calorie intake (Clark & Slavin, 2013) ^[8].
- **Allergen-Friendly Alternative:** Naturally gluten-free (when made with lentil flours), making them suitable for individuals with wheat intolerance.
- Lentil flour is naturally gluten-free and a suitable alternative for individuals with celiac disease or gluten sensitivity (Pulido *et al.*, 2009) ^[17].
- **Sustainable Nutrition:** Plant-based formulation makes it an eco-friendly snack option, contributing to sustainable eating habits.
- Pulses like lentils have a low environmental footprint, making them a sustainable dietary choice (FAO, 2016) ^[18].

Market Availability and Scope

The snack industry is experiencing a notable shift as consumers increasingly prefer healthier alternatives over traditional fried and processed options (Smith & Johnson, 2022) ^[19]. Snacks that are rich in protein, high in fiber, and nutritionally dense are in growing demand (Global Market Insights, 2023) ^[20]. Lentil crackers are ideally suited to meet this demand, offering a combination of taste, crunch, and nutritional value in one convenient product (Khan *et al.*, 2021) ^[21].

These crackers cater to diverse dietary needs due to their plant-based, gluten-free, and protein-rich composition (Patel & Verma, 2020) ^[22]. The inclusion of seeds, spices, and natural flavors enhances both their nutritional profile and sensory appeal, making them attractive to health-conscious individuals, fitness enthusiasts, and those following specialized diets (Nguyen & Lee, 2022) ^[23].

Lentil crackers can be made available through multiple channels, including supermarkets, health-food stores, convenience outlets, and online retail platforms, ensuring broad consumer access (Market Research Future, 2023). The rise of e-commerce and online grocery shopping further strengthens their market reach, allowing even wider

distribution across urban, semi-urban, and international markets (Euromonitor, 2022) ^[25].

The potential of lentil crackers extends beyond regular snacking. They can be promoted as part of a healthy lifestyle, with opportunities for innovation in flavors, functional ingredients, and packaging (Ahmed & Kumar, 2021) ^[26]. As global trends favor plant-based, sustainable, and clean-label foods, lentil crackers are well-positioned for strong growth in both domestic and international markets, appealing to consumers who seek convenient yet healthful snacking options (Mintel, 2023) ^[27].

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