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Seedilicious protein bar: A novel functional snack rich in plant protein and micronutrients

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Abstract
The present study aimed to develop a nutritious and functional plant-based protein bar named "Seedilicious" using pumpkin seeds, sunflower seeds, dates, and dark chocolate. The formulated bar was designed to provide a healthy alternative to conventional snacks by incorporating natural ingredients rich in protein, healthy fats, minerals, fiber, and antioxidants. Pumpkin and sunflower seeds served as major protein and micronutrient sources, while dates acted as a natural sweetener and binding agent. Dark chocolate enhanced sensory quality and antioxidant potential. The preparation process involved cleaning, roasting, blending, molding, and cooling of ingredients under hygienic conditions. Nutritional evaluation revealed that the developed bar contained appreciable amounts of protein, iron, zinc, calcium, and beneficial lipids. The product also showed good sensory acceptability in terms of taste, texture, aroma, and appearance. The study concludes that Seedilicious protein bar can serve as a wholesome functional snack suitable for health-conscious consumers, athletes, and individuals seeking plant-based nutritional supplements.

Keywords: Functional food, plant-based protein bar, pumpkin seeds, sunflower seeds

Introduction

In recent years, increasing awareness regarding health, nutrition, and lifestyle-related disorders has significantly influenced consumer food choices. Modern consumers are now more inclined toward functional foods that not only satisfy hunger but also provide additional health benefits. Functional snack products such as protein bars have gained considerable popularity because of their convenience, portability, and nutritional value (Gupta and Prakash, 2019) [3]. Protein bars are widely consumed by athletes, fitness enthusiasts, students, and working individuals as quick sources of energy and nutrients. Plant-based nutrition has emerged as an important trend in the food industry due to growing concerns regarding sustainability, health, and consumer preference for natural products. Seed-based ingredients are increasingly being incorporated into food products because of their high nutritional density and therapeutic value. Pumpkin seeds are rich sources of protein, zinc, iron, magnesium, healthy fats, and antioxidants, making them highly beneficial for immune support, cardiovascular health, and muscle development (Patel, 2020) [8]. Similarly, sunflower seeds contain significant amounts of protein, vitamin E, niacin, selenium, and unsaturated fatty acids that contribute to antioxidant protection and metabolic health (Ahmed and Ali, 2019) [2]. Dates are commonly used in functional snack formulations due to their natural sweetness, high carbohydrate content, dietary fiber, and phenolic compounds. They also act as natural binding agents, reducing the requirement for artificial sweeteners and preservatives (Al-Farsi *et al*., 2017) [1]. Dark chocolate, especially with high cocoa content, contains flavonoids and polyphenols that exhibit antioxidant and cardioprotective properties (Katz *et al*., 2011) [4]. The combination of seeds, dates, and dark chocolate therefore offers the potential to develop a nutritious and palatable functional snack product. Several researchers have reported the successful incorporation of seeds into protein and energy bars. Nikam *et al*. (2025) [6] developed pumpkin seed-based protein bars and observed improvements in protein and mineral composition. Similarly, A. Omran (2018) [7] reported enhanced nutritional quality of oat bars enriched with sunflower and pumpkin seeds. Multi-seed energy bars formulated by Sharma *et al*. (2021) [9] also demonstrated improved nutrient density and consumer acceptability. Considering the nutritional importance of seeds and the growing demand for healthy snack products, the present study was undertaken to develop a plant-based functional protein bar named "Seedilicious" using pumpkin seeds, sunflower seeds, dates, and dark chocolate. The study aimed to evaluate its nutritional significance, sensory quality, and potential as a healthy dietary supplement for health-conscious consumers.

Material and Method

The raw materials used for the preparation of the Seedilicious protein bar included pumpkin seeds, sunflower seeds, dates, and dark chocolate. All ingredients were procured from the local market and selected carefully based on freshness, quality, and absence of impurities. Pumpkin and sunflower seeds were used as the primary sources of plant protein, healthy fats, and micronutrients, while dates served as a natural sweetener and binding agent. Dark chocolate was incorporated to improve flavor, texture, and antioxidant properties of the final product (Patel, 2020, Ahmed and Ali, 2019) [2, 8].

Methodology

Selection and Preparation of Raw Materials

Fresh pumpkin seeds and sunflower seeds were cleaned thoroughly to remove dust, foreign particles, and impurities. The seeds were then air-dried before further processing. Soft and ripe dates were selected, manually deseeded, and converted into a smooth paste. Dark chocolate containing approximately 60–70% cocoa was selected for better

sensory quality and antioxidant potential (Al-Farsi *et al*., 2017; Katz *et al*., 2011) [1, 4].

Roasting of Seeds

The cleaned pumpkin and sunflower seeds were dry roasted at a temperature of 120–140°C for about 5–7 minutes. Roasting improved the flavor, aroma, texture, and shelf life of the seeds while reducing excess moisture content. Similar roasting treatments have been reported in seed-based snack formulations by Nikam *et al*. (2025) [6].

Preparation of Chocolate Mixture

Dark chocolate was melted using the double-boiler method at 45–50°C with continuous stirring to obtain a smooth and glossy consistency. The melted chocolate was allowed to cool slightly before blending with other ingredients. Cocoa-based products are known to enhance sensory quality and antioxidant activity in functional foods (Katz *et al*., 2011) [4].

Mixing and Formulation

The roasted seeds, dates paste, and melted dark chocolate were mixed thoroughly to obtain a uniform and cohesive blend. Proper mixing ensured equal distribution of ingredients throughout the product. Similar methodologies for multi-seed protein bar development have been reported by Sharma *et al*. (2021) [9].

Molding and Setting

The prepared mixture was transferred into rectangular molds lined with butter paper and pressed uniformly to achieve the desired shape and thickness. The molds were refrigerated for proper setting and firmness of the bars.

Packaging and Storage

After setting, the protein bars were removed from the molds, cut into suitable sizes, and packed in airtight packaging materials to maintain freshness and prevent moisture absorption. The prepared bars were stored under refrigerated conditions until further evaluation. Proper packaging is essential to maintain sensory and nutritional quality of functional snack products (Omran, 2018).

Result and Discussion

The present study successfully developed a plant-based functional protein bar named “Seedilicious” using pumpkin seeds, sunflower seeds, dates, and dark chocolate. The developed product showed desirable nutritional composition, sensory quality, and functional significance, indicating its suitability as a healthy snack alternative for health-conscious consumers.

The nutritional evaluation of the Seedilicious protein bar revealed that the incorporation of pumpkin and sunflower seeds significantly enhanced the protein and healthy fat content of the product. Pumpkin seeds contributed considerable amounts of protein, zinc, iron, and magnesium, while sunflower seeds improved the content of healthy unsaturated fatty acids, niacin, and antioxidants. Similar findings were reported by Nikam *et al*. (2025) [6], who observed that pumpkin seed incorporation improved the nutritional quality of protein bars. Likewise, Omran (2018) reported that sunflower and pumpkin seeds increased the protein, mineral, and antioxidant content of fortified snack bars.

Dates played an important role in improving the texture, sweetness, and binding properties of the developed bar. The natural sugars present in dates provided instant energy without the addition of refined sugar. Dates also contributed dietary fiber and phenolic compounds, which may support digestive health and antioxidant activity (Al-Farsi *et al*., 2017) [1]. The use of dates as a natural sweetener enhanced the overall acceptability of the product and improved its clean-label appeal. Dark chocolate significantly enhanced the flavor, appearance, and sensory quality of the Seedilicious protein bar. The glossy texture and pleasant cocoa flavor improved consumer acceptability. In addition, dark chocolate is rich in flavonoids and polyphenols that possess antioxidant properties and may contribute to cardiovascular health benefits (Katz *et al*., 2011) [4]. The inclusion of dark chocolate therefore improved both the nutritional and sensory profile of the product.

Roasting of pumpkin and sunflower seeds at controlled temperature improved aroma, taste, and shelf stability of the bar. Roasting also reduced moisture content, thereby helping in preservation and texture enhancement. Similar processing methods have been successfully used in seed-based snack formulations by Sharma *et al*. (2021) [9].

The developed protein bar demonstrated good sensory characteristics in terms of appearance, texture, aroma, taste, and overall acceptability. The chewy texture provided by dates, combined with the crunchy roasted seeds and smooth chocolate coating, created a balanced and appealing mouthfeel. The product was found to be highly palatable and acceptable for regular consumption. From a functional food perspective, the Seedilicious protein bar can be considered a nutrient-dense snack product because it contains plant-based protein, healthy fats, minerals, antioxidants, and dietary fiber. The combination of these nutrients may help support muscle maintenance, energy metabolism, immune function, cardiovascular health, and digestive health. The product can therefore serve as a suitable snack option for athletes, students, office workers, and individuals seeking healthier dietary alternatives.

The findings of the present study are in agreement with previous reports suggesting that seed-based snack bars possess high nutritional and commercial potential. Increasing consumer awareness regarding plant-based diets and natural foods has created strong demand for such functional products (Kaur and Singh, 2022) [5]. The developed Seedilicious protein bar may therefore have promising market potential in the growing health food industry.

Overall, the results indicate that the incorporation of pumpkin seeds, sunflower seeds, dates, and dark chocolate successfully produced a nutritious, sensory acceptable, and functional protein bar with potential applications in health and sports nutrition.

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References

1. Al-Farsi M, Alasalvar C, Morris A, Baron M, Shahidi F. Nutritional importance and health benefits of dates.

Critical Reviews in Food Science and Nutrition,2017:57(3):556–567.
2. Ahmed F, Ali R. Health benefits of sunflower seeds and their applications in food products. International Food Research Journal,2019:26(5):1421–1430.
3. Gupta R, Prakash J. Functional foods and nutraceuticals: Emerging trends in health promotion. Journal of Food Science and Nutrition,2019:8(2):45–57.
4. Katz DL, Doughty K, Ali A. Cocoa and chocolate in human health and disease. Antioxidants & Redox Signaling,2011:15(10):2779–2811.
5. Kaur M, Singh N. Plant-based protein products and consumer acceptance. Food Quality and Safety,2022:6(1):1–12.
6. Nikam K, Patil S, Jadhav R, More P. Development of pumpkin seed-based protein bar. International Journal of Agriculture and Food Science,2025:7(3):134–139.
7. A. Omran. Enhancing the nutritional value of oat bars by incorporating sunflower and pumpkin seeds. American Journal of Food Science and Technology,2018:6(4):151–160.
8. Patel S. Nutritional and therapeutic potential of pumpkin seeds. Food Reviews International,2020:36(4):345–360.
9. Sharma D, Thakur P, Verma A, Chauhan R. Development of multi-seed energy bars for sports persons. Himachal Journal of Agricultural Research,2021:47(1):66–76.