Kenaf Leaf Powder Incorporated Millet Muesli: A Novel Functional Food Formulation

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ABSTRACT

Kenaf **(Hibiscus cannabinus L.)** leaf powder, recognized for its rich nutritional profile, has been successfully integrated into millet flakes muesli, presenting an innovative approach in functional food and nutritional therapy. The nutrient composition of kenaf leaf powder-enriched muesli was rigorously calculated per 100g, revealing it to be nutrient-dense: 398 kcal, 10.3g protein, 78.9g carbohydrates, 25.1g total sugars, 4.6g total fat, 23.5mg sodium, 0.9mg vitamin C, 60.8mg calcium, and 2.9mg iron. The combination of kenaf leaf powder, millet flakes, nuts, edible seeds, and 70% dark chocolate results in a balanced and nutritious diet. This innovative muesli formulation leverages the health benefits of kenaf leaf powder to enhance nutritional intake and support overall health, particularly focusing on personalized nutrition and breast cancer management. Incorporating this product into millet flakes muesli provides the advantages of a natural, sustainable food while also offering therapeutic benefits. This study highlights the necessity for further research into the health benefits and applications of kenaf leaf powder in functional foods, potentially leading to new dietary strategies and interventions aimed at improving public health outcomes. The integration of kenaf leaf powder into millet flakes muesli represents a promising advancement in functional foods, with significant relevance to therapeutic and personalized nutrition. The findings provide a foundation for further research and validation of kenaf leaf powder as a valuable ingredient in health-promoting food products.

KEYWORDS

Kenaf, muesli, functional food, public health, personalized nutrition

1.INTRODUCTON

Kenaf **(Hibiscus cannabinus)** is a plant traditionally valued for its fiber, has emerged as a potent source of nutritional and therapeutic compounds. Its leaves, in particular, are rich in essential nutrients, making them a promising candidate for incorporation into dietary products. The exploration of functional foods has garnered significant attention in recent years, driven by the increasing demand for health-promoting and therapeutic dietary options. This study investigates the integration of kenaf leaf powder into millet flakes muesli, aiming to create a novel functional food with enhanced nutritional and therapeutic benefits.

The nutritional composition of the kenaf leaf powder-enriched muesli is analyzed. The resultant product is found to be nutrient-dense, containing significant amounts of energy, protein, carbohydrates, sugars, fats, and essential minerals such as calcium and iron.

Incorporating kenaf leaf powder into millet flakes muesli not only capitalizes on the plant's nutritional profile but also aligns with the growing trend of personalized nutrition and therapeutic applications. This innovative formulation aims to enhance dietary intake, support overall health, and provide specific benefits for breast cancer management. The integration of natural, sustainable ingredients like kenaf leaf powder into everyday foods offers a dual advantage of health promotion and environmental sustainability.

This study underscores the importance of further research into the health benefits and applications of kenaf leaf powder in functional foods. By exploring new dietary strategies and interventions, it is possible to develop innovative food products that contribute to improved public health outcomes. The promising results of this research pave the way for future investigations and validation of kenaf leaf powder as a valuable ingredient in health-promoting food products.

OBJECTIVES

- To Develop a Nutritionally Balanced Muesli Formulation.
- To Analyze the Nutrient Composition of Kenaf Leaf Powder-Enriched Muesli.

2.MATERIALS AND METHODS

2.1 Procurement of raw materials

The raw materials such as kenaf leaves, millets, nuts, edible seeds and 70% dark chocolate were purchased in local super market.

2.2. Methods

2.2.1. Standardization of kenaf leaf powder incorporated millet muesli

To formulate and standardize kenaf leaf powder-incorporated millet muesli, a blend of 10g kenaf leaf powder, 50g millet flakes, 15g nuts (almonds, cashews, walnuts), 10g edible seeds (chia seeds, pumpkin seeds), 15g shredded 70% dark chocolate, 10g raisins, and honey to taste is combined. Ingredients are prepared by grinding and toasting where necessary, ensuring even distribution. The mixture is stored in airtight containers.

2.2.2 Nutrient composition of kenaf leaf powder incorporated millet muesli

Nutrient analysis is a crucial step in food product development, providing detailed information about the macronutrient (proteins, fats, carbohydrates) and micronutrient (vitamins, minerals) content of a product. This process ensures that the food meets dietary requirements and health standards, supporting informed consumer choices and promoting overall well-being. In the case of kenaf leaf powder-incorporated millet flakes muesli,

nutrient analysis validates its nutritional benefits by confirming the presence of key nutrients known for their health-enhancing properties. The analysis involves preparing samples, conducting laboratory tests using different techniques.

2.2.3 Organoleptic evaluation of kenaf leaf powder incorporated millet muesli

A comprehensive sensory evaluation of the kenaf leaf powder-incorporated millet muesli was conducted using a hedonic scale rating to assess its acceptability. The evaluation focused on key attributes such as appearance, texture, flavor, and aroma. Participants rated the appearance of the muesli as highly appealing, appreciating the vibrant mix and uniform ingredient distribution. Overall, the hedonic scale ratings indicated strong consumer acceptance, highlighting the product's balanced sensory attributes and potential as a functional food product.

3.RESULTS

3.1. Nutrient composition of kenaf leaf powder incorporated millet muesli

The analysis of kenaf leaf powder-incorporated millet muesli revealed a nutrient-dense product with the following composition per 100g: energy 398 kcal, protein 10.3g, carbohydrates 78.9g, total sugars 25.1g, total fat 4.6g, sodium 23.5mg, vitamin C 0.9mg, calcium 60.8mg, and iron 2.9mg. This composition highlights the muesli's potential as a balanced and nutritious food option, leveraging the rich nutritional profile of kenaf leaf powder.
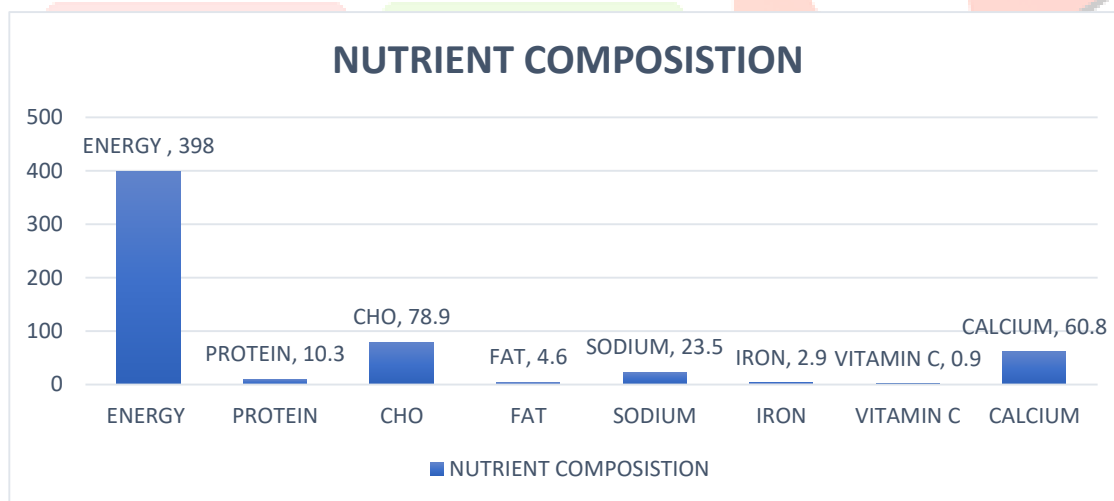

Table 1. Nutrient composition of kenaf leaf powder incorporated millet muesli

3.2 Organoleptic evaluation of kenaf leaf powder incorporated millet muesli

The sensory evaluation, on a hedonic scale, checked the appearance, texture, flavor, and aroma of muesli. This nutricious blend of ingredients, including nuts (almonds, cashews, walnuts), edible seeds (chia, pumpkin), raisins, and 70% dark chocolate, was visually attractive and homogeneously distributed. Texture scored high in terms of satisfying crunch by millet flakes and nuts, balanced by softer elements such as raisins and dark

chocolate. The flavor profile was harmonious with earthy notes from kenaf leaf powder that complemented sweetness from raisins and dark chocolate, nutty undertones enhanced the taste of muesli. The aroma was inviting with the richness of dark chocolate, nutty fragrance, and a hint of leafy note. In general, muesli was very acceptable, suggesting good prospects for consumer acceptance.

4.RESULT & DISCUSSION

The comprehensive study on kenaf leaf powder-incorporated millet muesli highlights its nutritional and therapeutic potential as a novel functional food. Nutrient analysis revealed the product's dense nutritional profile, including significant amounts of energy, protein, carbohydrates, sugars, fats, sodium, vitamin C, calcium, and iron. Sensory evaluation, conducted using a hedonic scale, indicated strong consumer acceptance due to the muesli's visually appealing mix, satisfying texture, harmonious flavor, and inviting aroma. The incorporation of kenaf leaf powder not only enhances the muesli's nutritional value but also aligns with trends in personalized nutrition and therapeutic applications, particularly for cancer management. The results underscore the importance of further research to validate these benefits and explore scalability for commercial production. This study contributes to the growing body of knowledge on functional foods, emphasizing the dual advantage of health promotion and environmental sustainability offered by incorporating natural, nutrient-rich ingredients like kenaf leaf powder into everyday diets.

5.CONCLUSION

The study on kenaf leaf powder-incorporated millet muesli demonstrates its potential as a highly nutritious and therapeutic functional food. The nutrient analysis highlighted the muesli's rich nutritional profile, including significant levels of essential nutrients like protein, carbohydrates, fats, vitamins, and minerals. Sensory evaluation using a hedonic scale confirmed strong consumer acceptance, with high ratings for appearance, texture, flavor, and aroma. The integration of kenaf leaf powder into the muesli not only enhances its nutritional value but also aligns with contemporary trends in personalized nutrition and therapeutic applications, specifically for breast cancer management. These findings emphasize the importance of incorporating natural and nutrient-dense ingredients like kenaf leaf powder into everyday diets, contributing to health promotion and environmental sustainability. The study underscores the need for further research to validate the therapeutic benefits and explore scalability for commercial production, ultimately positioning kenaf leaf powder-incorporated millet muesli as a promising addition to the functional food market.

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