Nutritional and Sensory Properties of Biscuit Produced using Composite Flour Made from Wheat and Almond, Fortified with Almond Milk

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Extended Abstract

Introduction

Biscuits are widely consumed baked products, primarily made from wheat flour, which is rich in carbohydrates but lacks essential nutrients such as protein, fibre, and micronutrients. To improve their nutritional quality, composite flour blends and fortification with plant-based ingredients have gained interest. Almonds are nutrient-dense, providing protein, fibre, healthy fats, vitamins, and minerals (Dreher, 2021). Almond milk, a lactose-free dairy alternative, also enhances nutritional composition (Hussein et al., 2020). The aim of this study is to determine the quality evaluation of biscuit produced from composite flour of wheat and almond flour fortified with almond milk.

Materials and Methods

Whole wheat and almond nuts wereprocured fromSayedero market in Ilaro, Ogun State and processed into flour. Five biscuit samples were formulated: Sample A (100% wheat flour), Sample B (90% wheat flour, 10% almond milk), and Samples C, D, and E with 80%, 70%, and 60% wheat flour, respectively, each incorporating 10%, 20%, and 30% almond flour while maintaining 10% almond milk. Standard analytical methods were used to determine proximate composition, micronutrient levels, anti-nutritional factors, and sensory attributes.

Results and Discussion

Results showed significant differences ($p<0.05$) in proximate composition, micronutrient content, and anti-nutritional properties. Moisture content ranged from 22.24% to 28.01%, protein from 8.53% to 16.78%, fat from 2.82% to 4.11%, ash from 1.73% to 2.51%, crude fiber from 3.10% to 4.50%, and carbohydrates from 46.11% to 61.62%, with a decline in carbohydrate content as almond flour increased. Calcium levels increased from 199.75 mg to 399.75 mg, magnesium from 24.90 mg to 44.90 mg, vitamin A from 0.03 µg to 20.05 µg, and vitamin D from 0.42 µg to 30.11 µg. Oxalate ranged from 8.03 mg to 10.03 mg, and phytate from 3.83 mg to 5.03 mg, both within acceptable limits. Sensory evaluation scores ranged from 6.84 to 8.28, with Sample A being the most preferred, though samples with higher almond content were also well accepted. Dada et al. (2023) found that carbohydrate content decreased as non-wheat flour increased. This study aligns, with the study of Dada et al showing a similar trend with almond substitution, indicating energy-rich biscuit formulations.

Conclusion and Recommendation

The study showed that substituting wheat flour with almond flour and fortifying with almond milk improved protein, fibre, fat, and micronutrient content while reducing carbohydrate levels. Sensory evaluation confirmed consumer acceptability, with Sample A being the most preferred. Incorporating 10% almond milk and moderate almond flour substitution is recommended to enhance nutritional benefits and consumer acceptability.

Keywords: Almond milk, composite flour, fortified, biscuit.