



DEVELOPMENT AND EVALUATION OF FINGER MILLET (RAGI) COOKIES FOR POTENTIAL HEALTH BENEFITS

Madhav Sharma^{*1}, Ms. Sangeeta Adhikari^{*2}

^{*1} Student of Nutrition and Dietetics, Deen Dayal Upadhyaya Kaushal Kendra, DAVV, Indore, Madhya Pradesh, India

^{*2} Faculty of Nutrition and Dietetics, Deen Dayal Upadhyaya Kaushal Kendra, DAVV, Indore, Madhya Pradesh, India

ABSTRACT

Finger millet (*Ragi*), a nutritionally dense yet underutilized cereal crop, presents substantial potential in the development of functional food products aimed at promoting better health outcomes. This research centres on the formulation and evaluation of ragi-based cookies fortified with natural ingredients to enhance their nutritional composition without compromising consumer appeal. Various proportions of finger millet flour were combined with wheat flour to create cookies enriched in dietary fibre, calcium, iron, and essential amino acids. Sensory evaluation was conducted to analyze attributes such as taste, texture, aroma, and overall acceptability. Additionally, the developed cookies were subjected to proximate analysis to determine their nutritional profile. Findings indicated that the optimized formulation yielded a nutritionally superior and palatable snack option. This study emphasizes the role of traditional millets like ragi in modern dietary practices and highlights their potential in promoting public health and sustainable food systems.

Keywords: Finger millet, functional foods, sensory evaluation, nutritional composition, health benefits.

I. INTRODUCTION

- The increasing prevalence of lifestyle-related health conditions such as obesity, diabetes, and cardiovascular disorders has led to a surge in the demand for functional, nutrient-rich food products. Finger millet (*ragi*), scientifically known as *Eleusine coracana*, has gained attention for its high nutritional value, being rich in dietary fibre, calcium, protein, and antioxidants. Its gluten-free nature and low glycaemic index make it particularly suitable for individuals managing weight, diabetes, and metabolic disorders.
- Despite its numerous health benefits, finger millet remains underexploited in the development of mainstream snack products. In response, Prokies—a health-centric snack brand—introduced Prokies Ragi Cookies, a plant-based, protein-rich, and naturally sweetened alternative to conventional cookies. These cookies target health-conscious individuals, fitness enthusiasts, and consumers seeking gluten-free snack options.
- This research aims to evaluate the nutritional content, sensory attributes, and consumer acceptability of Prokies Ragi Cookies. The specific objectives include assessing the cookies' protein, fibre, and micronutrient levels, conducting sensory analysis, and investigating consumer preferences. The study also explores the potential of finger millet snacks to serve as healthier substitutes for traditional, refined-flour-based snacks, which are often linked to metabolic imbalances and nutrient deficiencies.
- By showcasing the health benefits and market viability of finger millet cookies, this study contributes to the innovation of sustainable, functional foods tailored to modern dietary trends.

II. METHODOLOGY.

2.1 Ingredient Selection

- Flour Base: 100% finger millet (ragi) flour.
- Protein Source: Plant-based protein powder (e.g., pea protein).
- Sweeteners: Natural plant-based sugar alternatives (such as stevia, erythritol, or jaggery powder).
- Fat Source: Healthy oils (e.g., coconut oil).
- Binding Agent: Plant-based binders like flaxseed gel or chia gel.
- Flavouring: Natural vanilla extract and Himalayan pink salt.
- Leavening Agents: Baking powder and a small quantity of baking soda.
- Optional Additions: Nuts (e.g., almonds, walnuts) and seeds (e.g., pumpkin seeds).

2.2 Mixing Process

- Dry ingredients (ragi flour, protein powder, leavening agents, and salt) were mixed in a large bowl.
- In a separate bowl, wet ingredients (natural sweetener, oil, flaxseed gel, vanilla extract) were whisked together.
- The dry mixture was gradually incorporated into the wet mixture to form a soft dough.
- A small amount of plant-based milk (such as almond milk) was added if the dough was too dry.
- Cookies were shaped and baked until edges were crisp with a soft centre.

2.3 Quality Assurance

- Texture: Evaluated for a crispy outer layer with a chewy centre.
- Taste Profile: Mild sweetness with nutty undertones from ragi and hints of vanilla.
- Nutritional Benchmarking: Ensured each 100g serving contained at least 10.6g of protein, in line with the Prokies nutritional standard.
- Shelf Life Testing: Established a stable shelf life of 45 days under proper storage conditions.

III. SAMPLING AND DATA COLLECTION

3.1 Sampling Method

- A non-probability convenience sampling technique was employed due to resource constraints and the exploratory nature of the study. Participants were selected based on availability, willingness to participate, and basic interest in health-oriented snacks. The sample size was fixed at 50 respondents.

3.2 Study Tools

A structured questionnaire was developed and validated informally for clarity. It comprised four sections:

- Section A: Demographic details (age, gender, occupation, dietary habits)
- Section B: Awareness and perception regarding millets and health-focused diets
- Section C: Feedback on Prokies Ragi Cookies (including taste, texture, satisfaction)
- Section D: Consumer preferences and expectations regarding healthy snacks

- The questionnaire utilized multiple-choice, closed-ended, and Likert scale items for comprehensive feedback.

3.3 Data Collection Techniques

- A self-administered survey approach was adopted.
- Both digital (Google Forms, email, WhatsApp) and printed versions of the questionnaire were circulated.
- Participants were informed about the study's purpose and assured of confidentiality.

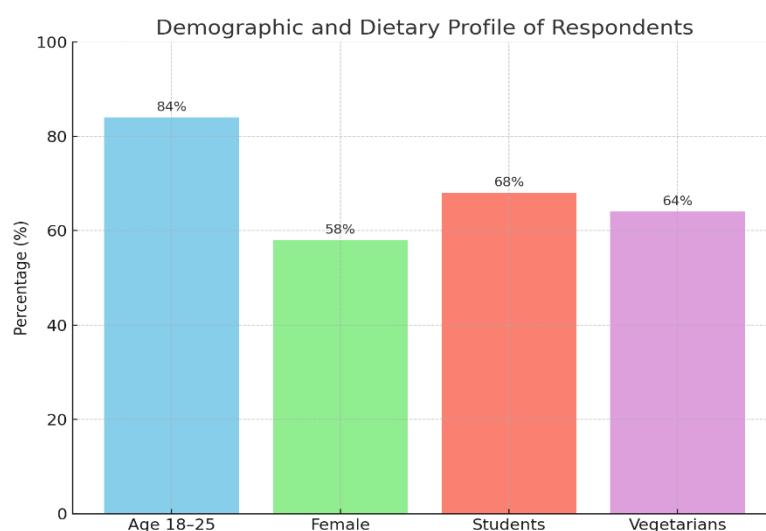
3.4 Data Analysis

- Collected responses were compiled and tabulated using Microsoft Excel.
- Descriptive statistics including frequencies, percentages, and mean scores were used to interpret consumer awareness, acceptance, and preference

IV. Results and Discussion

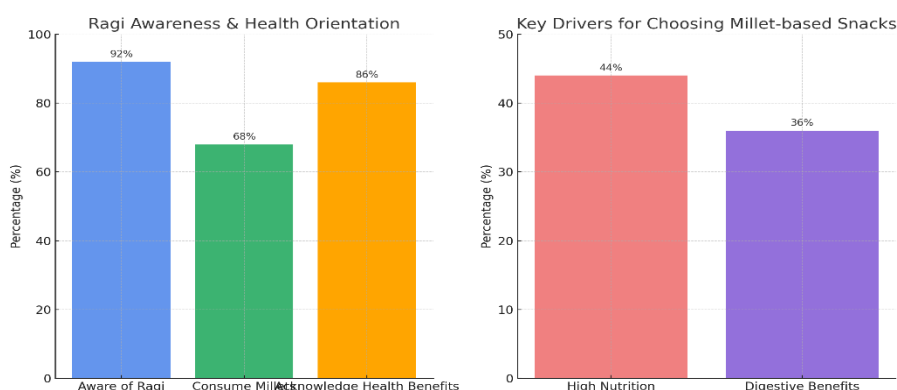
4.1 Demographic Profile

- Among the 50 respondents, 84% were aged 18–25, 58% were female, and 68% were students. A vegetarian diet was followed by 64% of participants, indicating a preference for plant-based foods.



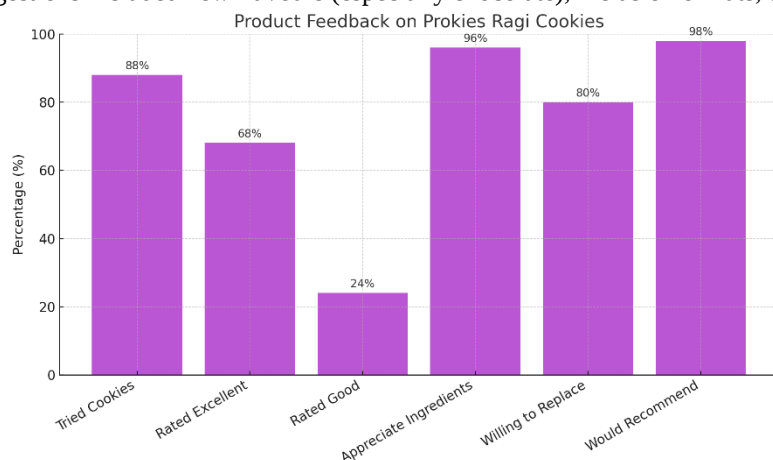
4.2 Awareness and Health Orientation

- 92% were aware of ragi.
- 68% consumed millets occasionally or frequently.
- 86% acknowledged ragi's health benefits, citing improved digestion and bone health as primary benefits.
- Key drivers for choosing millet-based snacks were high nutrition (44%) and digestive benefits (36%)



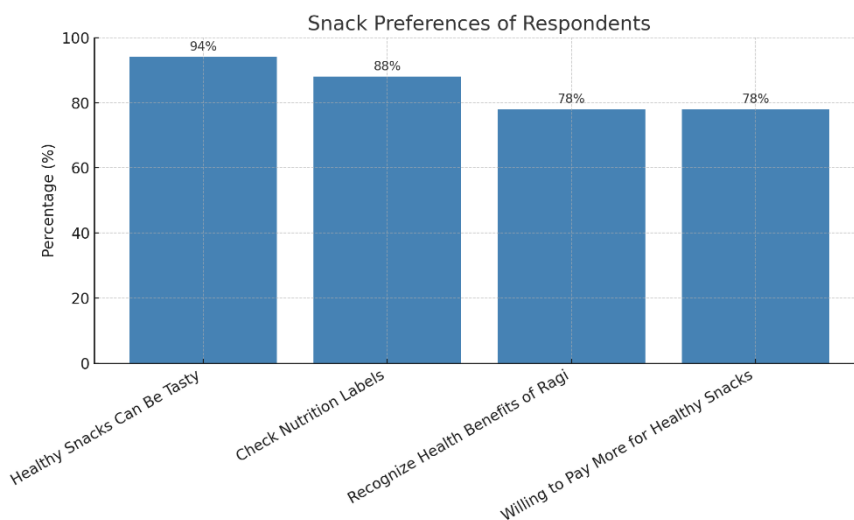
4.3 Product Feedback on Prokies Ragi Cookies

- 88% had tried the cookies; 68% rated them excellent, and 24% rated them good.
- 96% appreciated the natural ingredients and absence of refined sugar.
- 80% expressed willingness to replace regular cookies with Prokies.
- 98% would recommend the product to others.
- Suggestions included new flavours (especially chocolate), inclusion of nuts, and better availability.



4.4 Snack Preferences

- 94% agreed that healthy snacks can be tasty.
- 88% reported checking nutritional labels.
- 78% acknowledged long-term health benefits of ragi consumption.
- The same proportion was open to paying a premium for health-based snacks



4.5 Open Feedback

- Participants highlighted product satisfaction and expressed interest in expanded offerings such as millet-based brownies, bars, and cereals. About 92% were enthusiastic about more millet products from Prokies.

ACKNOWLEDGMENT

I Madhav Sharma acknowledge Ms. Sangeeta Adhikari , friends and family member who help in research work..

V. Conclusion

The present study aimed to evaluate consumer awareness, perception, and acceptance of *Prokies Ragi Cookies* as a healthy snack alternative. The findings indicate a strong preference for nutritious, millet-based products, especially among young, health-conscious individuals aged 18–25. The majority of participants recognized the health benefits of ragi, such as aiding digestion and improving bone health. *Prokies Ragi Cookies* were positively received, with most respondents rating them highly in terms of taste, texture, and ingredient quality.

A significant number of participants expressed willingness to replace regular cookies with *Prokies* and even pay more for a product that is both healthy and tasty. Furthermore, the brand received enthusiastic feedback and suggestions for product line extensions, including energy bars, brownies, and cereals. This shows a clear demand for innovation within the millet snack category.

The study also highlights growing awareness around reading nutrition labels and choosing foods based on health benefits. Overall, the results underscore the market potential for *Prokies* and similar functional foods. With continued emphasis on quality, availability, and consumer education, *Prokies* can further strengthen its position as a trusted and preferred health-snack brand in the expanding wellness food sector.

VI. References

- Devi, P. B., Vijayabharathi, R., Sathyabama, S., Malleshi, N. G., & Priyadarisini, V. B. (2014). Health benefits of finger millet (*Eleusine coracana* L.) polyphenols and dietary fibre: A review. *Journal of Food Science and Technology*, 51(6), 1021–1040. <https://doi.org/10.1007/s13197-011-0584-9>
- Saleh, A. S. M., Zhang, Q., Chen, J., & Shen, Q. (2013). Millet grains: Nutritional quality, processing, and potential health benefits. *Comprehensive Reviews in Food Science and Food Safety*, 12(3), 281–295. <https://doi.org/10.1111/1541-4337.12012>
- Gopalan, C., Sastri, B. V. R., & Balasubramanian, S. C. (2012). *Nutritive value of Indian foods*. National Institute of Nutrition, Indian Council of Medical Research. <https://www.nin.res.in/ebooks/IFCT2017.pdf>