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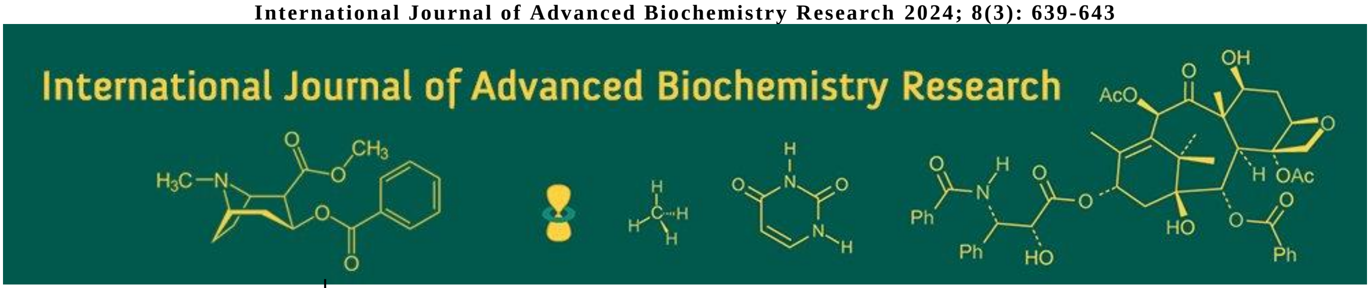

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Quality evaluation of nutritional cookies prepared by incorporation with chia seed and garden cress seed powder

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Abstract
The baking industry stands as a prominent sector within the realm of processed foods. One key benefit of bakery goods lies in their adaptability for enrichment with grains, millets, or additional beneficial components. Cookies, typically comprising cereal-based baked items, tend to possess a moisture content below 5% following the baking process. Two major ingredients-fat and sugar are used to enrich four in cookies. Considering these concerns, it becomes necessary to replace wheat flour with alternative substances to decrease gluten content and enhance the quality attributes of cookies. The bulk of Indian people diet is vegetarian and the major part of energy and protein comes from cereals and pulses. The aim of this study involve examining the physicochemical attributes of cookies prepared by integrating chia seed and garden cress seed powder. Analysis of physical properties and Mineral content of cookies consists of Weight (g), diameter (Per/mm), thickness (Per/mm), spread Ratio (%) and Calcium (%), Magnesium (%) and Iron (%). The gathered data underwent analysis using one-way ANOVA with a significance level set at 5%. These results show the content of Weight, diameter, thickness, spread Ratio (%), Calcium, Magnesium and Iron content were obtained in the range of (9.80-13.30 gm), (46.20-47.90 mm), (9.80-11.70 mm), (4.01-4.83%), (15.05-212.75%), (22.18-148.90%) and (1.70-19.42%) respectively. Based on the Physical properties and Minerals content, T12: T1: T2. The outcome of this research can be used as valuable information for the quality evaluation of nutritious cookies.

Keywords: Quality evaluation, minerals content, cookies, nutrient, chia seed flour and garden cress seed powder

Introduction
Cookies is highly accepted in the global market due to their strong sensory appeal and commercial success among consumers worldwide. They represent a classic transformation of cereal products and serve as a significant source of energy and essential nutrients. Nevertheless, cookies typically utilize refined cereals in their production, which limits their nutritional value El-Adawy (1997) [8]. Hence, researchers and food technologists persistently strive to enhance the nutritional content and antioxidant properties of these product. Presently, ready-to-eat food items are customized to align with consumer preferences for healthier and functional options. Given the widespread popularity of cookies among consumers, they present a suitable avenue for the development of functional foods, as they can be easily enriched and fortified with various beneficial ingredients Syed *et al.*, (2022) [13]. Cookies or biscuits are a type of baked treat typically made with flour (usually wheat flour), fat, shortening, sugar, and salt. These snacks are widely enjoyed globally as convenient ready-to-eat options. Moreover, cookies provide an excellent opportunity for incorporating blended flours, offering a simple and effective means of enhancing nutritional value. In recent times, there has been a heightened consumer awareness regarding the consumption of whole grains that are gluten-free and rich in fiber and protein. Consequently, various studies have explored the utilization of composite flours derived from grains, pseudo cereals, and root crops as substitutes for wheat flour in the development of cookies and other functional food products Chopra *et al.* (2018) [7].

Chia, scientifically known as *Salvia hispanica* L., belongs to the Lamiales order, Lamiaceae family, Nepetoideae subfamily, and Salvia genus, being a herbaceous plant (Arctos Specimen Database, 2018) [3]. The Salvia genus is notably the most prevalent within the Lamiaceae family. The term "chia" is derived from the Spanish word "chian," which translates to oily. Chia is valued as an oilseed due to its high concentration of omega-3 fatty acids, high-quality protein, plentiful dietary fiber, minerals, and vitamins. Moreover, it contains a wide range of polyphenolic antioxidants, protecting chia seeds from both chemical and microbial oxidation (Cahill, 2003) [5]. Chia seeds contain around 30-33% fat, 15-25% protein, 41% carbohydrates, 18-30% dietary fiber, 4-5% ash, and are composed of 90-93% dry matter, along with a varied collection of polyphenols. Remarkably, they are abundant in the essential fatty acid alpha-linolenic acid (ALA 18:3(n-3)), vital for supporting a range of physiological functions (Chicco *et al.*, 2009, Fernandez *et al.*, 2008, and Meester *et al.*, 2008) [6, 9, 11].
Barrientos *et al.* (2012) [4] Examined the impact of integrating chia seed flour into sugar-snap cookies, resulting in increased levels of alpha-linolenic fatty acids, protein, fat, crude fiber, calcium, and zinc Mesais *et al.* (2016) [12] Additionally investigated the impact of integrating 5–20% chia seed flour, noting that higher proportions of chia seed incorporation led to improvements in the antioxidant activity, phenolic content, and fatty acid profile of cookies. The growing population of health-conscious consumers is driving expansion in the health food industry, resulting in a surge of new food products boasting various health claims to meet diverse consumer demands. Nevertheless, there remains ample opportunity to enhance the nutritional value of cookies both quantitatively and qualitatively by incorporating nutritious ingredients. Garden cress seed, also known as haliv, aliv, or halim, emerges as a significant yet underutilized oilseed. Rich in vitamins A, E, and C, particularly niacin, B6, and folic acid, garden cress seeds also offer essential minerals such as calcium and iron Gaikwad *et al.*, (2020) [10].

Materials and Methods

The research project "Quality evaluation of nutritional cookies prepared by incorporation with chia seed and garden cress seed powder" was carried out in the research Lab of Department of Food and Dairy Technology, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P. (India). In the current inquiry, several tools and machinery were employed, such as a Soxhlet apparatus, centrifuge, electronic balance, laminar air flow, thermometer, hot air oven, texture analyzer, vernier Calliper and bakery oven. The equipment utilized were from different department's *viz.*, Department of Food and Dairy Technology, Warner College of Dairy Technology.

Physical parameters

Weight (g), diameter (Per/mm), thickness (Per/mm) & spread Ratio (%) of cookies were estimated as per (AOAC 2005) [2] methods.

Minerals contents

Calcium (%), Magnesium (%) and Iron (%) of cookies were estimated as per (AOAC 2000) [1] methods.

Statistical analysis

Analysis of variance revealed at significance of p> 0.05 level, S.E. and C.D. at 5% level was mentioned wherever required.

Results and Discussion

The data collected on different aspects, as per the methodology were tabulated and analyzed statically. The findings are also represented diagrammatically. The data regarding physical properties such as weight (g), diameter (Per/mm), thickness (Per/mm), spread Ratio (%) & Minerals content such as Calcium (%), Magnesium (%) and Iron (%) of cookies prepared by incorporation with chia seed and garden cress seed powder.

Weight (g)

It is evident from the figure.1 that the highest average value of weight (g) (13.30), was obtained in the treatment Mii. Whereas lowest value of weight (g) (9.80) was obtained in the treatment Mv. There was a significant variation (p-value < 0.05) in the weight (g) among the different treatments.

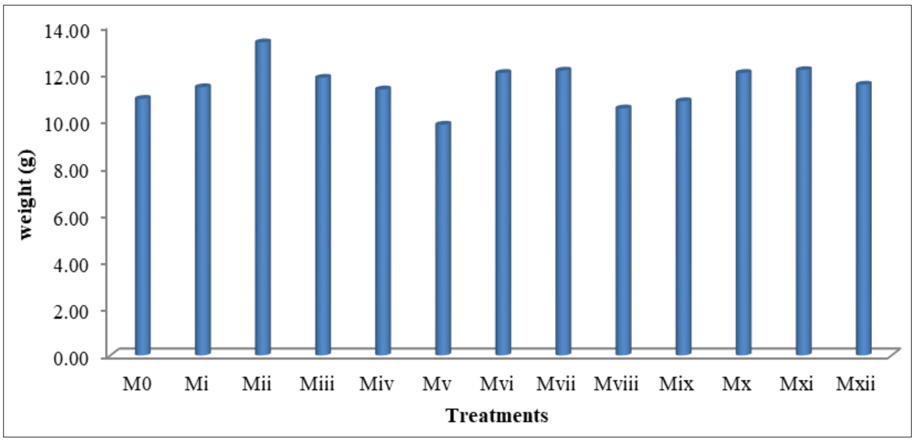

Fig 1: Graphical representation of weight (g) of final developed Cookies

Diameter (Per/mm)

Figure 2 clearly demonstrates that the highest average value of Diameter (Per/mm) (47.90) was obtained in the treatment M_{iii}. Whereas lowest value of Diameter (Per/mm) (46.20) was obtained in the treatment M_0 and M_{ix}. The current investigation reveals a significant difeerent (p-value < 0.05) among various treatments.

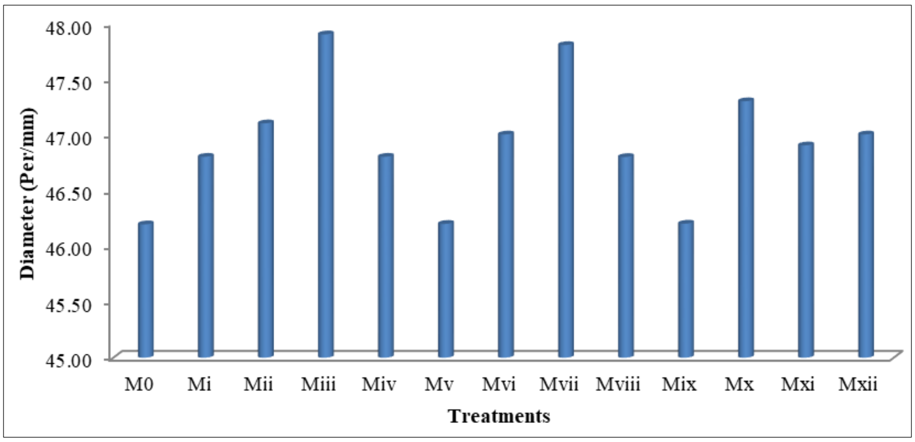

Fig 2: Graphical representation of diameter (per/mm) of final developed Cookies

Thickness (Per/mm)

It is evident from the figure 3 that the highest average value of Thickness (Per/mm) (11.70) was obtained in the treatment M_{xi}. Whereas lowest value of Thickness (Per/mm) (9.80) was obtained in the treatment M_{ii}. The thickness also showing significant difference ($p<0.05$) between different treatments.

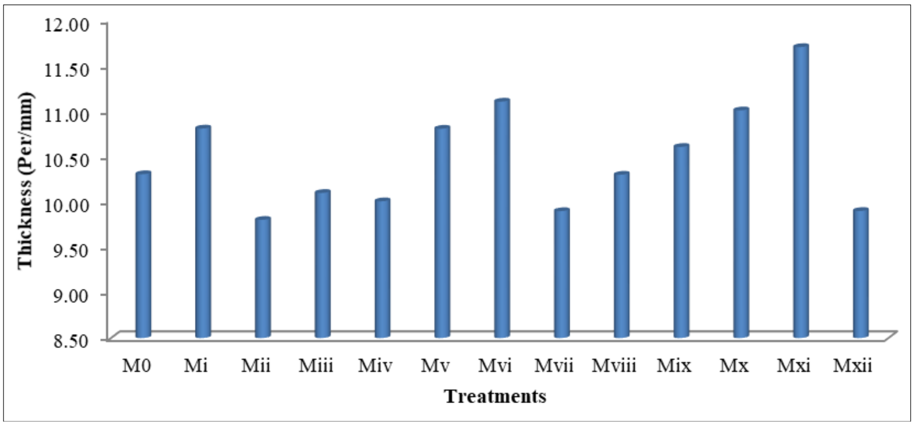

Fig 3: Graphical representation of thickness (per/mm) of final developed Cookies

Spread Ratio (%)

It is evident from the figure no.4 that the highest average value of Spread Ratio (%) (4.83) was obtained in the treatment M_{vii}. Whereas lowest value of Spread Ratio (%) (4.01) was obtained in the treatment M_{xi}. The above parameter also showing significant difference ($p<0.05$) between different treatments.

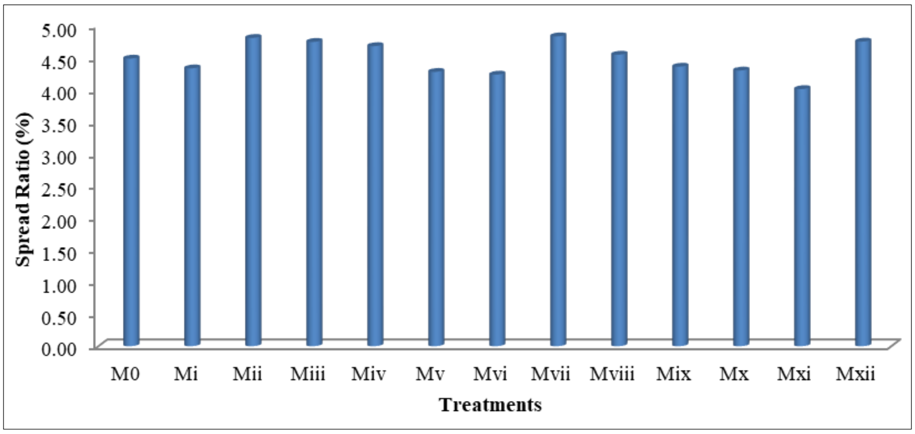

Fig 4: Graphical representation of spread ratio (%) of final developed Cookies

Calcium content (%)

It is evident from the figure no.5 that the highest average value of Calcium (Mg/100 gm) (212.75) was obtained in the treatment M_{xii}. Whereas lowest value of Calcium (Mg/100 gm) (15.05) was obtained in the treatment M_0. The present study showing significant difference ($p<0.05$) between different treatments.

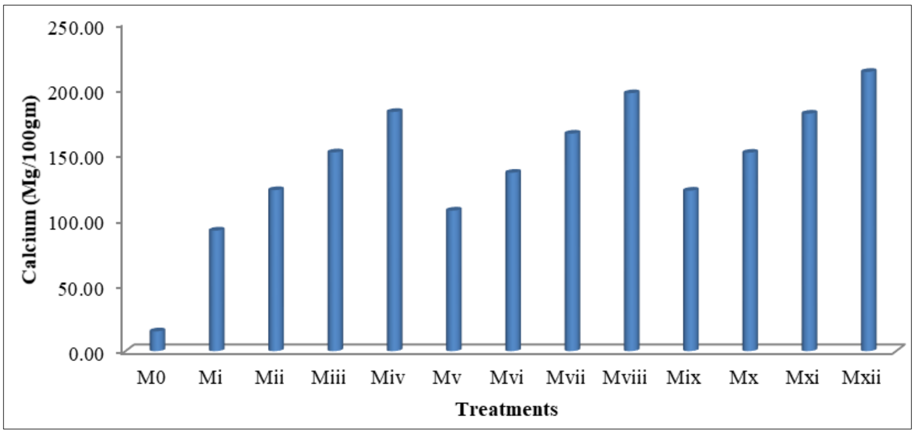

Fig 5: Graphical representation of calcium (%) of final developed Cookies

Magnesium content (%)

It is evident from the figure no.6 that the highest average value of Magnesium (Mg/100 gm) (148.90) was obtained in the treatment M_{xii}. Whereas lowest value of Magnesium (Mg/100 gm) (22.18) was obtained in the treatment M_0. Magnesium content significant difference ($p<0.05$) between different treatments.

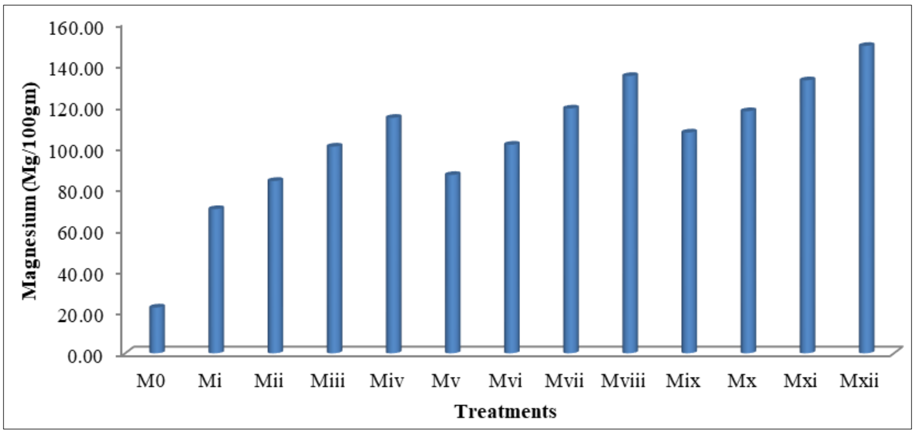

Fig 6: Graphical representation of magnesium (%) of final developed Cookies

Iron content (%)

It is evident from the figure no.7 that the highest average value of Iron (Mg/100 gm) (19.42) was obtained in the treatment M_{xii}. Whereas lowest value of Iron (Mg/100 gm) (1.70) was obtained in the treatment M_0. The present study showing significant difference ($p<0.05$) between different treatments.

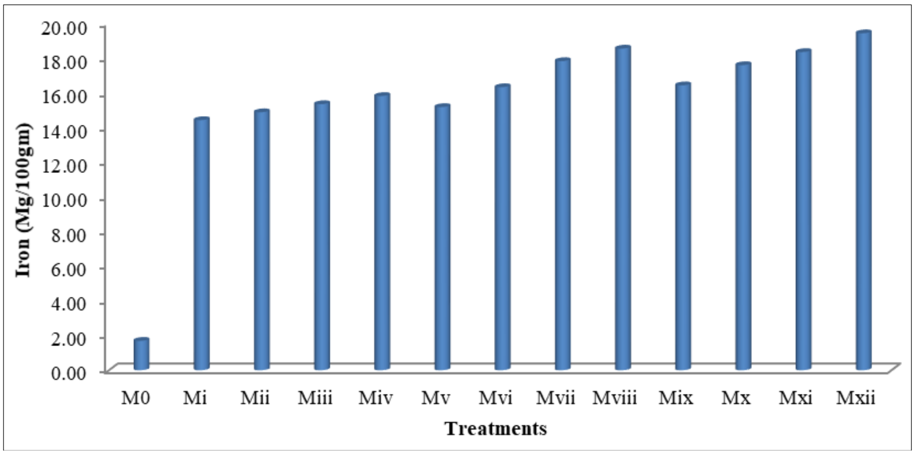

Fig 7: Graphical representation of iron (%) of final developed Cookies

Conclusion

The findings suggest that the physical characteristics of the cookie, such as weight (g), diameter (Per/mm), thickness (Per/mm) & spread ratio (%) while cookie thickness decreased. Cookies made by including chia seed and garden cress seed powder showed improved color, crispiness, flavor, surface qualities, and overall acceptability. The physical properties and minerals content of develop cookies results show the content of Weight, diameter, thickness, spread Ratio (%), Calcium, Magnesium and Iron content were obtained in the range of (9.80-13.30 gm), (46.20-47.90 mm), (9.80-11.70 mm), (4.01-4.83%), (15.05-212.75%), (22.18-148.90%) and (1.70-19.42%) respectively.

References

1. AOAC. Official methods of analysis. 17th ed. Association of Official Analytical Chemists; 2000.
2. AOAC. Official Methods of Analysis. 18th ed. Association of Official Analytical Chemists; 2005.
3. Arctos Specimen Database. Collaborative collection management solution. 2018.
4. Barrientos V, Aguirre A, Borneo R. Chia (Salvia hispanica) can be used to manufacture sugar-snap cookies with an improved nutritional value. Int J Food Std. 2012;1:135-143.
5. Cahill J. Ethnobotany of chia, Salvia hispanica L. (Lamiaceae). Economic Botany. 2003;57:604-618.
6. Chicco AG, D’Alessandro ME, Hein GJ, Oliva ME, Lombardo YB. Dietary chia seed (*Salvia hispanica* L.) rich in alpha-linolenic improves adiposity and normalizes hypertriacylglycerolemia and insulin resistance in dyslipaemic rats. Br J Nutr. 2009;101:41-50.
7. Chopra N, Dhillon B, Rani R, Singh A. Physico-nutritional and sensory properties of cookies formulated with quinoa, sweet potato, and wheat flour blends. Curr Res Nutr Food Sci Jour. 2018;6(3):798-806.
8. El-Adawy T. Effect of sesame seed protein supplementation on the nutritional, physical, chemical, and sensory properties of wheat flour bread. Food Chem. 1997;59(1):7-14.
9. Fernandez I, Vidueiros SM, Ayerza R, Coates W, Pallarob A. Impact of chia (Salvia hispanica L.) on the immune system: preliminary study. Nutrition Society. 2008;67:E12.
10. Gaikwad VG, Chavan UD, Godase SN, Kotecha PM. Studies on Nutritional Quality of Garden Cress Seed Biscuits. Int J Curr Microbial App Sci. 2020;Special Issue-11:4118-4130.
11. Meester F, Watson RR, Ayerza R, Coates WE. Chia Seeds and the Columbus Concept. In: Wild-Type Food in Health Promotion and Disease Prevention. Humana Press; 2008. p. 377-392.
12. Mesais M, Holgado F, Marquiez-Ruiz G, Morales FJ. Risk/benefit considerations of a new formulation of wheat-based biscuit supplemented with different amounts of chia flour. LWT-Food Sci Tech. 2016;73:528-535.
13. Hussain SZ, Rafiq A, Naseer B, Naqash S, Shafi F. Exploring chia seed for development of functional cookies-nutritional, phytochemical, textural, amino acid and fatty acid profiling. Research Square. 2022:1-16.