

UNIVERSITI TEKNOLOGI MARA

**DEVELOPMENT AND EVALUATION OF SOFT COOKIES ENRICHED
WITH WALNUTS AND RAISINS: PHYSICOCHEMICAL PROPERTIES,
SENSORY ACCEPTANCE, AND ANTIOXIDANT ACTIVITY**

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July 2025

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful

Alhamdulillah, all praises be to Allah SWT for His endless blessing, the ease, challenges, strength and grace that He gave to complete this journey. This thesis marks not only the completion of a research project but also a meaningful chapter of growth and learning in my life. I am sincerely grateful to all those who have been a part of this journey.

To my supervisor, Professor Dr. Norazmir bin Md Nor, words often fall short to express how much his guidance has meant to me. I am deeply grateful for his patience during my moments of uncertainty and when I felt overwhelmed and his thoughtful insights that helped me stay on the right path. To the laboratory staff, En. Muhammad Fathee bin Md Bohari, special thank you for being more than assistance. He has been a teacher and pillar of support throughout my project. Not forget Pn. Sarida and Pn. Rohaiza, who supported me and taught me many things along this journey. To my silent guardian, Sir Faris, ever present in the quiet moments. His comforting words and willingness to help touched me deeply and will forever hold a special place in my heart.

To my beloved family, especially mak and ayah,
this achievement belongs as much to them as it does to me. Whenever I am struggling emotionally, they're always there to comfort me, telling me I am capable and believing in me more than anyone else does. I owe my strength and achievements to the blessings of their prayers. To my siblings, I am endlessly thankful for the love they have shown me, especially during the most difficult moments.

To all my friends, Cro15sant, thank you for their kindness and moral support during my studies and my laboratory mate, Hanis Batrisyia, thank you for walking this journey beside me. Every shared moment, from trials to triumphs, added meaning to this experience. To Naylisa, Marissa, Khairun, Fathihah and Dania, thank you for the companionship along this journey. Their presence, shared stress and laughter helped carry me through when motivation was hard to find. I am grateful for their presence and friendship. Though not all names can be mentioned here, each one remains in my prayers. May everyone who contributed, directly or indirectly, be granted ease and success in this life and the hereafter.

And lastly, to myself, thank you for holding on. This thesis may not be perfect, but it carries every bit of your effort, late nights, and silent strength. If you ever look back again one day, remember, you have learned more than you ever thought you would and yes, you continue to grow beyond what you thought possible.

“If you were to rely upon Allah with the reliance, He is due, you would be given provision like the birds: they go out hungry in the morning and return full in the evening” – Sunan al-Tirmidhi.

ABSTRACT

Skipping breakfast is a common issue among university students, often due to time constraints and irregular sleep patterns. This behaviour is linked to unhealthy eating patterns, which reduce academic performance and lead to negative health outcomes. Functional ingredients are increasingly used in baked goods, however, the potential of walnuts and raisins to boost antioxidant activity in soft cookies formulations remains relatively unexplored. This study aimed to develop and evaluate walnut soft cookies as ready-to-eat food with enhanced antioxidant activity, which suitable for consumption by the general population, particularly students. Four cookie formulations were prepared with the addition of raisins and varying levels of walnut (sample S0:0%, S1:10%, S2:20%, and S3:30%) to partially replace wheat flour. The products were analysed for the physicochemical content such as moisture, ash, carbohydrate, crude protein, crude fat, and fiber. The sensory evaluation was conducted by 35 semi-trained panelists using 7-point hedonic scale to evaluate on appearance, aroma, texture, taste and overall acceptance. The antioxidant activity was determined by using the DPPH radical scavenging assay. The nutritional content of sample S0 is 10.38%, 1.53%, 68.60%, 1.93%, 15.47% and 2.09% respectively, followed by sample S1's nutritional content with 10.46%, 1.53%, 66.61%, 2.10%, 17.10% and 2.21% consecutively. The nutritional content of sample S2 is 10.47%, 1.66%, 66.06%, 2.28%, 17.20% and 2.33% respectively, while sample S3 has 11.02%, 1.8%, 62.94%, 2.98%, 18.80% and 2.46% of nutritional content, respectively. The sensory result showed that sample S2 was rated highest for the aroma, taste and overall acceptance. The antioxidant activity was analysed and the result indicated that antioxidant activity in samples S1, S2, and S3 was 21.56%, 50.0% and 59.22% consecutively. In conclusion, the developed walnut soft cookies could serve as a potential alternative to improve breakfast intake among students.

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CHAPTER I

INTRODUCTION

1.1 Introduction

Breakfast refers to the first meal consumed at the start of the day, typically in the morning (Olatona et al., 2022). Indeed, it has been shown as the most important main meal in daily routine, which helps in enhancing cognitive function, nutrient intake, and overall dietary quality in adolescents (O'Neil et al., 2014; Barr et al., 2015; Zahedi et al., 2022). It serves as the primary meal of the day, providing essential nutrients to sustain daily functions (Harris et al., 2021). Based on recommendations from the International Breakfast Research Initiative, an ideal breakfast represents around 20-25% of daily energy intake (Pérez-Vega et al., 2024) while it is an important source of key nutrients in the diet, including three main macronutrients such as milk, cereal, and fruits (Rani et al., 2021). Furthermore, frequent breakfast consumption can improve mental performance in adolescents and adults (Zahedi et al., 2022) and increase energy expenditure in the early morning (Rani et al., 2021). As Baltar et al. (2018) stated, at least 50 kcal of energy should be taken during breakfast (Rani et al., 2021).

However, the prevalence of skipping meals, especially breakfast, has been increasing each day across all age groups, from children, teenagers to adults (Howden et al., 1993; Ma et al., 2020). In fact, university students are also identified as a group that frequently skips breakfast in their daily life (Pengpid & Peltzer, 2020). Moving from secondary school to a university setting is a big life transition for them, which can be accompanied by unhealthy habits such as irregular sleep patterns, decreased physical activity, increased use of alcohol and cigarettes, and unhealthy eating patterns (Butler et al., 2004; Demory-Luce et al., 2004; Crombie et al., 2009; SánchezOjeda et al., 2015; Díaz-Torrente & Quintiliano-Scarpelli, 2020). This pattern often begins with one in three adolescents which