

UNIVERSITI TEKNOLOGI MARA

**ASSOCIATION OF FTO GENE POLYMORPHISM WITH DIETARY
PATTERNS, PSYCHOLOGICAL STATUS, AND PHYSICAL ACTIVITY
BEHAVIOR AMONG ADULTS WITH GENETIC PREDISPOSITION TO
OBESITY**

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ABSTRACT

Obesity is influenced by both behavioral and genetic factors, with the FTO rs9939609 polymorphism playing a known role in increasing susceptibility to weight gain. This study aimed to examine whether structured lifestyle interventions could influence dietary intake, psychological status, and physical activity, regardless of FTO genotype. A total of 80 adults, including normal weight and overweight individuals, were genotyped and categorized into control and intervention groups. Dietary intake, psychological health, and activity levels were measured using validated tools before and after the program. The TT genotype was the most common (53.8%), followed by AT (40.0%) and AA (6.3%), reflecting regional trends. Participants in the intervention group showed statistically significant reductions in total energy ($Z = -3.92$, $p < 0.001$), carbohydrate ($Z = -3.92$, $p < 0.001$), protein ($Z = -3.88$, $p < 0.001$), and fat intake ($Z = -3.92$, $p < 0.001$). Psychological outcomes also improved, with significant reductions in stress ($Z = -3.20$, $p < 0.001$), anxiety ($Z = -3.24$, $p < 0.001$), and depression ($Z = -3.13$, $p < 0.001$) scores among the obese intervention group. Although the Chi-Square test did not show a significant association between FTO genotype and physical activity ($\chi^2 = 1.019$, $p > 0.05$), a descriptive increase in moderate activity was observed among AT carriers post-intervention. These results suggest that lifestyle interventions can be effective regardless of genetic predisposition, reinforcing the importance of behavior-focused strategies in public health nutrition.

Keywords: FTO gene, obesity, dietary intake, physical activity, psychological health, nutrigenetics

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CHAPTER 1: INTRODUCTION

1.1 Research Background

In this era of rapid lifestyle transformation, the prevalence of obesity has emerged as one of the most pressing global health challenges. Far from being a superficial concern, obesity significantly increases the risk of metabolic disorders, cardiovascular diseases, and type 2 diabetes. According to the World Obesity Federation (2022), more than 670 million adults and 120 million children are affected by obesity worldwide, with the numbers rising steadily. This alarming trend underscores the urgent need for effective prevention and intervention strategies that go beyond conventional approaches. Among the many genetic markers studied, the Fat Mass and Obesity-Associated (FTO) gene, particularly the rs9939609 polymorphism, has received considerable attention (Leońska-Duniec et al., 2016). This single-nucleotide polymorphism (SNP) has been consistently associated with elevated BMI, increased fat mass, and heightened risk of obesity (Poosri et al., 2024). These associations have been replicated across various populations and age groups, making FTO a key candidate gene in obesity research.

Moreover, individuals who carry the A allele (genotypes AA or AT) tend to exhibit greater fat accumulation and metabolic alterations, often accompanied by distinctive eating behaviors. Studies show that these individuals frequently prefer energy-dense, high-fat foods and may be more susceptible to overeating, particularly under stress or emotional strain (Leońska-Duniec et al., 2016). In addition, research has shown that individuals carrying the FTO risk allele tend to display specific dietary preferences, particularly a higher intake of fat and energy-dense foods, which may contribute to excess calorie consumption and subsequent weight gain (McCaffery et al., 2012). These dietary patterns are often habitual and long-term, making it essential