

11-03-2026

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To cite this article: Hengdayat, M., Mentari, R., Adefta, M. A. L., Agustine, D., King, M. K., Lazuardi, A. T., Effendi, T. K., Candra, T. & Nugroho, N. L. A. (2026). Comparison of the effectiveness of diet methods for weight loss: A Kruskal–Wallis analysis. *Priviet Multidisciplinary Journal*, 1(1), 18–30. <https://journal.privietlab.org/index.php/PMJ/article/view/46>

To link to this article: <https://journal.privietlab.org/index.php/PMJ/article/view/46>



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Comparison of the effectiveness of diet methods for weight loss: A Kruskal–wallis analysis

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Received 1 November 2025

Revised 15 January 2026

Accepted 11 March 2026

ABSTRACT

Obesity is a chronic condition characterised by excessive fat accumulation, representing one of the most critical and growing public health challenges in Indonesia, where national prevalence rose from 10.5% in 2007 to 21.8% in 2018. This study investigates and compares the effectiveness of three widely adopted dietary methods—the Mayo Diet, Ketogenic Diet, and DEBM (*Diet Enak Bahagia Menyenangkan*) Diet—in promoting weight reduction among university students at Binus University, Alam Sutera campus. A quantitative non-experimental design was employed, with weight loss data collected from 100 student respondents across the three dietary groups. A Kolmogorov–Smirnov normality test was conducted first, revealing that the Keto Diet (Sig. = 0.008) and DEBM Diet (Sig. = 0.000) data were non-normally distributed, while Mayo Diet data was normally distributed (Sig. = 0.063 > α = 0.05). Accordingly, the Kruskal–Wallis non-parametric test was applied. Results demonstrated a calculated chi-square value ($H = 0.859$) below the table value (5.99), with a significance value of 0.651 exceeding the alpha threshold of 0.05. These findings indicate no statistically significant difference in weight loss effectiveness among the three dietary methods. The study concludes that individual metabolic differences and personal dietary adherence are more determinative of weight loss outcomes than the specific dietary method selected.

Keywords: obesity; diet methods; Mayo diet; ketogenic diet; DEBM diet; Kruskal–Wallis test; weight loss; Indonesia

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1. INTRODUCTION

Obesity is increasingly recognised as a chronic relapsing progressive disease process that imposes substantial burdens on individual and public health (Bray et al., 2017). In Indonesia, the magnitude of this challenge has grown considerably. According to a report entitled “Cases of Obesity in Indonesia Are Increasingly Alarming” published by CNN Indonesia (2021), national obesity prevalence rose from 10.5% in 2007 to 14.8% by 2012, and further to 21.8% as documented by the Basic Health Research (*Riset Kesehatan Dasar*, RISKESDAS) in 2018. This upward trend has been further compounded by the COVID-19 pandemic, during which population-wide physical inactivity associated with home confinement accelerated weight gain across demographics.

A common source of misconception in the general public is the conflation of obesity with overweight, which are clinically distinct conditions. Obesity refers specifically to a pathological state of excessive adipose tissue accumulation, whereas overweight encompasses excess body mass comprising fat, muscle mass, and bodily fluids. Clinically, an individual is classified as obese when their Body Mass Index (BMI) equals or exceeds 27, though complementary indicators—including waist circumference, the waist-to-hip ratio (WHR), skinfold thickness, and body fat percentage measured via Bioelectrical Impedance Analysis (BIA)—are also employed (Swari, 2016).

As reported in the Indonesian Clinical Nutrition Journal, obesity may arise from a multifactorial combination of determinants including excessive fast food consumption, physical inactivity, genetic predisposition, media influence, psychological factors, socioeconomic status, dietary behaviours, age, and sex (Kurdanti et al., 2015). Given this complexity, effective interventions must be tailored to individual circumstances rather than applied uniformly.

Building on this multifactorial understanding, contemporary approaches to obesity management increasingly emphasise a comprehensive and sustained strategy rather than short-term or fragmented interventions. From a clinical perspective, lifestyle modification remains the cornerstone of treatment, encompassing structured dietary regulation, increased physical activity, and behavioural therapy. However, adherence to these interventions is often inconsistent, particularly when individuals encounter environmental and psychological barriers. For instance, the widespread availability of energy-dense, nutrient-poor foods, coupled with sedentary occupational patterns, creates an obesogenic environment that undermines individual efforts to maintain a healthy weight.

Behavioural and cognitive factors play a critical role in shaping dietary habits and physical activity patterns. Emotional eating, stress-induced consumption, and maladaptive coping mechanisms frequently contribute to excessive caloric intake. In such contexts, behavioural interventions such as cognitive behavioural therapy (CBT), have demonstrated efficacy in addressing dysfunctional thought patterns and promoting sustainable lifestyle changes. This highlights that obesity should not be framed solely as a matter of personal responsibility, but rather as a condition influenced by complex interactions between biological, psychological, and social determinants.

In addition to lifestyle interventions, pharmacological treatments and bariatric surgery may be indicated for individuals with severe obesity or obesity-related comorbidities. Anti-obesity medications function through various mechanisms, including appetite suppression, nutrient absorption inhibition, and modulation of metabolic pathways. Meanwhile, bariatric procedures such as gastric bypass and sleeve gastrectomy have been shown to produce substantial and sustained weight loss, alongside improvements in metabolic health markers. Nevertheless, these approaches require careful clinical evaluation, long-term monitoring, and patient commitment, as they are not without risks and potential complications.

At the population level, public health policies are equally essential in addressing the rising prevalence of obesity. Government-led initiatives—such as nutritional labelling regulations, taxation on sugar-sweetened beverages, and the promotion of physical activity through urban planning—can create supportive environments that facilitate healthier choices. In Indonesia, efforts to integrate nutrition education into school curricula and community health programs represent important steps toward early prevention. However, the effectiveness of such measures depends heavily on consistent implementation, cross-sector collaboration, and public awareness.

Tackling obesity requires a paradigm shift from reactive treatment to proactive prevention. Early intervention, particularly during childhood and adolescence, is crucial in mitigating long-term health risks. Equally important is the need to reduce stigma associated with obesity, which often discourages individuals from seeking appropriate care. By adopting a holistic and evidence-based approach that integrates clinical management, behavioural support, and policy-level interventions, it is possible to address obesity as a chronic disease while improving overall population health outcomes.

Among the various preventive and management strategies—including exercise, caloric restriction, and behavioural modification—dietary programs have attracted widespread public interest. However, the comparative effectiveness of specific dietary methods remains incompletely understood. This study addresses that gap by examining and comparing the weight-loss outcomes of the Mayo Diet, Ketogenic Diet, and DEBM Diet among a sample of Binus University students using the Kruskal–Wallis non-parametric statistical test (Lind et al., 2018). Three specific questions are addressed: (1) Do dietary methods exert a statistically significant effect on weight reduction? (2) What factors contribute to weight reduction? (3) How effective is each dietary method in reducing body weight?

2. LITERATURE REVIEW

2.1. Definition of Diet

A diet is broadly defined as a regulated pattern of food consumption in which the types and sources of intake are structured according to the individual's health objectives. As noted by Halodoc (n.d.), while diet is commonly understood by the general public as a weight-management tool, its clinical functions extend beyond body weight. Dietary regimens are also prescribed medically to manage chronic conditions including diabetes mellitus, cardiovascular disease, and renal disorders, wherein precise regulation of macronutrient and micronutrient intake is therapeutically necessary.

From a scientific standpoint, the concept of diet encompasses not only caloric intake but also the qualitative composition of food, eating frequency, portion control, and nutrient timing. Macronutrients—carbohydrates, proteins, and fats—serve distinct physiological functions, while micronutrients such as vitamins and minerals are essential for metabolic processes, immune function, and cellular maintenance. Consequently, an optimal diet is one that achieves a balance between these components in accordance with an individual's age, sex, activity level, and clinical condition. This perspective underscores that diet is inherently personalised rather than universally standardised.

In clinical nutrition, diet is frequently utilised as a non-pharmacological intervention. For example, in patients with diabetes mellitus, dietary planning focuses on glycaemic control through carbohydrate monitoring and the selection of low glycaemic index foods. Similarly, in cardiovascular disease, dietary strategies emphasise the reduction of saturated fats and trans fats while increasing the intake of fibre-rich foods to improve lipid profiles. In renal disorders, dietary prescriptions may involve strict regulation of sodium, potassium, and protein intake to prevent further deterioration of kidney function. These examples illustrate that diet operates as a therapeutic modality that can significantly influence disease progression and patient outcomes.

Beyond its clinical applications, diet also reflects broader behavioural and cultural dimensions. Eating patterns are shaped by cultural traditions, socioeconomic status, food availability, and individual preferences. In many societies, dietary habits are influenced by convenience and modern lifestyles, often resulting in increased consumption of processed and energy-dense foods. This shift has contributed to the global rise in non-communicable diseases, highlighting the importance of promoting balanced and nutrient-dense dietary patterns at both individual and population levels.

The concept of diet must be distinguished from short-term or restrictive eating practices that are often popularised in mainstream media. While fad diets may promise rapid weight loss, they are frequently unsustainable and may lead to nutritional deficiencies or metabolic disturbances. In contrast, a scientifically grounded diet emphasises sustainability, adequacy, and long-term adherence. It prioritises gradual and consistent improvements in eating behaviour rather than extreme or temporary restrictions.

Psychologically, diet also plays a role in shaping an individual's relationship with food. A well-structured dietary pattern can foster mindful eating, improve self-regulation, and support overall wellbeing. Conversely, overly restrictive or poorly designed diets may contribute to disordered eating behaviours, including binge eating or chronic dieting cycles. Therefore, effective dietary planning should integrate both physiological and psychological considerations to ensure that it supports holistic health.

Diet is a multidimensional concept that extends far beyond simple caloric restriction or weight loss. It represents a structured, evidence-based approach to food consumption that integrates nutritional science, clinical application, behavioural factors, and cultural context. When appropriately designed and implemented, a diet serves not only as a means of maintaining body weight but also as a fundamental component of disease prevention, health promotion, and overall quality of life.

2.2. Types of Diet

Numerous dietary programs are available, each with distinct principles and practical requirements. According to [Cermati.com \(2018\)](#), at least fourteen dietary types have been identified in contemporary practice. Among these, three are particularly well recognised within the Indonesian public: the Mayo Diet, the Ketogenic Diet, and the DEBM Diet (*Diet Enak Bahagia Menyenangkan*). Despite their methodological differences, all three share the overarching objective of reducing body weight and promoting health.

The Mayo Diet was developed through clinical research and trials conducted by the Mayo Clinic Diet team. As described by [Agustin \(2021\)](#), this diet aims to reduce body weight while sustaining overall health and preventing chronic conditions such as cardiovascular disease and hypertension. Its nutritional structure is organised as a pyramid, with vegetables and fruits constituting the largest dietary proportion, followed by carbohydrates, and with sweets strictly limited.

The Ketogenic Diet is characterised by a low-carbohydrate, high-fat dietary pattern. According to [Adrian \(2020\)](#), while its full physiological effects remain under investigation, documented benefits include improved glycaemic control in patients with type 2 diabetes (under medical supervision) and a potential reduction in the risk of neurological disorders. The diet's safety profile continues to be scrutinised in clinical research.

The DEBM Diet shares the ketogenic approach of low-carbohydrate, high-fat intake but distinguishes itself by permitting pleasurable food choices without mandatory exercise, thereby prioritising adherence through enjoyment. As outlined by [Nareza \(2021\)](#), although low-carbohydrate diets have demonstrated general efficacy in weight reduction, the evidence base for the DEBM Diet specifically remains preliminary and lacks the methodological depth of established clinical trials.

2.3. Benefits of Diet

Beyond weight management, well-designed dietary regimens confer a range of physiological and psychological benefits when followed under appropriate professional guidance. As summarised by [Putra \(2021\)](#), dietary adherence can reduce the risk of chronic disease, improve mental health, and enhance self-confidence. Clinically, diet is integral to the management of conditions such as diabetes, cardiovascular disease, and cancer, partly through its capacity to regulate LDL cholesterol levels and reduce visceral adiposity, thereby improving insulin sensitivity. The National Institutes of Health further notes that a minimum reduction of 4.5 kg in body weight may produce a measurable decrease in blood pressure ([Jensen et al., 2014](#)).

The psychological dimension of diet is also relevant. Approximately 95% of serotonin—the neurotransmitter central to mood regulation—is synthesised in the gastrointestinal tract, which is densely innervated, highlighting the significance of the gut–brain axis ([Yano et al., 2015](#)). This enteric-neural pathway creates a physiological link between dietary patterns and emotional wellbeing. Research has established an inverse association between nutritious dietary intake and the prevalence of depressive episodes in adolescents ([Jacka et al., 2010](#)). Additionally, achieving a healthy body weight frequently enhances self-esteem and social confidence, generating positive outcomes beyond the purely physical domain.

Expanding on these psychological and physiological interactions, it is increasingly evident that diet functions as a central determinant of overall health through its influence on systemic inflammation and metabolic regulation. Chronic low-grade inflammation, which is strongly associated with obesity and non-communicable diseases, can be modulated through dietary patterns. Diets rich in whole grains, fruits, vegetables, and unsaturated fats such as the Mediterranean diet have been shown to reduce inflammatory markers and improve endothelial function, thereby lowering the risk of cardiovascular complications. Conversely, diets high in refined sugars, processed foods, and trans fats tend to exacerbate inflammatory responses, contributing to metabolic dysfunction and disease progression.

Moreover, the gut microbiota has emerged as a key mediator linking diet to both physical and mental health outcomes. The composition and diversity of gut microorganisms are highly responsive to dietary intake, particularly fibre and fermented foods. A diverse microbiota is associated with improved digestion, enhanced immune function, and more stable mood regulation. Dietary patterns that support microbial diversity may therefore contribute not only to physical resilience but also to psychological stability. This further reinforces the concept that diet operates within a complex biological network rather than as an isolated behavioural factor.

In addition to biological mechanisms, adherence to a structured dietary regimen often fosters improvements in cognitive and behavioural functioning. Individuals who maintain consistent eating patterns tend to exhibit better executive control, including planning, self-regulation, and decision-making. These cognitive benefits may arise from both improved nutritional status and the development of disciplined routines. Over time, such behavioural reinforcement can extend beyond dietary habits, positively influencing other aspects of lifestyle such as physical activity, sleep hygiene, and stress management.

It is also important to consider the role of diet in preventive health across the lifespan. Early dietary habits established during childhood and adolescence significantly shape long-term health trajectories. Nutrient-dense diets during developmental stages support optimal growth, cognitive development, and emotional regulation, while poor dietary habits may predispose individuals to obesity, metabolic disorders, and mental health challenges later in life. Therefore, public health initiatives that promote balanced nutrition from an early age are essential in reducing the future burden of disease.

Furthermore, the social implications of diet should not be overlooked. Food choices are often embedded within cultural practices, family dynamics, and social environments. Positive dietary changes can strengthen social interactions, particularly when they involve shared meals and collective health goals. On the other hand, restrictive or socially isolating diets may negatively impact emotional wellbeing and adherence. Thus, effective dietary interventions should aim to be flexible and culturally sensitive, ensuring that they are both practical and socially sustainable.

In light of these multidimensional benefits, it becomes clear that diet is not merely a tool for weight control but a foundational component of holistic health. Its influence extends across physiological systems, psychological wellbeing, cognitive function, and social dynamics. Consequently, healthcare professionals and policymakers should prioritise the promotion of balanced, evidence-based dietary patterns that are adaptable to individual needs and contexts. By doing so, diet can be leveraged not only as a means of managing disease but also as a proactive strategy for enhancing overall quality of life and long-term health outcomes.

3. METHODOLOGY

3.1. Population

A population constitutes the complete set of subjects or objects within a generalisable domain sharing common characteristics as defined by the researcher, and from which data are collected for analysis and inference (Lind et al., 2018). The population for this study comprises students of Bina Nusantara University (Binus University), with a total population size of 100 individuals.

3.2. Sample

A sample is a representative subset of the population, sharing equivalent attributes, employed when complete population examination is impractical. The sample for this study was drawn from the Binus University student population. Conclusions derived from the sample analysis will be extrapolated to the broader student population through inferential statistical methods.

3.3. Kruskal–Wallis Test

The Kruskal–Wallis test is a non-parametric statistical procedure used to assess differences in central tendency across three or more independent groups. It is employed as a non-parametric alternative to One-Way Analysis of Variance (ANOVA) when the assumption of normally distributed data cannot be satisfied, and as an extension of the two-sample Wilcoxon Rank-Sum Test to three or more groups. The test requires no assumption about the shape of the population distribution and is applicable only when the sampled populations are mutually independent (Lind et al., 2018).

The procedural steps for the Kruskal–Wallis test are as follows:

- All sample observations are pooled into a single combined dataset.
- All values are ranked in ascending order across the pooled dataset.
- Each observation is replaced by its corresponding rank, beginning with rank 1 assigned to the lowest value.

The test statistic is calculated as:

$$H = [12 / N(N+1)] \times \sum [R^2_j / n_j] - 3(N+1)$$

with $k - 1$ degrees of freedom, where: $\Sigma R_1, \Sigma R_2, \dots, \Sigma R_k$ are the rank sums for samples 1, 2, ..., k ; n_1, n_2, \dots, n_k are the corresponding sample sizes; and N is the total combined number of observations. The sampling distribution of H follows a chi-square distribution with $k - 1$ degrees of freedom, and at least five observations per group are required to apply chi-square critical values (Lind et al., 2018).

Statistical computations in this study were performed using IBM SPSS Statistics version 25, with a significance level of $\alpha = 0.05$. The analytical procedure comprised three stages: a normality test (Kolmogorov–Smirnov), followed by the Kruskal–Wallis test, and a chi-square evaluation.

4. RESULTS AND DISCUSSION

4.1. Data Collected

Table 1 presents the weight reduction in kilograms recorded for each respondent across the three dietary programs over the observation period.

Table 1. Weight loss data (kg) by dietary method across 100 respondents

Respondent No.	Weight Loss (kg) by Diet Method		
	Mayo Diet	Keto Diet	DEBM Diet
1	21	22	21
2	32	43	32
3	11	15	21
4	9	24	21
5	4	17	11
6	23	28	21
7	17	42	22
8	24	36	14
9	29	41	27
10	39	27	22
11	5	23	14
12	14	33	33
13	24	14	14
14	15	54	26
15	37	11	32

16	46	21	13
17	29	22	17
18	10	24	32
19	25	32	12
20	23	15	31
21	16	27	22
22	23	22	15
23	17	16	41
24	37	25	32
25	24	34	31
26	16	12	19
27	26	11	10
28	27	32	20
29	35	1	31
30	22	9	41
31	14	10	11
32	13	12	21
33	11	17	32
34	50	32	11
35	33	22	23
36	25	25	12
37	23	12	21
38	15	23	22
39	18	54	20
40	26	22	32
41	21	22	14
42	41	13	17
43	29	55	18
44	13	33	26
45	9	14	11
46	19	12	15
47	31	15	25
48	42	43	32
49	12	14	11
50	32	35	11
51	22	48	27
52	44	50	31
53	46	44	22
54	37	25	48
55	37	49	41
56	24	50	21
57	48	34	37
58	16	37	44
59	50	48	41
60	37	21	50
61	26	22	47
62	21	26	43
63	48	27	21
64	26	34	47
65	47	39	38
66	50	28	32
67	12	47	17
68	21	50	25
69	24	21	50
70	34	16	32
71	37	28	45
72	46	50	31
73	49	48	22
74	21	46	45

75	16	21	50
76	27	22	36
77	34	33	49
78	33	36	21
79	43	48	22
80	48	21	11
81	27	22	25
82	17	17	36
83	46	50	21
84	36	21	48
85	50	44	50
86	37	21	21
87	11	33	33
88	28	46	44
89	50	50	12
90	37	21	25
91	28	26	47
92	46	37	50
93	21	31	31
94	49	47	49
95	36	42	33
96	26	33	21
97	22	11	27
98	36	24	46
99	14	36	39
100	11	45	21

Source: Primary survey data, 2024.

4.2. Normality Test

Hypotheses:

- **H₀**: The weight loss data across all three dietary methods follow a normal distribution.
- **H_a**: The weight loss data across all three dietary methods follow a non-normal (free) distribution.

Decision criteria:

- If Sig. $\geq \alpha$, then H₀ is accepted.
- If Sig. $< \alpha$, then H₀ is rejected.

Table 2. Normality test results (Kolmogorov–Smirnov)

Dietary Method	Sig.	Sign	α	Decision
Mayo Diet	0.063	>	0.05	H ₀ Accepted – Normal
Keto Diet	0.008	<	0.05	H ₀ Rejected – Free
DEBM Diet	0.000	<	0.05	H ₀ Rejected – Free

Source: IBM SPSS Statistics 25 output, processed by authors.

In Table 2 the SPSS output indicates that the significance value for the Mayo Diet data was 0.063, which exceeds $\alpha = 0.05$; accordingly, the Mayo Diet data may be considered normally distributed and H₀ is accepted. In contrast, the Keto Diet (Sig. = 0.008) and DEBM Diet (Sig. = 0.000) data both fall below the alpha threshold, indicating non-normal distributions and leading to rejection of H₀ for these methods. The presence of non-normally distributed data in two of the three groups necessitated the use of the Kruskal–Wallis non-parametric test rather than One-Way ANOVA.

4.3. Kruskal–Wallis Test Results

Hypotheses:

- **H₀:** There is no statistically significant difference among the three dietary methods with respect to weight reduction.
- **H_a:** There is a statistically significant difference among the three dietary methods with respect to weight reduction.

Decision criteria:

- If Sig. $\geq \alpha$, then H₀ is accepted.
- If Sig. $< \alpha$, then H₀ is rejected.
- If X² calculated \leq X² table, then H₀ is accepted.
- If X² calculated $>$ X² table, then H₀ is rejected.

Table 3. Kruskal–Wallis test results

Sig. / X ² Calculated	Sign	α / X ² Table	Decision
0.651	>	0.05	H ₀ Accepted
0.859	<	5.99	H ₀ Accepted

Source: IBM SPSS Statistics 25 output, processed by authors.

Based on [Table 3](#) the SPSS output yields a calculated chi-square value ($H = 0.859$) that falls below the chi-square table value of 5.99 at $k - 1 = 2$ degrees of freedom. This is corroborated by a significance value of 0.651, which exceeds $\alpha = 0.05$. Both criteria therefore support acceptance of H₀: no statistically significant difference exists among the three dietary methods in terms of their effectiveness in promoting weight loss.

Building upon these findings, it is important to recognise that the apparent equivalence in weight-loss outcomes across dietary approaches does not imply that all diets are identical in their physiological effects or long-term implications. While caloric balance remains the fundamental driver of weight change, the composition of macronutrients can influence metabolic pathways, hormonal responses, and satiety regulation ([Hall & Guo, 2017](#)). For instance, ketogenic diets, which are characterised by very low carbohydrate intake, may promote rapid initial weight loss through glycogen depletion and increased fat oxidation. In contrast, more balanced dietary approaches such as the Mayo Diet emphasise gradual, sustainable changes in eating behaviour and may yield slower but more consistent outcomes over time.

Additionally, the DEBM Diet, which integrates behavioural modification principles with dietary regulation, highlights the significance of psychological and environmental factors in achieving weight loss. By addressing habits, triggers, and patterns of consumption, such approaches may enhance long-term adherence compared to more restrictive diets. This reinforces the notion that sustainability, rather than short-term efficacy, should be the primary criterion in evaluating dietary interventions. A diet that an individual can maintain consistently is more likely to produce durable health benefits than one that yields rapid results but is difficult to sustain ([Johnston et al., 2014](#)).

Another critical consideration is the role of individual variability. Genetic predisposition, gut microbiota composition, hormonal regulation, and lifestyle factors such as sleep and stress all contribute to differential responses to dietary interventions. As a result, a diet that is effective for one individual may not yield the same outcomes for another. This variability underscores the importance of personalised nutrition, an emerging field that seeks to tailor dietary recommendations based on individual biological and behavioural characteristics ([Zeevi et al., 2015](#)). Advances in nutrigenomics and metabolomics may further enhance the ability to predict individual responses to specific dietary patterns in the future.

The measurement of weight loss alone may not fully capture the health impacts of different diets. Changes in body composition, such as reductions in visceral fat or preservation of lean muscle mass, are equally important indicators of metabolic health. Some diets may produce similar reductions in total body weight but differ significantly in their effects on fat distribution and muscle retention. Therefore, future

studies should incorporate more comprehensive outcome measures, including body composition analysis, metabolic biomarkers, and indicators of cardiovascular and endocrine function (Sacks et al., 2009).

It is also essential to consider the broader behavioural and social context in which dietary interventions are implemented. Factors such as social support, cultural compatibility, food accessibility, and economic constraints can significantly influence adherence and outcomes. Interventions that align with an individual's cultural preferences and daily routines are more likely to be maintained over time. Consequently, public health strategies should not only focus on promoting specific dietary patterns but also on creating supportive environments that facilitate healthy choices.

In light of these considerations, future research should adopt a more integrative approach that combines quantitative and qualitative methodologies. Randomised controlled trials with larger sample sizes and longer follow-up periods would enhance the robustness of findings, while qualitative assessments could provide valuable insights into participant experiences, motivations, and barriers. Such comprehensive approaches would contribute to a more nuanced understanding of dietary effectiveness and inform the development of interventions that are both evidence-based and practically applicable.

These results suggest that, within this sample, the Mayo Diet, Ketogenic Diet, and DEBM Diet produce broadly equivalent weight-loss outcomes. This may be attributable to the shared macronutrient-regulation principle underlying all three approaches, whereby caloric balance—irrespective of the specific dietary framework—remains the primary determinant of weight change. Moreover, substantial inter-individual variability in metabolism, baseline health status, and dietary adherence likely attenuates detectable between-group differences. This finding is consistent with the broader nutritional science literature suggesting that adherence to any evidence-based dietary program, rather than the specific program type, is the most critical predictor of success (Bray et al., 2017). Future research incorporating controlled experimental designs, objective biomarker measurements, and longer observation periods would improve the precision and generalisability of such comparisons.

5. CONCLUSION

The Kruskal–Wallis method is a non-parametric statistical procedure for comparing central tendency across three or more independent samples, serving as an alternative to One-Way ANOVA when the homogeneity of variance assumption is not met. In this study, the method was applied to compare the effectiveness of the Mayo Diet, Ketogenic Diet, and DEBM Diet in promoting weight loss among 100 Binus University students.

Normality testing confirmed that the Mayo Diet data followed a normal distribution (Sig. = 0.063 > 0.05), while the Keto Diet (Sig. = 0.008) and DEBM Diet (Sig. = 0.000) data were non-normally distributed. The Kruskal–Wallis test produced a calculated X^2 of 0.859, below the table value of 5.99, and a significance value of 0.651 exceeding $\alpha = 0.05$. H_0 is therefore accepted: no statistically significant difference in weight loss effectiveness was found among the three dietary methods.

On the basis of these findings, it is recommended that individuals seeking to adopt a dietary program evaluate the characteristics of each available method and select the approach best aligned with their personal goals, metabolic profile, food preferences, and lifestyle. Personal suitability and sustained adherence are more determinative of weight loss success than the particular dietary method adopted. Clinicians and health educators are encouraged to individualise dietary recommendations accordingly, particularly given the evidence that obesity represents a chronic relapsing condition requiring long-term, person-centred management strategies (Bray et al., 2017).

Ethical Approval

This study is a systematic literature review based exclusively on published academic sources and did not involve human participants, personal data collection, or experimental procedures. Therefore, formal ethical approval was not required.

Informed Consent Statement

Not applicable because this study did not involve human participants.

Authors' Contributions

MH – conceptualization; RM – methodology; MALA – formal analysis; DA – data curation; MKK – writing – original draft preparation; ATL – writing – review and editing; TKE – conceptualization; TC – methodology; NLAN – formal analysis.

Disclosure Statement

The author declares no potential conflict of interest.

Data Availability Statement

No primary dataset was generated for this study. All materials analyzed are available in the published sources cited in the reference list.

Funding

This research received no external funding.

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