



The Effectiveness of Intermittent Fasting Diet Compared with Ketogenic Diet in Reducing Weight of the Adults with Obesity – A Systematic Review

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ABSTRACT

Obesity is a worldwide health concern, characterized by excessive body fat posing risks to overall health. In 2016, almost 13% of individuals above 18 years were obese, and projections for 2025 estimate higher rates, emphasizing the need for effective weight management strategies. Two popular diets, the ketogenic diet and intermittent fasting, have gained attention for their potential in adult weight reduction. Intermittent fasting involves alternating eating and fasting periods, while the ketogenic diet promotes ketosis through low carbs and high fat. This systematic review aims to compare the efficacy of intermittent fasting and ketogenic diet to clarify which approach may be more advantageous for adults looking to lose weight. Relevant literature from 2017 to 2023 was searched in databases such as CINAHL, MEDLINE, PUBMED, Science Direct, and Cochrane. Additionally, a few numbers of studies before 2017 were taken due to the availability of related information. Seven highly relevant articles were selected using PRISMA guidelines. After careful analysis, the study suggests that intermittent fasting holds promise for weight loss, particularly in comparison to the ketogenic diet. Intermittent fasting achieves weight loss without the potential side effects of the ketogenic diet, such as

nutrient deficiencies. Conversely, a simple meal-skipping approach in intermittent fasting may not suit everyone, warranting consultation with professionals for suitable dietary decisions. This study highlights the effectiveness of intermittent fasting as a potential weight loss strategy over the ketogenic diet, underscoring the importance of medical consultation in individual dietary planning.

1. INTRODUCTION

Obesity is defined by the World Health Organization (WHO) (2016a) as the accumulation of excess body fat that poses a risk to one's overall health. This condition is becoming increasingly prevalent worldwide and is typically identified as having a Body Mass Index (BMI) of 30 kg/m² or greater (Fruh, 2017). In 2016, 13% of adults who are over the age of 18 were considered obese (WHO, 2021). The Non-Communicable Disease Risk Factor Collaboration (2016) indicates a potential rise in adult obesity to 18% for men and 21% for women worldwide by 2025 if current trends persist. Two eating regimens, the Ketogenic Diet (KD) and Intermittent Fasting (IF) diet, have drawn a lot of attention recently because of their prospective advantages in terms of body weight reduction (Sripongpun et al., 2022). As described by Varady et al. (2021) the IF dietary plan involves alternating periods of eating with intervals of fasting or not eating. The KD is characterized as a low-carbohydrate diet with a small amount of protein restriction to promote ketosis without limiting fat intake, with a 4:1 ratio of fat to carbohydrates and protein (Batch et al., 2020). The goal of this study is to examine and contrast the efficacy of KD and IF in helping obese adults in weight reduction.

Since the 1960s, KD has been popular as one of the most widely used dietary regimens for weight loss (Crosby, 2021). Also, the IF diet has grown in favour over the past 10 years because of its' straightforward strategy, which does not

include tight calorie counting or regular food monitoring (Koliaki & Katsilambros, 2022). According to Ebbeling et al. (2018), the KD led to an increase in energy expenditure during weight loss maintenance, ultimately contributing to the successful treatment of obesity in the United States. After 52 weeks of the KD plan, Tay et al. (2015) observed a weight loss of 9.8kg in Australia. Parallel to Tay et al. (2015), a study undertaken by Dashti et al. (2004) in Kuwait showed significant body weight and BMI reduction with KD. In opposition, a sample of people in the United Kingdom on an IF diet experienced a mean percentage weight loss of 5.3% (Antoni et al., 2018). Similarly, Carter et al. (2016) found a body weight reduction of 5.9 4% (P 0.001) in the Australian sample after 12 weeks of IF initiation. IF has been proven to have a wide range of benefits for obesity, with encouraging outcomes for weight loss and better metabolic health in people who can safely handle periods of not eating or eating very little during specific hours of the day, night, or days of the week, (Cabo & Mattson, 2019).

Although IF and KD have both demonstrated results in helping obese people lose weight, figuring out the best strategy for guiding obese people is still difficult. Static reliable weight-control methods are essential for lowering adult obesity prevalence and obesity-related health concerns (Malik et al., 2013). Therefore, this study aims to conduct a systematic review to explore the effectiveness of the IF compared to KD in reducing weight in obese adults. The results can ensure that those who are battling with obesity have access to prompt and efficient weight loss solutions. This study explores the effectiveness of IF and KD to clarify which approach may be more advantageous for people looking to lose weight. Such findings can enhance patients' quality of life by providing information to health professionals to educate individuals.

2. MATERIALS AND METHODS

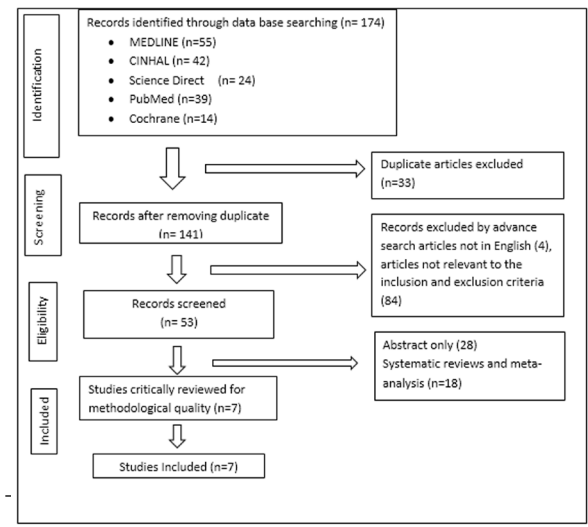
The research design selected for this study was a systematic review, deemed most appropriate by Kang (2015) as systematic reviews collect all possible studies and analyze their results. The process involved five distinct steps: formulating a specific research question, conducting a comprehensive literature search, critically assessing the quality of identified studies, synthesizing gathered data, and interpreting resultant findings (Khalid et al., 2003). The Population Intervention Comparison Outcome (PICO) approach (Bramer et al., 2017) was employed to refine the research question, yielding: “What is the efficacy of IF (intervention), relative to the KD (comparison), in reducing weight (outcome) among adults dealing with obesity (population)?”

Various health-focused bibliographic databases were utilized, encompassing MEDLINE, CINAHL, Science Direct, PubMed, and Cochrane. The refined search criteria consisted of combining search terms such as (Ketogenic OR keto diets OR low-carb diet) AND (intermittent fasting OR time-restricted fasting OR intermittent energy restriction) AND (weight reduction OR weight loss OR obesity OR Body Mass Index).

The present review incorporated articles published in English from 2017 to 2023, focusing on studies comparing the efficacy of KD or IF with other dietary approaches. Inclusion criteria encompassed studies involving human participants and reporting Body Mass Index (BMI) or body weight outcomes assessing KD or IF. Excluded were systematic reviews, duplicate articles, and abstract-only articles. After an initial evaluation of the 174 selected articles, further refinement occurred based on methodological quality and research findings. Subsequent removal of irrelevant articles led to the finalization of seven research papers for the systematic review, facilitated by adherence to the PRISMA flow chart (Figure 1).

Figure 1

Prisma Flow Chart



The Critical Appraisal Skills Programme (CASP) tool was employed to comprehensively and reliably synthesize available data regarding the effectiveness of IF in comparison to KD. As stated by Long et al. (2020) the CASP tool is widely used for quality appraisal in health-related evidence syntheses.

3. RESULTS AND DISCUSSION

As a result of the qualitative thematic analysis of the seven chosen studies, the culmination of findings leads to the observation that both diets yield favourable outcomes in terms of weight reduction in adults. Nonetheless, IF emerges as a promising dietary approach, particularly when compared with the KD. The analysis has derived two central themes that run across the articles: the first theme is ‘Carbohydrate out, weight down’, which highlights the impact of reducing carbohydrates on weight loss; the second theme is ‘The fast lane to health’, which emphasizes the potential health benefits of intermittent fasting.

Each study underwent meticulous scrutiny, encompassing aspects such as study design, sample size, sample characteristics, inclusion criteria, exclusion criteria, data analysis, and principal findings of each study (Table 1).

Table 1: The Brief of the Selected Articles

Authors and Year	Name of the Article	Method & Sample Size(N)	Result
Cai et al. (2019)	Effects of alternate day fasting on body weight and dyslipidaemia in patients with non-alcoholic fatty liver disease: a randomised controlled trial. China	RCT N=271	A significant decrease in body weight ($P < 0.001$) among participants in both the Alternate-Day Fasting (ADF) and Time-Restricted Feeding (TRF) groups, with the ADF group experiencing a reduction of 4.56 ± 0.41 kg ($6.1 \pm 0.5\%$) and the TRF group experiencing a reduction of 3.62 ± 0.65 kg ($4.83 \pm 0.9\%$) compared to the control group. Both groups experienced further decreases in body weight after 12 weeks (ADF: -4.04 ± 0.54 kg, $5.4 \pm 0.7\%$; TRF: -3.25 ± 0.67 kg, $4.3 \pm 0.9\%$). In addition, fat mass also reduced significantly in both the ADF (-3.49 ± 0.37 kg; $11 \pm 1.2\%$) and TRF (-2.91 ± 0.41 kg; $9.6 \pm 1.3\%$) groups, with the ADF group showing a further reduction in fat mass after 12 weeks (-3.48 ± 0.38 kg; $11 \pm 1.2\%$).
Zhang et al. (2022)	Randomized controlled trial for time-restricted eating in overweight and obese young adults China	RCT N=60	A noticeable trend towards a greater reduction in body weight in the 6-hour early Time-Restricted Eating (eTRE) group (4.6% [95%CI: 5.5 to 3.8]) when compared to the 6-hour late Time-Restricted Eating (lTRE) group (3.7% [95%CI: 4.6 to 2.9]).
Schreck et al. (2021)	Feasibility and Biological Activity of a Ketogenic/ Intermittent-Fasting Diet in Patients with Glioma United Kingdom	Single-arm phase II trials N=25	An average weight loss of 4.8 kg among patients ($p < 0.0001$), with a significant reduction in total BMI from 26.2 ± 5.6 to 25.4 ± 5.4 kg/m ² ($p < 0.0001$).
Moriconi et al. (2021)	A very-low-calorie ketogenic diet is a safe and valuable tool for long-term glycemic management in patients with obesity and type 2 diabetes. Italy	Retrospective study N=30	VLCKD group experienced a significant weight loss of 3kg at both 3 and 12 months. In contrast, the low-calorie diet (LCD) group showed an insignificant change in weight.
Goday et al. (2016)	Short-term safety, tolerability and efficacy of a very low-calorie ketogenic diet: interventional weight loss program versus hypocaloric diet in patients with type 2 diabetes mellitus Spain	multi-centric randomized clinical trial N=89	over 85% of the subjects in the KD group achieved a weight loss of more than 10% relative to their starting weight. Moreover, the weight loss and reduction in waist circumference observed in the KD group were significantly greater than those seen in the control group (with P-values less than 0.001).
Johari et al. (2019)	The Effectiveness and Adherence of Modified Alternate-day Calorie Restriction in Improving Activity of Non-Alcoholic Fatty Liver Disease Malaysia	RCT N=43	A notable reduction in weight and Body Mass Index (BMI) in the Moderate Alternate-Day Fasting (MACR) group compared to the control group, with P values of 0.001 and 0.02, respectively.

Hussain et al. (2012)	Effect of low-calorie versus low-carbohydrate ketogenic diet in type 2 diabetes	Kuwait	RCT N=102	LCKD group experienced a significant weight change, with a decrease from 104.01 ± 18.89 to 91.56 ± 17.45 kg. In contrast, the LCD group had a decrease in weight from 95.71 ± 9.56 to 89.02 ± 5.97 kg, which was not significant. However, there was no significant difference observed in the BMI values between the two groups, with the LCKD group showing a decrease from 36.31 ± 2.63 to 33.87 ± 2.75 kg/m ² , and the LCD group showing a decrease from 39.84 ± 6.40 to 35.05 ± 5.90 kg/m ² .
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BMI: Body Mass Index, RCT: Randomized Controlled Trial, ADF: Alternate Day Fasting, TRF: Time-Restricted Feeding, MACR: Modified Alternate-Day Calorie Restriction, KD: Ketogenic Diet, 6-h eTRE: 6 hours early Time-Restricted Eating (TRE), 6-h lTRE: 6 hours late Time-Restricted Eating (TRE); LCKD: low-calorie ketogenic diet, LCD: low-calorie diet, VLCKD: Very-Low-Calorie Ketogenic Diet

The findings highlighted that adopting KD can aid in weight loss by promoting the body's natural fat-burning processes, achieved through restricting carbohydrates (Hussain et al., 2012; Moriconi et al., 2021; Goday et al., 2016; Schreck et al., 2021). KD can be delicious and satisfying, dispelling the myth that healthy eating has to be tasteless and unsatisfying. Patients who followed the KD demonstrated greater satisfaction, attributed to rapid weight loss, reduced hunger sensation, and an overall sense of well-being during ketosis (Moriconi et al., 2021). Further KD has proven to be a successful weight loss method that offers additional benefits, such as enhanced blood sugar management, reduced inflammation, and decreased risk of heart disease and diabetes (Chawla et al., 2020). Moreover, Moriconi et al. (2021) found no unfavourable reactions among the KD group in the use of meal replacements.

Conversely, KD has been associated with several

adverse effects leading to reduced bowel movements and constipation due to high-fat and low-carbohydrate diets (Gibson et al., 2020), experiencing more fatigue and headache, increasing levels of LDL cholesterol in some individuals (Goday et al., 2016; Schreck et al., 2021). However with careful consideration given to meal planning and recipe selection, in conjunction with guidance from medical professionals, KD can be a satisfying and even indulgent experience (Hussain et al., 2012; Goday et al., 2016).

In contrast, IF has gained popularity as a weight loss approach and has become increasingly popular in the past decade (Schreck et al., 2021; Zhang et al., 2022; Cai et al., 2019; Johari et al., 2019). IF is a common dietary tactic for achieving a range of health benefits, such as weight loss, better metabolic health, and increased lifespan (Mattson et al., 2017). All the evidence suggests that IF has the potential to be a powerful tool for improving health and wellbeing (Cabo & Mattson, 2019). According to Cai et al. (2019), IF can be an effective weight-loss tool for those who have struggled with traditional calorie-restriction diets to lose weight. While IF can be beneficial for many adults, it may not be appropriate for pregnant or breastfeeding mothers (Alkhalefah et al., 2022). Further IF may trigger disordered eating patterns or aggravate an existing eating disorder (Cuccolo et al., 2022). Golden et al., (2015) identified that fasting may cause nutrient deficiencies. Contrariwise Zhang et al. (2022) observed no serious adverse events in both intervention groups throughout the trial relative to the control group of IF. Nevertheless, several mild adverse events, such as dizziness, headache, increased thirst, diarrhoea, nausea and vomiting occurred at the beginning of IF and then disappeared when participants adapted to the diet (Cai et al., 2019; Johari et al., 2019).

4. CONCLUSION

Intermittent Fasting emerges as a promising

dietary avenue for weight reduction, particularly when compared with the Ketogenic Diet. IF proves effective in achieving weight loss without encountering the potential adverse effects linked to KD, such as the risk of nutrient deficiencies. Notably, IF's simplicity, encompassing meals skipping rather than specific food choices, contributes to its ease of adoption. Hence, IF presents itself as a favourable dietary strategy for those aiming to shed weight securely and sustainably. However, it remains essential to acknowledge that the efficacy of any dietary regimen relies on individual adherence and the establishment of a caloric deficit. While IF demonstrates efficacy in weight loss, a cautious approach under the guidance of healthcare professionals is prudent. Further research is warranted to explore their suitability within diverse cultural contexts, along with assessing potential advantages and risks for adults in weight reduction.

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