

Comparative Effects of Mediterranean Diet and Ketogenic Diet on Weight Management in Overweight and Obese Adults: A Systematic Umbrella Review

Chenxuan Hu

*YK Pao School, Shanghai, China
Selina.hu1107@outlook.com*

Abstract. Obesity is a global health crisis, and dietary interventions such as the Mediterranean diet (MD) and ketogenic diet (KD) are widely used for weight management. This umbrella review systematically assessed and compared the effects of MD and KD on weight loss, BMI, and waist circumference in overweight and obese adults. A literature search across PubMed, ScienceDirect, and Google Scholar (2015–2026) identified six eligible studies, including systematic reviews, meta-analyses, cohort studies, and RCTs, with quality assessed using AMSTAR 1, Newcastle-Ottawa Scale, and Cochrane RoB2. Results indicated that KD induced significantly faster initial weight loss, with reductions of up to 10 kg within four weeks and a 5% body weight loss achieved within one month, alongside BMI reductions of 2.4–5.6 kg/m². In contrast, MD produced slower but progressive weight loss, reaching approximately 7.68% over three months and BMI reductions of about 2.6 kg/m² over four months. Importantly, MD demonstrated superior long-term weight maintenance over nearly five years of follow-up, while KD was associated with weight regain after dietary cessation. Both dietary approaches are effective for weight reduction, but KD excels in rapid short-term outcomes that may boost patient adherence, whereas MD offers better sustainability and cardiovascular benefits. Therefore, clinical recommendations should be individualized based on patients' health status, metabolic goals, and personal preferences, with healthcare providers weighing the trade-offs between rapid results and long-term maintenance when prescribing these diets for obesity management.

Keywords: Diet, Obesity, Overweight, Weight loss, Weight management

1. Introduction

Obesity, characterized by an abnormal accumulation of fat that results in health complications, including associated chronic conditions, such as diabetes, heart disease, metabolic disorders, and cancer, increases morbidity and mortality risk globally [1, 2]. According to the World Health Organization, by 2025, 39% of adults aged 18 years or older are projected to be classified as overweight (BMI ≥ 25 kg/m²), while 13% of the global population is expected to be considered obese (BMI ≥ 30 kg/m²) [3]. Consequently, effective weight management is a critical aspect of obesity or overweight treatment and intervention, and nutrition therapy can be a way of weight management.

In recent decades, some articles have illustrated that dietary patterns like intermittent fasting and the ketogenic diet - a high fat and moderate-level protein, but low-carbohydrate dietary plan, which the carbohydrate intake is usually less than 50g/day [4]. According to the article [5] ketogenic diet has a rapid initial weight loss, as users are expected to reduce 4.5kg of body weight in the first two weeks after the diet has started. The article further demonstrates the effectiveness of ketogenic diet on weight loss by discussing 12 randomized controlled trials for the last 10 years until March 2025. These trials present a higher decrease in obesity compared with other diets. This comparison is displayed in the reduce of weight in kilogram with the same types of people in a same time. Therefore, ketogenic diet is an effective way in reducing body weight.

On the other hand, Mediterranean diet, which contains rich fruits, vegetable, whole grains, and healthy fats, provides a method for weight reduction and improvements on cardiovascular disease. According to the article written by [6] a random controlled trail for demonstrating the effectiveness of Mediterranean diet on weight loss with 54 males, 137 females in December 2021 to May 2022 have displayed a $7.68 \pm 2.52\%$ percentage of weight loss after three months of applying the diet. The subjects also have a high waste reduction of 6.98 ± 3.59 cm. Hence, Mediterranean diet has a huge impact on weight loss.

This systematic review aims to assess and contrast the impacts of the Mediterranean diet and the ketogenic diet on obesity management among overweight and obese individuals. It will specifically focus on weight loss indicators, including changes in Body Mass Index (BMI), weight loss, and waist circumference. By existing research on these two dietary patterns, this review seeks to explore the potential of the Mediterranean diet and ketogenic diet for weight loss and to identify safe and healthy methods for weight reduction through both dietary approaches. Ultimately, the review aims to provide recommendations for healthcare providers and individuals regarding the selection of suitable dietary plans for effective obesity control.

2. Methodology

2.1. Review design

The umbrella review approach is used for this literature review to evaluate on the effectiveness of Mediterranean diet a ketogenic direct on weight loss outcomes on obese adults. Umbrella review is particularly suitable as it can include both primary and secondary evidence, such as both systematic review and meta-analysis [7]. With the synthesis of multiple published articles, the approach ensures an effective and clinical relevance evaluation on the two dietary interventions.

2.2. Search strategy

The search for relevant entries was conducted in electronic databases: PubMed, ScienceDirect, and Google Scholar. The articles researched are restrained between January 1, 2015, to July 17, 2026, ensuring recent information about dietary intervention of obesity is incorporated in the review.

The search strategy uses Boolean operator ("And" "Or") to combine keywords related to dietary intervention, weight related outcomes, and population characteristics. These keywords include: 'Mediterranean diet', 'Ketogenic diet', 'fat', 'obesity', 'adult', 'overweight', 'weight loss', 'weight management'.

2.3. Inclusion and exclusion criteria

In this review, the PICOS framework is used when research, defining follows:

"P" (Population): refers to the inclusion of studies or reviews focusing on individuals aged 18 and above, encompassing both genders, with an overweight proxy defined by $BMI \geq 25 \text{ Kg/m}^2$. Studies or reviews that include individuals with major medical conditions that could influence weight outcomes is excluded.

'I' (Intervention): denotes the inclusion of studies or reviews that has implementations of either Mediterranean Diet or ketogenic diet.

'C' (Comparison): indicates that studies or reviews that involves the comparison of weight loss between Mediterranean diet and ketogenic diet and comparison of either Mediterranean and Ketogenic diet with other dietary intervention is also included.

'O' (Outcome): The primary outcome focus is on the Body Mass Index (with a BMI of $\geq 25 \text{ Kg/m}^2$ defined as obesity). Secondary outcomes could include body fat percentage and waist circumference.

"S" (Study Design): As a umbrella review, the essay will include both primary and secondary data such as cohort study, randomized controlled trials (RCTs), systematic review and meta-analysis.

Additionally, to ensure consistency in language interpretation, only studies published in English were included. All articles that do not correspond to the inclusion criteria are excluded.

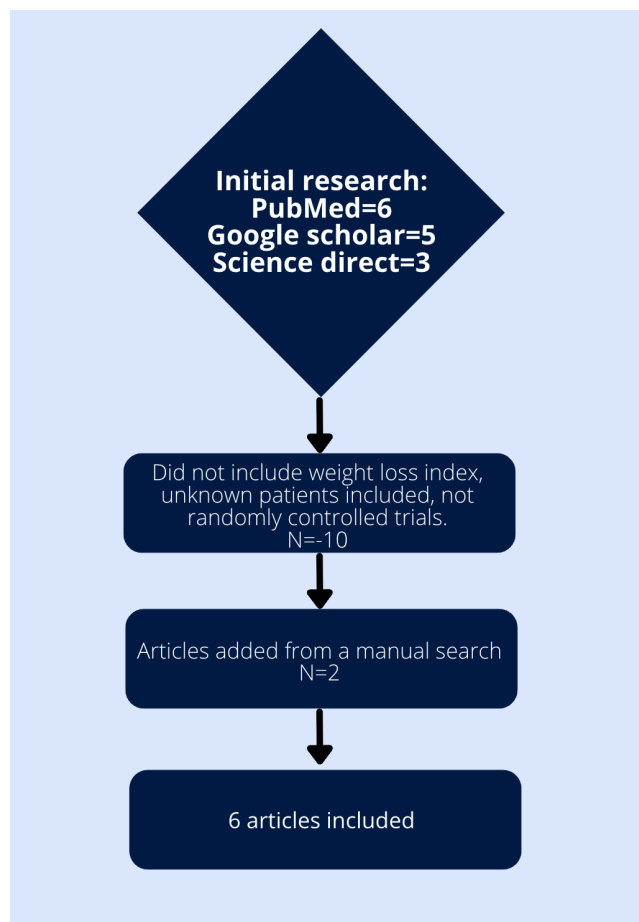


Figure 1. Flow chart of literature research and study selection process

2.4. Quality assessment

AMSTAR 1 index is used to evaluate the chosen meta-analysis and systematic review articles. This index provides a pragmatic total score of an article out of 11 fast speeds, making the evaluation process feasible and reliable [8]. On the other hand, cohort studies are evaluated using Newcastle-Ottawa Scale (NOS). This is an effective mean ranking each study with a maximum 9 point in three domains: selection of study group, comparability of groups, and ascertainment of exposure and outcomes [9]. Moreover, randomized controlled trails are assessed using Cochrane risk of bias 2 (RoB2). This method evaluates the risk of bias raised from 5 domains in the trial: randomization, deviation from intended interventions, missing data, outcome measurement and selection of reported results [10].

The quality assessment was initially based on the criterion given for each method, accepting articles that achieve AMSTAR 1 score of $\geq 8/11$, a NOS score $\geq 7/9$, and an overall low risk in RoB2. Articles achieving these scores and rates are considered methodologically and comprehensively reliable for the final synthesis.

3. Results

3.1. Characteristics of included articles

The evaluation of articles' quality was made by Chenxuan Hu according to AMSTAR 1 Index for systematic review articles (as shown in table 1) and cohort studies are included according to the Ottawa Scale (as shown in table 2).

Table 1. AMSTAR 1 Index score for systematic review and meta-analysis

AMSTAR-1 ("Yes" awards 1 point, "No" awards 0)	Castellana, M. et al. [11]	López-Espinoza, M.Á. et al. [12]	Mancini, Joseph G., et al. [13]
Was an 'a priori' design provided?	Yes	No	Yes
Was there duplicate study selection and data extraction?	Yes	Yes	No
Was a comprehensive literature search performed?	Yes	Yes	Yes
Was the status of publication used as an inclusion criterion?	Yes	No	Yes
Was a list of included and excluded studies provided?	No	No	No
Were the characteristic of included studies provided?	Yes	Yes	Yes
Was scientific quality of included studies assessed and documented?	Yes	Yes	Yes
Was the scientific quality of included studies used appropriately in formulating conclusion?	Yes	Yes	Yes

Table 1. (continued)

Were the methods used to combine the findings of studies appropriate?	Yes	Yes	Yes
Was the like hood of publication bias assessed?	Yes	Yes	No
Was the conflict of interest stated?	Yes	Yes	Yes
Total score out of 11	10/11	8/11	8/11

Table 2. Newcastle-Ottawa score for cohort studies

Newcastle-Ottawa Scale ("Yes" awards 1 point, "No" awards 0)	Di Rosa, C. et al. [6]	Paone, C. et al. [14]
Is there representativeness of exposed cohort?	Yes	Yes
Is there a selection of non-exposed cohort?	Yes	Yes
Is there ascertainment of exposure?	Yes	Yes
Is there comparability of cases and controls on the basis of the design?	Yes	No
Is there comparability of cases and controls on the basis of the analysis?	Yes	Yes
Is there assessment of outcomes?	Yes	Yes
Is follow-up long enough for outcomes to occur?	Yes	Yes
Is there an adequacy of follow up of cohorts?	Yes	Yes
Total score out of 9	9/9	8/9

Table 3. Cochrane risk of bias 2 evaluation on Estruch, Ramon, et al. [2]

Cochrane risk of bias 2	Result	Evidence
Bias arising from randomization process	Low risk	Use computer generated sequence to ensure randomization and used sensitivity analysis to exclude non-randomized participants to show a similar outcome between groups
Bias due to deviations from intended interventions	Low risk	The study uses objective bio marks to corroborate t a good compliance for participants in flowing the diet
Bias due to missing data	Low risk	The study used multiple imputations for missing dates, increasing the reliability of the overall results
Bias in measurement of outcome	Low risk	The measurements are done my trained personnel using precise equipment.
Bias in selection of reported results	Low risk	The outcome reported are from PREDIMED trial and have public registration.

Table 4. Characteristics for the articles included

Study	Design	Population(individuals)	Dietary intervention discussed	Duration	Outcome measurement
Castellana, M.et al.	Systematic review and meta-analysis	801	Very low-calorie ketogenic diet	From 3 weeks to 2 years	BMI and waist circumference
López-Espinoza, M.Á. et al.	Systematic review and meta-analysis	943	Very low-calorie ketogenic diet	From 4 weeks to 2 years	BMI
Estruch, Ramon, et al.	Randomized controlled clinical trial	7447	Mediterranean diet	4.8 years	Waist circumference
Mancini, Joseph G., et al.	Systematic review	998	Mediterranean diet	12-48 months	BMI, Body fat and waist circumference
Di Rosa, C. et al.	Cohort study	268	Mediterranean diet and Ketogenic diet	1-3 months	BMI and waist circumference
Paone, C. et al.	Cohort study	60	Mediterranean diet and Ketogenic diet	4 months	BMI and waist circumference

3.2. Changes in body weight

Among the investigation, both Mediterranean diet and Ketogenic diet contributes to a weight lost among the obese individuals. However, the speeded of weight loss differed drastically between the two different diets.

In the study reported from Paone, C. et al. [14], after 4 months of cohort study, there is a weight loss of $15.4 \pm 5.3\text{kg}$ for Ketogenic diet, but a $5.7 \pm 4.0\text{ kg}$ for Mediterranean diet over the same period. Similarly, the faster speed in weight reduction for ketogenic diet is also presented in comparison of study from Castellana, M.et al. [11] and Mancini, Joseph G., et al. [13]). In Castellana, M.et al. 's review article there is a 10kg weight loss for 4 weeks of Ketogenic dietary period. There is an increase in weight loss or possible weight maintenance in the 2 years follow up period. On the contrary, in Mancini, Joseph G., et al. review's investigation of Mediterranean diet, it only reaches a weight loss of 10.1kg at 12 months. Therefore, Mediterranean diet has a lower weight loss rate compared to Ketogenic diet in short-medium term of dietary approach.

Nevertheless, Mediterranean diet demonstrates a great effect in weight maintenance. According to the randomized controlled clinical trial by Estruch, Ramon, et al., after a follow of 4.8 years without a calorie restriction diet, participants did not promote weight gain and even experienced a marginal weight reduction. Conversely, participants following Ketogenic diet often gain a small amount of weight after reintroducing food and relieving the dietary restriction [2].

3.3. Changes in body mass index (BMI)

In the cohort study by Di Rosa, C. et al. [6], participants with the Ketogenic diet reached a 5% body weight loss goal which has a reduction on 2.4 to 2.5 kg/m^2 with in 1 month, while participants with Mediterranean diet took more than 3 months to reach the same goal.

This relatively rapid reduction in BMI between Ketogenic and Mediterranean diet is further justified through the cohort study from Paone, C. et al. [14]. In this study, there is a significantly more reduction in BMI for participants taking Ketogenetic diet, which has a BMI reduction of $5.6 \pm 2.4\text{ kg/m}^2$, than the one taking Mediterranean diet, which has a BMI reduction of $2.6 \pm 3.0\text{ kg/m}^2$. This also change the percentage of individuals in severe obese status. In the Ketogenetic diet group, there is a decrease in severe obese individuals from 30% to 7%. One the other hand, there is a relatively less decrease in severe obese individuals taking the Mediterranean diet from 40% to 33%.

4. Limitation

There are several limitations relating these articles, which is limited duration. Most of the duration measured for this relation are from 3 weeks to 4 months. Since 4-months can only show a medium-term effect, it is not sufficient to determine the result's long-term sustainability. Also, for article [1] only 60 patients are included. With this small sample, it is harder to detect the small effect, making the results more subject to random variations. In addition, most of the studies are from Europe mostly Italy, so further research should include outside Europe. Further research should be focused on accessing studies with a larger sample size and with a longer duration.

5. Conclusion

The studies reviewed indicate that both Mediterranean and Ketogenic diet are effective in weight loss, with a reduction in weight and BMI, although they differ markedly in their timelines and long-term weight maintenance [4, 2]. Ketogenic diet clearly excels in swift weight loss; research indicates that it allows individuals to lose 5% of their body weight within one month, while the Mediterranean diet often takes three months to attain the same outcome [2]. The quick results associated with the Ketogenic diet may boost patient motivation and lower the likelihood of abandoning the dietary protocol. Nonetheless, it is crucial to recognize that Ketogenic diet requires rigorous medical oversight due to the possibility of immediate side effects and contraindications, and its sustainability over the long term is limited [10]. On the other hand, in terms of weight management after the dietary practice, participants who took Mediterranean diet shows a consistent weight maintenance with no calorie restriction diet [15], while participants practicing Ketogenic diet experienced a slightly weight gain [3]. Hence, with the current available information, it is not yet appropriate to recommend one dietary approach as universally superior for dietary control. For healthcare providers it is crucial to decide a diet for a patient based on their individualized health status and dietary preferences.

References

- [1] Ahmed, A., & Mohammed, M. (2025). Obesity: Prevalence, causes, consequences, management, preventive strategies and future research directions. *[Journal Name]*.
<https://www.sciencedirect.com/science/article/pii/S2589936825000313>

- [2] Estruch, R., & Ros, E. (2020). The role of the Mediterranean diet on weight loss and obesity-related diseases. *Reviews in Endocrine & Metabolic Disorders*, 21(3), 315-327. <https://doi.org/10.1007/s11154-020-09579-0>
- [3] World Health Organization. (2025). Obesity and overweight. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
- [4] Zhou, C., et al. (2022). Ketogenic diet benefits to weight loss, glycemic control, and lipid profiles in overweight patients with type 2 diabetes mellitus: A meta-analysis of randomized controlled trials. *International Journal of Environmental Research and Public Health*, 19(16), 10429. <https://doi.org/10.3390/ijerph191610429>
- [5] Dyńska, D., et al. (2025). Ketogenic diets for body weight loss: A comparison with other diets. *Nutrients*, 17(6), 965. <https://www.mdpi.com/2072-6643/17/6/965>
- [6] Di Rosa, C., et al. (2022). Mediterranean diet versus very low-calorie ketogenic diet: Effects of reaching 5% body weight loss on body composition in subjects with overweight and with obesity—A cohort study. *International Journal of Environmental Research and Public Health*, 19(20), 13040. <https://doi.org/10.3390/ijerph192013040>
- [7] Choi, G. J., & Kang, H. (2022, April 1). The umbrella review: A useful strategy in the rain of evidence. *The Korean Journal of Pain*, 35(2), 127–128. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8977198/>, 10.3344/kjp.2022.35.2.127
- [8] Shea, B. J., et al. (2009, October). Amstar is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. *Journal of Clinical Epidemiology*, 62(10), 1013–1020. 10.1016/j.jclinepi.2008.10.009
- [9] Lo, C. K.-L., et al. (2014, April 1). Newcastle-Ottawa scale: Comparing reviewers' to authors' assessments. *BMC Medical Research Methodology*, 14(1). https://pmc.ncbi.nlm.nih.gov/articles/pmc4021422/?utm_source=chatgpt.com, 10.1186/1471-2288-14-45
- [10] Sterne, J. A. C., et al. (2019, August 28). RoB 2: A revised tool for assessing risk of bias in randomised trials. *BMJ*, 366(1), 14898. 10.1136/bmj.14898
- [11] Castellana, M., et al. (2019). Efficacy and safety of very low-calorie ketogenic diet (VLCKD) in patients with overweight and obesity: A systematic review and meta-analysis. *Reviews in Endocrine and Metabolic Disorders*, 21, 5–16. <https://doi.org/10.1007/s11154-019-09514-y>
- [12] López-Espinoza, M. Á., et al. (2021). Effect of a ketogenic diet on the nutritional parameters of obese patients: A systematic review and meta-analysis. *Nutrients*, 13(9), 2946. <https://doi.org/10.3390/nu13092946>
- [13] Mancini, J. G., et al. (2016, April). Systematic review of the Mediterranean diet for long-term weight loss. *The American Journal of Medicine*, 129(4), 407–415.e4. <https://doi.org/10.1016/j.amjmed.2015.11.028>
- [14] Paone, C., et al. (2022). Efficacy and tolerability of the ketogenic diet compared to the Mediterranean diet in a cohort of overweight/obese patients: Effects on anthropometric and metabolic parameters. *Zenodo (CERN European Organization for Nuclear Research)* [Preprint]. <https://doi.org/10.5281/zenodo.6599264>
- [15] Estruch, R., et al. (2019, April 16). Effect of a high-fat Mediterranean diet on bodyweight and waist circumference: A prespecified secondary outcomes analysis of the Predimed randomised controlled trial. *The Lancet Diabetes & Endocrinology*, 7(5), e6–e17. https://www.sciencedirect.com/science/article/abs/pii/S2213858719300749?utm_source=chatgpt.com, 10.1016/S2213-8587(19)30074-9. Accessed 24 July 2026.