

Ketogenic Diet Effect on Weight Loss and Lipids in Obesity

I Gusti Ayu Indira Pratiwi¹, Agustinus I Wayan Harimawan²

¹Faculty of Medicine, Udayana University, Bali, Indonesia

²Department of Clinical Nutrition, Faculty of Medicine, Udayana University/Ngoerah Hospital, Denpasar, Bali, Indonesia

Corresponding Author: I Gusti Ayu Indira Pratiwi

DOI: <https://doi.org/10.52403/ijrr.20260333>

ABSTRACT

Obesity is a major global health problem associated with increased risk of metabolic and cardiovascular diseases. The ketogenic diet, characterized by very low carbohydrate and high fat intake, has gained attention as a dietary strategy for weight management and metabolic improvement. This systematic review evaluates its effects on body weight and lipid profiles across diverse populations. A comprehensive search of PubMed, ScienceDirect, Google Scholar, and the Cochrane Library identified eight eligible studies involving obese adults, patients with type 2 diabetes, and overweight children and adolescents, with intervention durations ranging from 4 weeks to 2 years. The findings consistently showed significant weight loss, ranging from 1.5 kg to 14.2 kg, depending on study duration and population characteristics. Changes in lipid profiles were variable: most studies reported increased low-density lipoprotein levels, raising potential cardiovascular concerns, while high-density lipoprotein levels generally increased and triglyceride levels decreased, indicating certain cardiometabolic benefits. These effects may be explained by ketosis-induced changes in fat oxidation, insulin regulation, and lipid metabolism. In conclusion, the ketogenic diet appears effective for short-term weight loss; however, its long-term safety,

particularly regarding lipid profile alterations, requires further investigation and careful monitoring.

Keywords: ketogenic diet, weight loss, lipid profile, obesity, cardiovascular risk

INTRODUCTION

Obesity is one of the most urgent public health challenges of the 21st century. Its prevalence has increased dramatically over recent decades, making it a major contributor to global morbidity and mortality [1]. According to the World Health Organization, in 2016 more than 39% of the global adult population was overweight and approximately 13% were classified as obese [2]. Obesity significantly increases the risk of chronic diseases such as type 2 diabetes, hypertension, and coronary heart disease, while also reducing quality of life and imposing substantial economic burdens [3,4]. These trends highlight the urgent need for effective and safe long-term weight management strategies.

The ketogenic diet, originally developed in the 1920s as a therapeutic intervention for epilepsy, has recently gained widespread attention as a potential strategy for obesity management [5]. This diet is characterized by high fat intake (70–75% of total daily calories), very low carbohydrate intake (5–10%), and moderate protein consumption

(15–20%), aiming to induce ketosis. In this metabolic state, the body utilizes fatty acids as the primary energy source through hepatic ketone production, replacing glucose derived from carbohydrates [6]. Previous studies have demonstrated significant weight loss outcomes associated with ketogenic diets. For example, Hallberg et al. (2018) reported an average weight reduction of 14% after one year of adherence [7]. Additionally, improvements in fasting insulin levels and insulin sensitivity have been observed, suggesting potential benefits for individuals with insulin resistance or type 2 diabetes [8].

Despite these promising findings, the ketogenic diet remains controversial, particularly regarding its effects on lipid profiles. Several studies report increases in high-density lipoprotein (HDL) levels, considered protective against cardiovascular disease, but also note elevations in low-density lipoprotein (LDL) and total cholesterol, which may increase cardiovascular risk [9]. These conflicting findings raise concerns about the long-term safety of ketogenic diets, especially among individuals with pre-existing cardiovascular risk factors [10].

While numerous studies have examined the effects of ketogenic diets on weight loss, evidence regarding their impact on lipid profiles remains inconsistent. Some research highlights cardiometabolic benefits, whereas others emphasize potential risks associated with elevated LDL levels. Furthermore, variations in study populations, intervention durations, and dietary compositions limit the generalizability of findings. Existing reviews often focus on specific populations, such as patients with type 2 diabetes, rather than providing a comprehensive synthesis across diverse groups. This review positions itself as a critical synthesis that both supports evidence of weight loss benefits and examines ongoing debates regarding lipid profile changes and long-term safety.

This systematic review offers a comprehensive evaluation of the ketogenic diet's effects on both weight loss and lipid

profiles across diverse populations, including obese adults, individuals with type 2 diabetes, and overweight children and adolescents. By integrating findings from studies with varying durations and participant characteristics, this review aims to clarify the balance between benefits and potential risks. The objective of this study is to critically assess the effectiveness and safety of the ketogenic diet for obesity management, with particular emphasis on long-term lipid profile changes and cardiovascular risk implications

MATERIALS & METHODS

This systematic review was conducted following the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) guidelines to ensure methodological rigor and transparency. The review aimed to synthesize evidence on the effects of the ketogenic diet on weight loss and lipid profiles in obese patients. Eligible studies included randomized controlled trials, cohort studies, and case-control studies published in English between 2013 and 2023, involving participants with obesity (BMI ≥ 30 kg/m²). Studies were required to evaluate a ketogenic diet for at least four weeks and report outcomes on body weight and lipid parameters (total cholesterol, LDL, HDL, and triglycerides). Studies involving severe comorbidities, descriptive designs without control groups, reviews, editorials, conference abstracts, or those lacking quantitative data were excluded.

A systematic search was performed in PubMed, ScienceDirect, Google Scholar, and the Cochrane Library using combinations of keywords such as “ketogenic diet,” “obesity,” “weight loss,” and “lipid profile,” with database-specific indexing terms applied where appropriate. Retrieved records were managed using reference software, and duplicates were removed automatically and manually. Two independent reviewers screened titles, abstracts, and full texts based on predefined criteria, with disagreements resolved

through discussion or consultation with a third reviewer. Data extraction was conducted using a standardized form to collect study characteristics, population details, intervention duration and composition, outcomes, and methodological quality indicators.

Study quality was assessed using the Cochrane Risk of Bias Tool for randomized trials and the Newcastle–Ottawa Scale for non-randomized studies. Data were synthesized narratively due to heterogeneity in study designs and outcomes. Where

comparable quantitative data were available, meta-analysis was performed using fixed- or random-effects models based on heterogeneity assessed with the I^2 statistic. Subgroup analyses were conducted, when possible, to explore the influence of intervention duration, dietary composition, and population characteristics. Results were reported in tables and figures, including a PRISMA flow diagram and forest plots where applicable, with interpretation focusing on the strength, limitations, and clinical implications of the evidence.

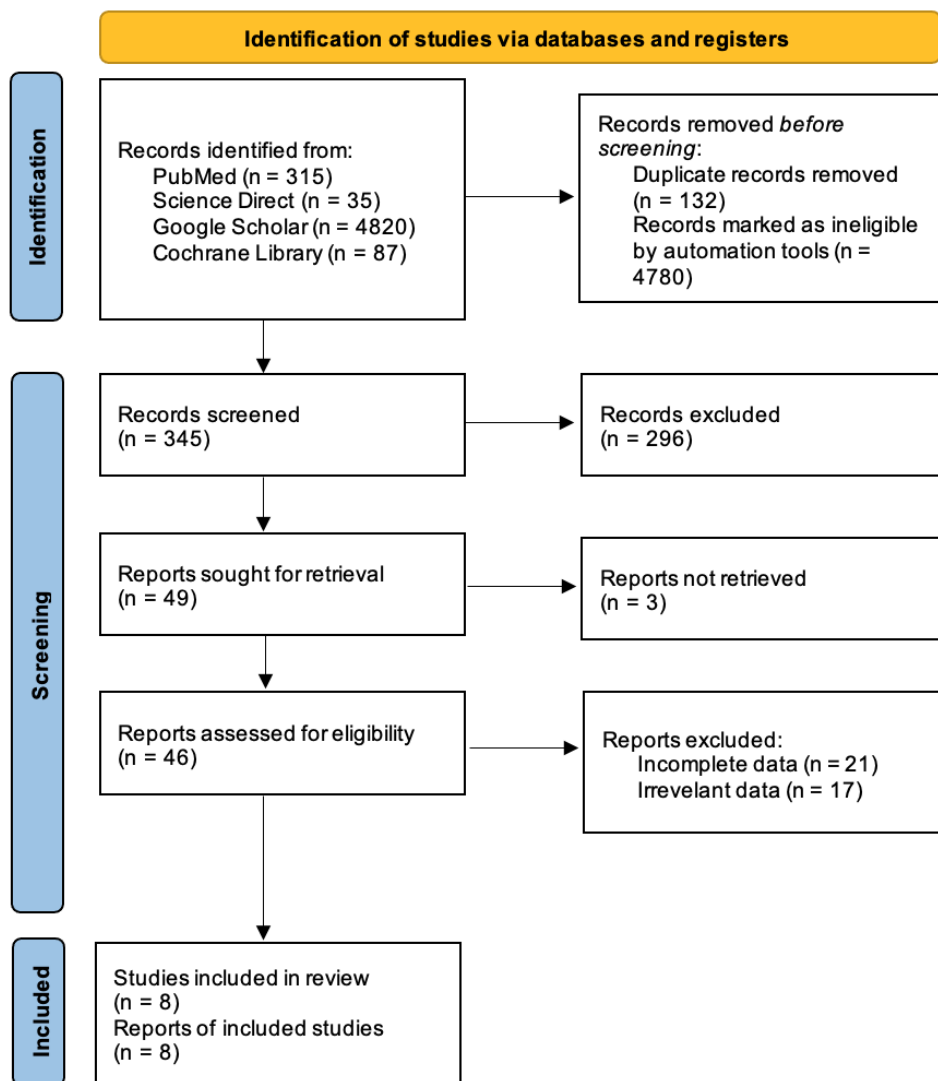


Figure 1. PRISMA Flowchart

RESULT AND DISCUSSION

This systematic review aimed to comprehensively evaluate the effects of the ketogenic diet on weight loss and lipid profiles across diverse populations,

including individuals with obesity, type 2 diabetes mellitus, and obese children and adolescents. The ketogenic diet has increasingly been explored as a therapeutic dietary strategy for metabolic disorders and

weight management [6,11]. Findings from the eight included studies demonstrate that the ketogenic diet consistently produces significant weight reduction. However, lipid profile changes were heterogeneous, particularly the consistent elevation in low-density lipoprotein (LDL) levels, which raises concerns regarding long-term cardiovascular risk [12,13]. In addition, this discussion highlights the metabolic implications of ketogenic diets that may influence lipid metabolism, insulin regulation, and cardiometabolic risk factors [7,10].

A total of 5,257 articles were identified through the initial search of PubMed, ScienceDirect, Google Scholar, and the Cochrane Library. After duplicate removal, 345 records remained for title and abstract screening, of which 49 articles were assessed for full-text eligibility. Following full-text review and exclusion based on predefined criteria—such as low methodological quality, inadequate follow-up duration, or inappropriate populations—eight studies published between 2013 and 2023 were included in this systematic review.

Table 2. Characteristics of Studies Included in the Systematic Review

Study	Population	Intervention	Duration	Main Outcomes
Li et al. (2022)	60 newly diagnosed T2DM patients with obesity	Ketogenic diet vs. standard diabetic diet	12 weeks	Significant weight loss and lipid profile improvement; increased uric acid in KD group
Burén et al. (2021)	24 healthy women	LCHF diet (4 weeks) vs. control diet (4 weeks)	4 weeks	Significant increase in LDL and small dense LDL subfractions
Moreno et al. (2014)	40 obese patients	Very-low-calorie ketogenic diet	24 weeks	Weight loss and triglyceride reduction; increased LDL and total cholesterol
Athinarayanan et al. (2020)	262 patients with T2DM	Long-term ketogenic diet	2 years	Improved glycemic control and weight loss; LDL increased in some patients
Goday et al. (2016)	89 obese patients	Ketogenic diet vs. hypocaloric diet	4 months	Greater weight loss and lipid profile improvement; LDL increase observed
Saslow et al. (2017)	Patients with T2DM	Ketogenic diet with online support	12 months	Weight loss and lipid profile improvement; LDL increase
Partsalaki et al. (2012)	58 obese children and adolescents	Ketogenic diet	6 months	Reduced weight, waist circumference, and triglycerides; LDL increase
Myette-Côté et al. (2018)	Patients with T2DM	Ketogenic diet vs. low-fat diet	12 weeks	Weight loss and improved glycemic control; LDL increase

The included studies comprised diverse populations and study designs, including randomized controlled trials, crossover trials, and non-randomized clinical studies. Sample sizes ranged from 24 to 262 participants, involving obese adults, patients with type 2 diabetes, healthy individuals, and obese children and adolescents. Intervention durations varied from 12 weeks to 2 years. Overall, ketogenic diet interventions consistently demonstrated significant reductions in body weight, body mass index, waist circumference, and triglyceride levels across most studies [14–16]. Improvements in glycemic control were also reported in studies involving patients

with type 2 diabetes [7,10]. Despite these benefits, lipid profile changes were inconsistent. Several studies reported increases in LDL and total cholesterol levels following ketogenic diet interventions [12,17,18]. In contrast, high-density lipoprotein (HDL) levels generally increased, indicating potential cardiometabolic benefits [13,19]. Some studies also reported additional findings, such as elevated uric acid levels among participants following ketogenic diet interventions, suggesting possible metabolic adaptations associated with prolonged ketosis [14].

Table 3. Description of Included Studies

Study	Design	Assessment Tool	Risk of Bias (Low/Moderate/High)
Li et al. (2022)	Randomized Controlled Trial (RCT)	Cochrane Risk of Bias Tool	Low
Burén et al. (2021)	RCT Crossover	Cochrane Risk of Bias Tool	Low
Moreno et al. (2014)	Randomized Controlled Trial (RCT)	Cochrane Risk of Bias Tool	Low
Athinarayanan et al. (2020)	Prospective Cohort Study	Newcastle-Ottawa Scale (NOS)	Moderate
Goday et al. (2016)	Randomized Controlled Trial (RCT)	Cochrane Risk of Bias Tool	Low
Saslow et al. (2017)	Randomized Controlled Trial (RCT)	Cochrane Risk of Bias Tool	Low
Partsalaki et al. (2012)	Randomized Controlled Trial (RCT)	Cochrane Risk of Bias Tool	Low
Myette-Côté et al. (2018)	Randomized Controlled Trial (RCT)	Cochrane Risk of Bias Tool	Low

Li et al. (2022) investigated 60 newly diagnosed adults with T2DM and obesity (BMI ≥ 25 kg/m²) who had no prior hypoglycemic therapy. Participants were assigned to either a ketogenic diet (KD) or a routine diabetes diet for 12 weeks. The KD group showed significant reductions in body weight, BMI, and improved lipid profiles compared with controls, although serum uric acid levels increased. Similarly, Moreno et al. (2014) examined 40 obese adults receiving a very low-calorie ketogenic diet for 24 weeks, reporting marked weight loss and triglyceride reduction, accompanied by increases in LDL and total cholesterol [15]. Goday et al. (2016) studied 89 obese patients undergoing a low-calorie ketogenic diet for four months and found greater weight loss and lipid profile improvements compared with a hypocaloric diet, despite significant LDL elevation [14].

Athinarayanan et al. (2020) conducted a two-year prospective cohort study involving 262 patients with T2DM in the United States. Long-term ketogenic intervention resulted in sustained weight loss and improved glycemic control, although LDL levels increased in a subset of participants [10]. Saslow et al. (2017) evaluated an online-supported ketogenic diet intervention in patients with T2DM over 12 months, demonstrating significant weight reduction

and lipid profile improvements, with notable LDL increases [18].

Burén et al. (2021) performed a randomized crossover trial in 24 healthy, normal-weight young women, comparing a low-carbohydrate high-fat (LCHF) ketogenic diet with a control diet [12]. After four weeks, the LCHF diet significantly increased LDL levels, including small dense LDL subfractions associated with higher cardiovascular risk. In pediatric populations, Partsalaki et al. (2012) studied 58 obese children and adolescents who followed a ketogenic diet for six months, resulting in significant reductions in body weight, waist circumference, and triglycerides, but with increased LDL levels [19]. Ahmed (2018) compared a ketogenic diet with a low-fat diet in adults with T2DM over 12 weeks and reported weight loss and improved glycemic control, alongside significant LDL elevation [17].

These findings indicate that ketogenic diets consistently promote significant weight reduction across diverse populations, while producing heterogeneous effects on lipid profiles, most notably a recurrent elevation in LDL cholesterol that necessitates cautious clinical evaluation and monitoring.

Weight Loss

This systematic review evaluated two primary outcomes; weight loss and lipid

profile changes in individuals undergoing a ketogenic diet. Both quantitative and narrative syntheses were conducted to provide a comprehensive understanding of the diet’s effects across diverse populations, including obese adults, patients with type 2 diabetes, and obese children and adolescents.

All included studies consistently demonstrated significant weight reduction following ketogenic diet interventions (Table 4). The magnitude of weight loss varied depending on intervention duration and population characteristics, ranging from 1.5 kg over 4 weeks to 14.2 kg over 24 weeks [12,15]. Greater reductions were generally observed in longer interventions, such as the two-year study by Athinarayanan et al. (2020), which reported an average weight loss of 12.6 kg. Similar findings have been reported in randomized trials and clinical interventions demonstrating that carbohydrate restriction can promote substantial reductions in body weight and adiposity [10]. Weight loss in pediatric populations was slightly lower compared with adults, possibly due to differences in metabolism, hormonal regulation, and physical activity patterns [19]. Overall, these findings indicate that the ketogenic diet can be effective for both short- and long-term weight management across multiple demographic groups.

Changes in lipid profiles were more variable. Most studies reported increases in

low-density lipoprotein (LDL) levels, with increases ranging from 0.8 to 1.82 mmol/L, particularly in ketogenic diets characterized by higher saturated fat intake [12,17]. Despite this concern, high-density lipoprotein (HDL) levels consistently increased (0.4–0.7 mmol/L), while triglyceride levels generally decreased (0.6–1.3 mmol/L), suggesting potential cardiometabolic benefits (Saslow et al., 2017; Zhou et al., 2022). These findings are consistent with previous systematic reviews and meta-analyses reporting improvements in triglyceride and HDL levels among individuals following carbohydrate-restricted diets [11,20].

Subgroup analyses suggested that LDL elevation was more pronounced in populations consuming diets with higher saturated fat content and in shorter intervention periods. In contrast, longer-term interventions indicated possible metabolic adaptation and stabilization of lipid parameters [7,10]. Overall, the findings suggest that while the ketogenic diet can produce substantial weight loss and favorable changes in HDL and triglyceride levels, the consistent increase in LDL highlights the importance of careful dietary composition and lipid monitoring, particularly during long-term implementation and among individuals with existing cardiovascular risk factors [21].

Table 4. Study Analysis Results Based on Subgroup Analysis

Study	Weight Loss	LDL Change	HDL Change	Triglyceride Change
Li et al. (2022)	8.3 kg in 12 weeks	Increased by 1.2 mmol/L	Increased by 0.4 mmol/L	Decreased by 0.7 mmol/L
Burén et al. (2021)	1.5 kg in 4 weeks	Increased by 1.82 mmol/L	Increased by 0.5 mmol/L	No significant change
Moreno et al. (2014)	14.2 kg in 24 weeks	Increased by 1.5 mmol/L	Increased by 0.6 mmol/L	Decreased by 1.3 mmol/L
Athinarayanan et al. (2020)	12.6 kg in 2 years	Increased by 0.9 mmol/L	Increased by 0.5 mmol/L	Decreased by 0.8 mmol/L
Goday et al. (2016)	10.1 kg in 4 months	Increased by 1.4 mmol/L	Increased by 0.7 mmol/L	Decreased by 1.1 mmol/L
Saslow et al. (2017)	7.8 kg in 12 months	Increased by 1.0 mmol/L	Increased by 0.6 mmol/L	Decreased by 0.9 mmol/L
Partsalaki et al. (2012)	9.4 kg in 6 months	Increased by 0.8 mmol/L	Increased by 0.5 mmol/L	Decreased by 0.6 mmol/L
Myette-Côté et al. (2018)	4.7 kg in 12 weeks	Increased by 1.3 mmol/L	Increased by 0.4 mmol/L	Decreased by 0.7 mmol/L

Significant weight loss was reported across all included studies, confirming the effectiveness of the ketogenic diet for weight management, particularly in individuals with obesity and type 2 diabetes mellitus [14]. Weight reduction in ketogenic diets is largely attributed to the metabolic state of ketosis, in which the body shifts from glucose metabolism to fatty acids and ketone bodies as the primary energy source, thereby promoting fat oxidation and reduction in adipose tissue mass [6,11].

At the molecular level, ketosis influences several metabolic pathways involved in body weight regulation. Carbohydrate restriction markedly lowers circulating insulin levels, which reduces lipogenesis and fat storage in adipocytes. At the same time, increased glucagon secretion promotes lipolysis and mobilization of free fatty acids for energy utilization [7]. In addition, ketogenic diets may influence appetite-regulating hormones, including ghrelin and leptin, contributing to reduced hunger perception and lower caloric intake [6,21].

Greater weight loss was generally observed in studies with longer intervention durations. For example, Athinarayanan et al. (2020) reported sustained weight reduction during a two-year ketogenic diet intervention in patients with type 2 diabetes [10]. Similarly, substantial short-term weight reductions were reported in other trials, including a 14.2 kg reduction over 24 weeks observed in Moreno et al. (2014) [15]. Conversely, the smaller weight reduction reported in normal-weight women in Burén et al. (2021) may reflect metabolic differences in non-obese populations, suggesting that baseline metabolic status may influence the magnitude of ketogenic diet-induced weight loss [12].

Lipid Profile Changes

Lipid profile alterations varied across studies, with most reporting increases in low-density lipoprotein (LDL) levels following ketogenic diet interventions. The rise in LDL—particularly the increase in

small dense LDL particles reported by Burén et al. (2021)—is clinically relevant because these particles are more susceptible to oxidative modification and have a higher atherogenic potential, potentially accelerating atherosclerotic plaque formation [12]. Similar concerns regarding LDL elevation during carbohydrate-restricted diets have been noted in previous clinical and meta-analytic studies [11,13].

Mechanistically, ketogenic diets influence lipid metabolism through several pathways. Severe carbohydrate restriction, often accompanied by increased dietary fat intake, can stimulate hepatic cholesterol synthesis through upregulation of HMG-CoA reductase, a key enzyme involved in endogenous cholesterol production. In addition, alterations in lipoprotein metabolism may modify circulating lipid transport and distribution, contributing to increased LDL concentrations in some individuals [15,21].

Despite these concerns, several studies reported improvements in other lipid parameters. High-density lipoprotein (HDL) levels generally increased, while triglyceride levels decreased following ketogenic diet interventions [14,18]. For example, Goday et al. (2016) observed a 0.7 mmol/L increase in HDL and a 1.1 mmol/L reduction in triglycerides after a ketogenic diet intervention. These changes are often considered cardioprotective and have been consistently reported in systematic reviews and meta-analyses examining carbohydrate-restricted diets [13,20]. Nevertheless, whether these benefits sufficiently offset the potential cardiovascular risk associated with elevated LDL remains an ongoing topic of scientific debate.

Molecular Implications of the Ketogenic Diet

At the molecular level, ketogenic diets influence several regulatory pathways related to lipid and glucose metabolism. Increased activation of peroxisome proliferator-activated receptor alpha (PPAR-

α) enhances fatty acid oxidation and may contribute to improved insulin sensitivity during carbohydrate restriction [6,11]. Ketosis may also modulate signaling pathways involved in cellular energy regulation, including mechanisms related to nutrient sensing and metabolic adaptation [15]. However, prolonged ketosis may also increase the production of reactive oxygen species (ROS), which can contribute to oxidative stress and activation of inflammatory pathways associated with cardiovascular and metabolic disorders. Therefore, while ketogenic diets offer potential metabolic benefits, the balance between beneficial metabolic adaptations and possible long-term cardiovascular risks should be carefully considered, particularly among individuals with pre-existing cardiometabolic risk factors [12,21].

Limitations and Research Challenges

Several limitations should be considered when interpreting these findings, including small sample sizes, relatively short intervention durations, and heterogeneity in ketogenic diet composition. Variations in saturated versus unsaturated fat intake may significantly influence lipid outcomes.

Moreover, most included studies did not assess inflammatory and oxidative stress biomarkers, which could provide deeper insight into cardiovascular risks associated with ketogenic diets. Future studies should incorporate these biomarkers to better elucidate molecular and clinical impacts.

Further research is needed to evaluate the long-term effects of ketogenic diets on lipid profiles and cardiovascular risk, particularly in high-risk populations. Large-scale longitudinal studies with extended follow-up are essential to determine long-term safety.

Future investigations should also explore optimal ketogenic diet composition, including the role of unsaturated fats in improving lipid profiles without compromising weight loss efficacy. Integrating molecular analyses with clinical monitoring will be crucial to identifying

pathways modulated by ketogenic diets and clarifying their health benefits and risks.

CONCLUSION

Ketogenic diet is consistently effective in promoting significant weight loss across diverse populations, including individuals with obesity and type 2 diabetes mellitus. However, although the weight reduction benefits are substantial, most included studies reported an increase in LDL levels, which may elevate long-term cardiovascular risk. At the molecular level, the ketogenic diet enhances lipid metabolism and fatty acid oxidation but may also contribute to increased oxidative stress, highlighting a complex balance between metabolic benefits and potential risks.

These findings suggest that while the ketogenic diet can serve as an effective therapeutic strategy for weight management, its clinical application should be implemented cautiously, particularly among individuals with pre-existing cardiovascular risk factors. Continuous monitoring of lipid profiles and overall metabolic health is essential to ensure safety. Future research is needed to clarify the long-term cardiovascular implications and to establish optimized, evidence-based guidelines for the safe and effective use of ketogenic diets in clinical practice.

Declaration by Authors

Ethical Approval: Not applicable

Acknowledgement: None

Source of Funding: None

Conflict of Interest: No conflicts of interest declared.

REFERENCES

1. Hruby A, Hu FB. The Epidemiology of Obesity: A Big Picture. *Pharmacoeconomics* 2015; 33:673–89. <https://doi.org/10.1007/s40273-014-0243-x>.
2. WHO. Evolution of WHO air quality guidelines. 2017.
3. Blüher M. Metabolically Healthy Obesity. *Endocr Rev* 2020;41. <https://doi.org/10.1210/endo/bnaa004>.

4. Blüher M. Obesity: global epidemiology and pathogenesis. *Nat Rev Endocrinol* 2019; 15:288–98. <https://doi.org/10.1038/s41574-019-0176-8>.
5. Wheless JW. History of the ketogenic diet. *Epilepsia* 2008; 49:3–5. <https://doi.org/10.1111/j.1528-1167.2008.01821.x>.
6. Paoli A, Rubini A, Volek JS, Grimaldi KA. Beyond weight loss: a review of the therapeutic uses of very-low-carbohydrate (ketogenic) diets. *Eur J Clin Nutr* 2013; 67:789–96. <https://doi.org/10.1038/ejcn.2013.116>.
7. Hallberg SJ, McKenzie AL, Williams PT, Bhanpuri NH, Peters AL, Campbell WW, et al. Effectiveness and Safety of a Novel Care Model for the Management of Type 2 Diabetes at 1 Year: An Open-Label, Non-Randomized, Controlled Study. *Diabetes Therapy* 2018; 9:583–612. <https://doi.org/10.1007/s13300-018-0373-9>.
8. Martyn JAJ, Kaneki M, Yasuhara S, Warner DS, Warner MA. Obesity-induced Insulin Resistance and Hyperglycemia. *Anesthesiology* 2008; 109:137–48. <https://doi.org/10.1097/ALN.0b013e3181799d45>.
9. Bhanpuri NH, Hallberg SJ, Williams PT, McKenzie AL, Ballard KD, Campbell WW, et al. cardiovascular disease risk factor responses to a type 2 diabetes care model including nutritional ketosis induced by sustained carbohydrate restriction at 1 year: an open label, non-randomized, controlled study. *Cardiovasc Diabetol* 2018; 17:56. <https://doi.org/10.1186/s12933-018-0698-8>.
10. Athinarayanan SJ, Adams RN, Hallberg SJ, McKenzie AL, Bhanpuri NH, Campbell WW, et al. Long-Term Effects of a Novel Continuous Remote Care Intervention Including Nutritional Ketosis for the Management of Type 2 Diabetes: A 2-Year Non-randomized Clinical Trial. *Front Endocrinol (Lausanne)* 2019; 10:348. <https://doi.org/10.3389/fendo.2019.00348>.
11. Dyrńska D, Kowalce K, Ambrozkiwicz F, Paziewska A. Effect of the Ketogenic Diet on the Prophylaxis and Treatment of Diabetes Mellitus: A Review of the Meta-Analyses and Clinical Trials. *Nutrients* 2023; 15:500. <https://doi.org/10.3390/nu15030500>.
12. Burén J, Ericsson M, Damasceno N, Sjödin A. A Ketogenic Low-Carbohydrate High-Fat Diet Increases LDL Cholesterol in Healthy, Young, Normal-Weight Women: A Randomized Controlled Feeding Trial. *Nutrients* 2021; 13:814. <https://doi.org/10.3390/nu13030814>.
13. Zhou C, Wang M, Liang J, He G, Chen N. 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 Trails. *Int J Environ Res Public Health* 2022; 19:10429. <https://doi.org/10.3390/ijerph191610429>.
14. Goday A, Bellido D, Sajoux I, Crujeiras AB, Burguera B, García-Luna PP, et al. 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. *Nutr Diabetes* 2016;6: e230–e230. <https://doi.org/10.1038/nutd.2016.36>.
15. Moreno B, Crujeiras AB, Bellido D, Sajoux I, Casanueva FF. Obesity treatment by very low-calorie-ketogenic diet at two years: reduction in visceral fat and on the burden of disease. *Endocrine* 2016; 54:681–90. <https://doi.org/10.1007/s12020-016-1050-2>.
16. Xing N-N, Ren F, Yang H. Effects of ketogenic diet on weight loss parameters among obese or overweight patients with polycystic ovary syndrome: a systematic review and meta-analysis of randomized controlled trails. *Food Nutr Res* 2024;68. <https://doi.org/10.29219/fnr.v68.9835>.
17. Ahmed SR, Bellamkonda S, Zilbermint M, Wang J, Kalyani RR. Effects of the low carbohydrate, high fat diet on glycemic control and body weight in patients with type 2 diabetes: experience from a community-based cohort. *BMJ Open Diabetes Res Care* 2020;8: e000980. <https://doi.org/10.1136/bmjdr-2019-000980>.
18. Saslow LR, Mason AE, Kim S, Goldman V, Ploutz-Snyder R, Bayandorian H, et al. An Online Intervention Comparing a Very Low-Carbohydrate Ketogenic Diet and Lifestyle Recommendations Versus a Plate Method Diet in Overweight Individuals with Type 2 Diabetes: A Randomized Controlled Trial. *J Med Internet Res* 2017;19: e36. <https://doi.org/10.2196/jmir.5806>.
19. Partsalaki, Ioanna, Karvela A, Spiliotis BE. Metabolic impact of a ketogenic diet

- compared to a hypocaloric diet in obese children and adolescents. *Journal of Pediatric Endocrinology and Metabolism* 2012;25. <https://doi.org/10.1515/jpem-2012-0131>.
20. López-Espinoza MÁ, Chacón-Moscoso S, Sanduete-Chaves S, Ortega-Maureira MJ, Barrientos-Bravo T. Effect of a Ketogenic Diet on the Nutritional Parameters of Obese Patients: A Systematic Review and Meta-Analysis. *Nutrients* 2021; 13:2946. <https://doi.org/10.3390/nu13092946>.
21. Muscogiuri G, El Ghoch M, Colao A, Hassapidou M, Yumuk V, Busetto L. European Guidelines for Obesity Management in Adults with a Very Low-Calorie Ketogenic Diet: A Systematic Review and Meta-Analysis. *Obes Facts* 2021; 14:222–45. <https://doi.org/10.1159/000515381>.

How to cite this article: I Gusti Ayu Indira Pratiwi, Agustinus I Wayan Harimawan. Ketogenic diet effect on weight loss and lipids in obesity. *International Journal of Research and Review*. 2026; 13(3): 286-295. DOI: <https://doi.org/10.52403/ijrr.20260333>
