

Efficacy of the Ketogenic Diet in Reducing Hemoglobin A1c for Glycemic Control in Overweight Type 2 Diabetics

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Introduction

- Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and impaired glucose regulation, affecting over 500 million people globally.
- One of the primary markers used to assess long-term glycemic control in individuals with T2DM is hemoglobin A1c (HbA1c). Effective management of HbA1c is crucial for preventing diabetes-related complications.
- Standard medical management for T2DM includes medications like metformin, GLP-1 receptor agonists, and SGLT2 inhibitors to improve glycemic control and promote weight reduction.
- The optimal diet for managing T2DM in overweight individuals remains uncertain. With the rising prevalence of T2DM, exploring effective dietary strategies is crucial.
- The ketogenic diet is a high-fat, low-carbohydrate dietary regimen that has gained attention as a potential therapeutic approach for diabetes management.
- By inducing ketosis, the ketogenic diet may help regulate blood sugar, promote weight loss, and lessen the reliance on diabetes medications.
- Nevertheless, while initial findings are promising, its long-term efficacy and safety in overweight T2DM patients remain underexplored in the literature.

Aim: This systematic review aims to critically assess the efficacy of ketogenic diets compared to standard dietary interventions in reducing HbA1c for improved glycemic control in overweight patients with T2DM.

Approach

- The intervention assessed was the ketogenic diet, characterized by low carbohydrate intake, moderate protein consumption, and high intake of healthy fats.
- Studies were identified through a systematic literature search using PubMed.
- The following search terms were used: ketogenic diet, overweight, BMI, type II diabetes, low carb diet, insulin resistance, blood sugar, and glycemic control.

Inclusion Criteria:

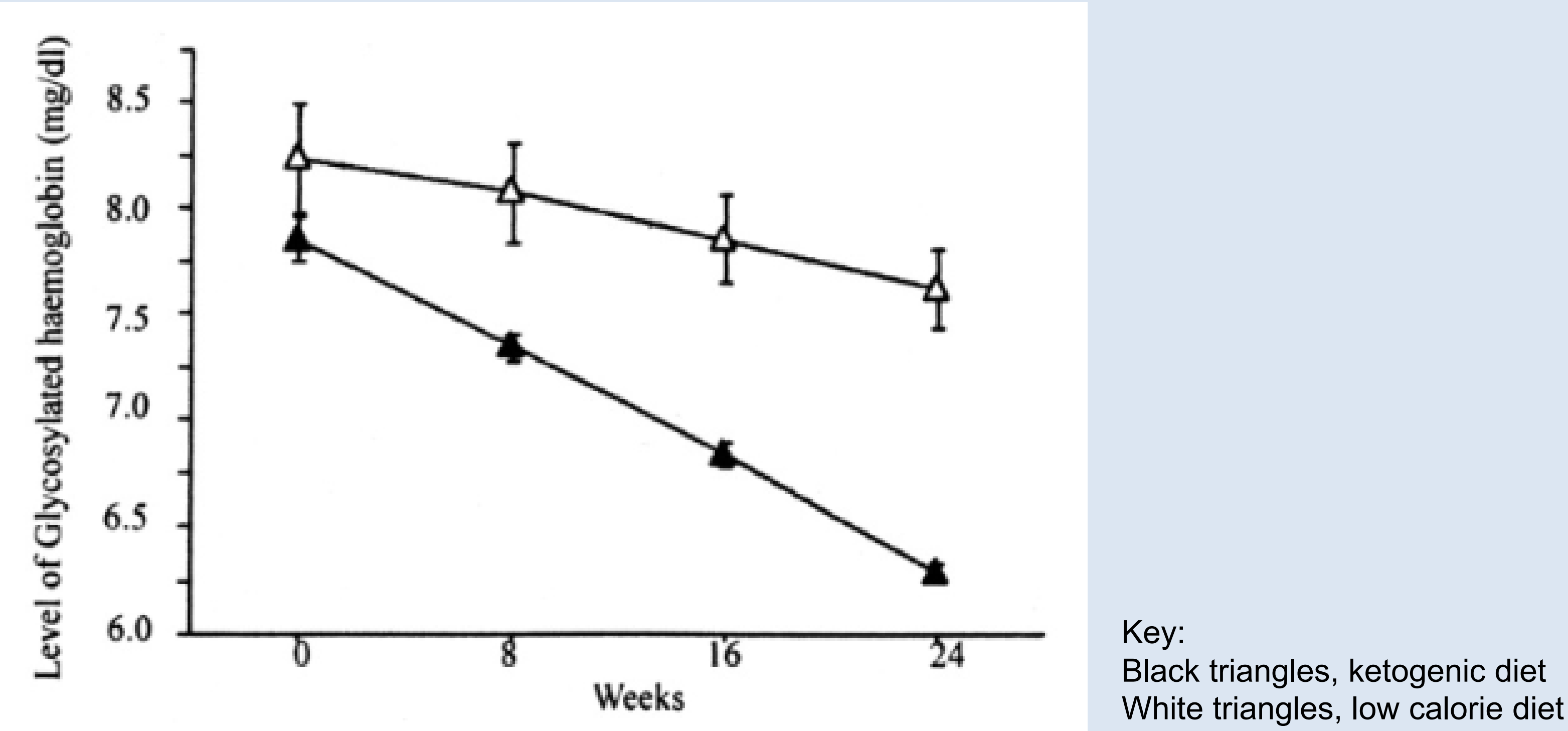
- Literature search limited to peer-reviewed journal articles published within the last 20 years (2004–2024).
- Study designs included meta-analyses, prospective cohort studies, and randomized controlled trials.
- Studies available in English.
- Participants diagnosed with T2DM based on glycated hemoglobin (HbA1c) or fasting glucose.
- Participants with a BMI of not less than 25 kg/m².
- Dietary intervention included a ketogenic diet (intervention group) compared to other diets (control group).
- Data extraction consisted of collecting information on primary and secondary outcomes from the selected studies, with HbA1c reduction as the primary endpoint and secondary outcomes including LDL, HDL, total cholesterol, triglycerides, fasting glucose and insulin, body weight, BMI, and waist circumference.

Findings

Study Authors	Study Design	Number of Participants	Control Diet	Diet Interventions	Results (Levels of HbA1c)
Hussain et al. (2012)	24-week Clinical trial	Total: 363 Participants with T2DM: 102 (28% of total)	Low-Calorie Diet (LCD)	Low-Carbohydrate Ketogenic Diet (LCKD)	LCD: Baseline: 8.2% Final: 7.625% LCKD: Baseline: 7.8% Final: 6.3%
Goday et al. (2016)	4-month Randomized Clinical trial	Total: 89	Low-Calorie Diet (LC)	Very Low-Carbohydrate Ketogenic Diet (VLCK)	LC: Baseline: 6.88% Final: 6.4% VLCK: Baseline: 6.89% Final: 6.0%
Westman et al. (2008)	24-week Randomized Clinical trial	Total: 84 Participants who completed the study: 50	Low-Glycemic Index Diet (LGID)	Low-Carbohydrate Ketogenic Diet (LCKD)	LGID: Baseline: 8.3% Final: 7.8% LCKD: Baseline: 8.8% Final: 7.3%

Summary of Clinical Trials Evaluating the Effect of Ketogenic Diets on HbA1c Levels in Overweight Patients with Type 2 Diabetes.

This table presents data from three clinical trials assessing the impact of ketogenic diets compared to control diets on glycemic control. Each study reports changes in HbA1c levels from baseline to study completion, demonstrating greater reductions in HbA1c among participants following a ketogenic diet.



Changes in level of glycosylated hemoglobin (HbA1c) in diabetic subjects after the administration of a low-calorie diet or a low-carbohydrate ketogenic diet for 24 weeks. (Hussain et al, 2012)

The glycosylated hemoglobin level significantly decreased with the low-carbohydrate ketogenic diet compared to the low-calorie diet.

Conclusions

- The findings across all studies indicate significant improvements in glycemic control with ketogenic diets, as evidenced by statistically significant reductions in HbA1c levels, which were more substantial than those observed with standard or other dietary interventions.
- The restrictive nature of ketogenic diets presents challenges to long-term adherence, which may impact their sustained effectiveness in managing T2DM.
- Common adverse effects, such as gastrointestinal discomfort, require careful monitoring by healthcare providers to ensure patient safety.
- While current evidence supports the efficacy of ketogenic diets, further large-scale, long-term studies are necessary to fully assess their sustainability, safety, and role in personalized diabetes management for overweight individuals.

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References

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