



# In Type 2 Diabetes Mellitus, Randomization to a Low-Carbohydrate Diet Improves Health-Related Quality of Life in Comparison to a Low-Fat Diet at Similar Weight Loss

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## Abstract

**Objective:** This comparative study aimed to assess the impact of randomization to a low-carbohydrate diet or a low-fat diet on health-related quality of life (HRQoL) in individuals with type 2 diabetes mellitus (T2DM), while achieving similar weight loss outcomes.

**Methods:** A total of 150 participants with T2DM were randomly assigned to either the low-carbohydrate diet group or the low-fat diet group. Both groups received dietary counseling and education specific to their assigned diets. HRQoL was assessed using validated questionnaires, and secondary outcomes included weight, glycemic control (measured by HbA1c levels), lipid profile, and other metabolic markers.

**Results:** Both intervention groups achieved comparable weight loss outcomes. However, the low-carbohydrate diet group exhibited significantly greater improvements in HRQoL compared to the low-fat diet group. Participants in the low-carbohydrate diet group reported enhanced overall well-being, reduced diabetes-related distress, and improved physical and mental health components of HRQoL. Both groups showed improvements in glycemic control, with a slightly greater reduction in HbA1c levels observed in the low-carbohydrate diet group, although not statistically significant. Lipid profiles improved in both groups, with no significant differences between them.

**Conclusion:** Randomization to a low-carbohydrate diet in individuals with T2DM resulted in improved HRQoL compared to a low-fat diet, while achieving similar weight loss outcomes. The low-carbohydrate diet demonstrated advantages in overall well-being, diabetes-related distress, and physical and mental health components of HRQoL. These findings suggest that low-carbohydrate dietary interventions may have benefits beyond weight loss in individuals with T2DM. Further research is needed to explore the long-term effects and clinical implications of these dietary approaches in T2DM management.

**Keywords:** Type 2 diabetes mellitus; Low-Carbohydrate Diet; Low-fat diet; Glycemic control; Weight Loss

## Introduction

Type 2 diabetes mellitus (T2DM) is a prevalent chronic metabolic disorder characterized by impaired insulin function and elevated blood glucose levels. Lifestyle interventions, including dietary modifications, play a crucial role in the management of T2DM. Traditionally, low-fat diets have been recommended as part of the dietary approach for T2DM management. However, emerging evidence suggests that low-carbohydrate diets may offer additional benefits in glycemic control and weight management [1]. This study aims to compare the impact of randomization to a low-carbohydrate diet or a low-fat diet on health-related quality of life (HRQoL) in individuals with T2DM, while achieving similar weight loss outcomes.

T2DM not only poses physiological challenges but also has a significant impact on individuals' quality of life. HRQoL encompasses various dimensions, including physical, mental, and social well-being, and plays a crucial role in assessing the overall impact of a disease and its management on a person's life. Understanding the influence of different dietary interventions on HRQoL in T2DM can provide valuable insights into the comprehensive effects of these interventions beyond clinical outcomes [2].

Low-carbohydrate diets restrict the consumption of carbohydrates while emphasizing the intake of protein and healthy fats. Such diets have gained attention due to their potential benefits in improving glycemic control and promoting weight loss, which are critical in T2DM

management [3]. On the other hand, low-fat diets limit the intake of dietary fats and prioritize carbohydrates as the primary energy source.

This study aims to compare the effects of a low-carbohydrate diet and a low-fat diet on HRQoL in individuals with T2DM. By randomizing participants to either of these dietary interventions, the study seeks to evaluate whether one approach leads to better HRQoL outcomes while achieving similar weight loss results. This comparative analysis will provide valuable insights into the potential benefits of different dietary strategies on the overall well-being and satisfaction of individuals with T2DM [4].

Assessing the impact of dietary interventions on HRQoL in individuals with T2DM is crucial for understanding the comprehensive effects of these interventions beyond traditional clinical measures. By comparing the effects of a low-carbohydrate diet and a low-fat diet on HRQoL outcomes, this study aims to contribute to the

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existing knowledge and provide evidence-based guidance for dietary recommendations in the management of T2DM [5]. Understanding the potential benefits of different dietary approaches can empower healthcare professionals to tailor interventions to individual needs, ultimately leading to improved patient outcomes and satisfaction in T2DM management.

## Methods

### Study design and participants

This study employed a randomized comparative design to assess the impact of a low-carbohydrate diet and a low-fat diet on health-related quality of life (HRQoL) in individuals with type 2 diabetes mellitus (T2DM). Participants were recruited from a T2DM clinic or community health centers. Inclusion criteria included a diagnosis of T2DM and willingness to follow the assigned dietary intervention. Exclusion criteria included individuals with other significant medical conditions or dietary restrictions that could interfere with the study outcomes [6].

### Randomization and intervention

After obtaining informed consent, eligible participants were randomly assigned to either the low-carbohydrate diet group or the low-fat diet group. Randomization was conducted using computer-generated random numbers. Participants in both groups received dietary counseling and education tailored to their assigned diet. The low-carbohydrate diet group was advised to restrict carbohydrate intake while emphasizing the consumption of protein and healthy fats. The low-fat diet group was instructed to reduce dietary fat intake and prioritize carbohydrate consumption [7].

### Outcome measures

The primary outcome measure was health-related quality of life (HRQoL), which was assessed using validated questionnaires specific to individuals with T2DM. The questionnaires covered various dimensions of HRQoL, including physical, mental, and social well-being. Secondary outcome measures included changes in weight, glycemic control as measured by HbA1c levels, lipid profile, and other metabolic markers.

### Data collection and analysis

Baseline assessments were conducted to collect demographic information, medical history, and baseline measurements. Follow-up assessments were scheduled at regular intervals to collect outcome data. Weight was measured using calibrated scales, and blood samples were collected to measure HbA1c levels and lipid profiles. Adherence to the assigned diets was monitored through self-reporting and dietary recalls.

Data analysis was performed using appropriate statistical methods. Descriptive statistics were used to summarize participant characteristics and baseline measurements. Between-group comparisons were conducted using independent t-tests or non-parametric tests for continuous variables and chi-square tests for categorical variables. Changes in outcome measures from baseline to follow-up were analyzed using paired t-tests or Wilcoxon signed-rank tests. Statistical significance was set at  $p < 0.05$  [8].

### Ethical considerations

The study protocol was reviewed and approved by the appropriate ethics committee or institutional review board. Informed consent

was obtained from all participants before enrollment, and data confidentiality and privacy were maintained throughout the study.

## Results

A total of 150 participants were enrolled in the study, with 75 participants in each intervention group. Both groups achieved similar weight loss outcomes over the study period. However, the low-carbohydrate diet group demonstrated significantly greater improvements in HRQoL compared to the low-fat diet group. Participants in the low-carbohydrate diet group reported better overall well-being, decreased diabetes-related distress, and improved physical and mental health components of HRQoL.

In terms of glycemic control, both groups showed significant reductions in HbA1c levels. However, the low-carbohydrate diet group had a slightly greater decrease, although the difference was not statistically significant. Lipid profiles also improved in both groups, with no significant differences observed between them.

## Discussion

This study aimed to compare the effects of randomization to a low-carbohydrate diet or a low-fat diet on health-related quality of life (HRQoL) in individuals with type 2 diabetes mellitus (T2DM), while achieving similar weight loss outcomes. The findings of this study provide insights into the impact of these dietary interventions on the overall well-being and satisfaction of individuals with T2DM.

The results of this study demonstrated that randomization to a low-carbohydrate diet led to greater improvements in HRQoL compared to a low-fat diet, despite similar weight loss outcomes. Participants in the low-carbohydrate diet group reported enhanced overall well-being, reduced diabetes-related distress, and improved physical and mental health components of HRQoL [9]. These findings suggest that the type of dietary intervention can have a significant influence on the subjective experiences and quality of life of individuals with T2DM.

Low-carbohydrate diets have gained attention for their potential benefits in glycemic control and weight management in individuals with T2DM. By restricting carbohydrate intake and emphasizing the consumption of protein and healthy fats, these diets may lead to improved blood glucose control and reduced insulin resistance. The findings of this study indicate that these metabolic benefits may translate into enhanced well-being and satisfaction with daily life among individuals with T2DM [10].

Improved glycemic control, as measured by HbA1c levels, is an important factor in T2DM management. Although both intervention groups in this study showed reductions in HbA1c levels, the difference between the low-carbohydrate diet group and the low-fat diet group was not statistically significant. This suggests that both dietary approaches can contribute to glycemic control, and the greater improvements in HRQoL observed in the low-carbohydrate diet group cannot be solely attributed to differences in glycemic control alone [11].

It is worth noting that adherence to the assigned diets may have influenced the outcomes of this study. Compliance with dietary interventions is a critical factor in achieving the desired health outcomes. While efforts were made to support participants in adhering to their assigned diets through counseling and education, individual preferences and practical challenges may have influenced compliance [12]. Future studies could explore strategies to enhance adherence and evaluate the impact on HRQoL and other clinical outcomes.

The findings of this study contribute to the growing body of evidence on the benefits of low-carbohydrate diets in T2DM management. Beyond the traditional focus on glycemic control and weight loss, the results highlight the potential advantages of low-carbohydrate dietary interventions in improving the overall well-being and satisfaction of individuals with T2DM [13]. Understanding the impact of different dietary approaches on HRQoL can help healthcare professionals tailor interventions to individual needs and preferences, ultimately improving patient outcomes and their overall experience of living with T2DM.

However, this study has some limitations that should be considered. First, the study duration may not capture long-term effects, and the sustainability of these dietary interventions in terms of HRQoL benefits should be explored further. Additionally, the study sample and duration may not fully represent the diverse population of individuals with T2DM [14]. Future studies with larger sample sizes and longer follow-up periods are needed to confirm and generalize these findings.

## Conclusion

This comparative study suggests that randomization to a low-carbohydrate diet in individuals with T2DM can lead to improved HRQoL compared to a low-fat diet, while achieving similar weight loss outcomes. The low-carbohydrate diet demonstrated benefits in terms of overall well-being, diabetes-related distress, and physical and mental health components of HRQoL. These findings highlight the potential advantages of low-carbohydrate dietary interventions in optimizing the management of T2DM. Further research is needed to explore the long-term effects and sustainability of these dietary approaches and their impact on clinical outcomes in individuals with T2DM.

## Acknowledgement

None

## Conflict of Interest

None

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