Latest Releases on Nutrition in Diabetes

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Introduction Of Diabetes

Types Of Diabetes

Type 1 diabetes is characterized by insulin deficiency, while type 2 diabetes involves insulin resistance, and gestational diabetes occurs during pregnancy.

Causes Of Diabetes

The causes of diabetes can vary, including genetic predisposition, lifestyle factors, autoimmune factors, and hormonal changes during pregnancy.

Symptoms Of Diabetes

Common symptoms of diabetes include excessive thirst, frequent urination, unexplained weight loss or gain, fatigue, blurred vision, slow-healing wounds, and tingling or numbness in the hands or feet.

Managing Diabetes

Diet and Exercise

Managing diabetes involves maintaining a balanced diet and engaging in regular exercise to control blood sugar levels and improve overall health.

Lifestyle Changes

Managing diabetes requires implementing sustainable lifestyle changes, such as adopting a healthy eating plan, engaging in regular physical activity, monitoring blood glucose levels, taking prescribed medications, and managing stress levels.

ADA:
Standards of Care in Diabetes 2024

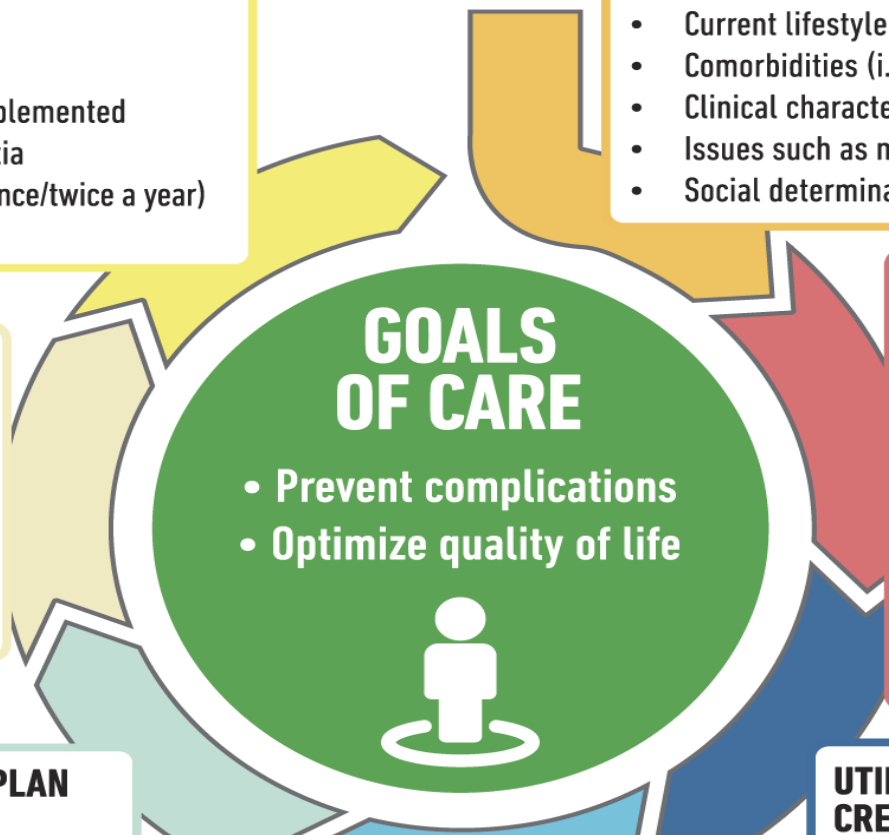
ADA 2024

ADA: Standards of Care in Diabetes 2024

Revisions to nearly all sections, including updated recommendations for:

- person-centered care
- obesity measurements
- weight-loss medications
- evaluation and management of comorbidities
- diabetes diagnosis and classification
- patient self-management and education

DECISION CYCLE FOR PERSON-CENTERED GLYCEMIC MANAGEMENT IN TYPE 2 DIABETES



ASSESS KEY PERSON CHARACTERISTICS

- The individual's priorities
- Current lifestyle and health behaviors
- Comorbidities (i.e., CVD, CKD, HF)
- Clinical characteristics (i.e., age, A1C, weight)
- Issues such as motivation, depression, cognition
- Social determinants of health

CONSIDER SPECIFIC FACTORS THAT IMPACT CHOICE OF TREATMENT

- Individualized glycemic and weight goals
- Impact on weight, hypoglycemia, and cardiorenal protection
- Underlying physiological factors
- Side effect profiles of medications
- Complexity of regimen (i.e., frequency, mode of administration)
- Regimen choice to optimize medication use and reduce treatment discontinuation
- Access, cost, availability of medication, and lifestyle choices

UTILIZE SHARED DECISION-MAKING TO CREATE A MANAGEMENT PLAN

- Ensure access to DSMES
- Involve an educated and informed person (and the individual's family/caregiver)
- Explore personal preferences
- Language matters (include person-first, strengths-based, empowering language)
- Include motivational interviewing, goal setting, and shared decision-making

AGREE ON MANAGEMENT PLAN

- Specify SMART goals:
  - **S**pecific
  - **M**easurable
  - **A**chievable
  - **R**ealistic
  - **T**ime limited

IMPLEMENT MANAGEMENT PLAN

- Ensure there is regular review; more frequent contact initially is often desirable for DSMES

PROVIDE ONGOING SUPPORT AND MONITORING OF:

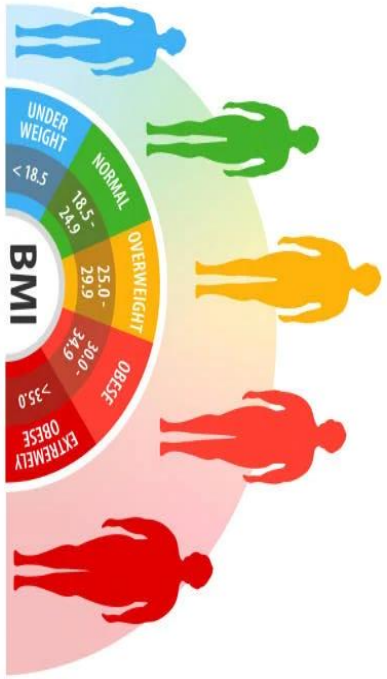
- Emotional well-being
- Lifestyle and health behaviors
- Tolerability of medications
- Biofeedback including BGM/CGM, weight, step count, A1C, BP, lipids

REVIEW AND AGREE ON MANAGEMENT PLAN

- Review management plan
- Mutually agree on changes
- Ensure agreed modification of therapy is implemented in a timely fashion to avoid therapeutic inertia
- Undertake decision cycle regularly (at least once/twice a year)
- Operate in an integrated system of care

Obesity management:

In people with type 2 diabetes and overweight or obesity, weight management should represent a **primary goal:**
People with diabetes and overweight or obesity may benefit from **any magnitude** of weight loss



Weight loss of 3–7% of baseline weight improves glycemia and other intermediate cardiovascular risk factors

Sustained loss of >10% of body weight usually confers greater benefits, including disease-modifying effects and **possible remission of type 2 diabetes**, and may improve long-term cardiovascular outcomes and mortality.

ADA:https://diabetesjournals.org/care/article/47/Supplement_1/S145/153942/8-Obesity-and-Weight-Management-for-the-Prevention

Anthropometric measurements

In addition to using BMI to diagnose obesity, this year's Standards of Care recommends using **body fat distribution measurements.** Measurements may include waist-to-hip ratio, waist circumference, and waist-to-height ratio.

The ADA recommends repeating these measurements **annually** to guide diabetes management.

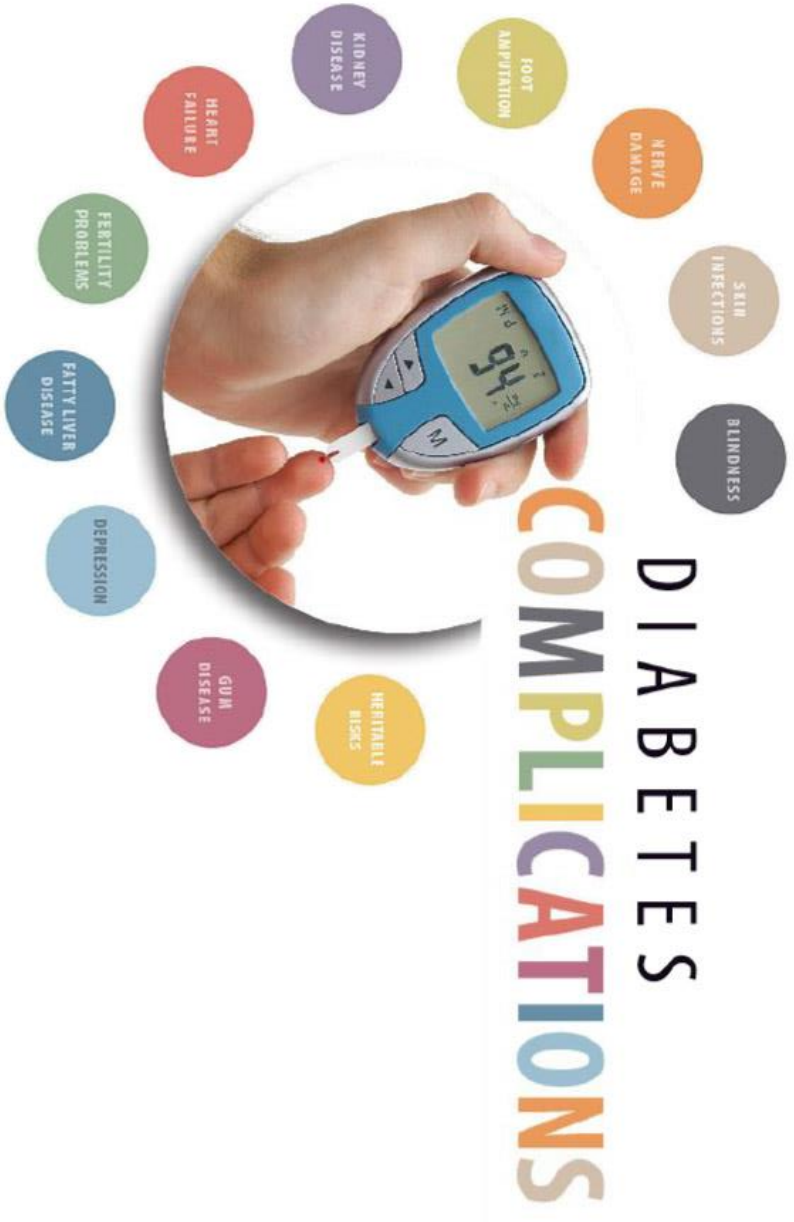
Managing the risk of comorbidities

The ADA **revised** its recommendations for evaluating and managing the risk of diabetes comorbidities External link, including

Assessing bone health, including diabetes-specific risk factors for fractures, as part of routine diabetes care and treatment considerations

recommending the COVID-19 **vaccine** and boosters for everyone age 6 and older, including those with diabetes

screening for and managing **liver disease** in people with diabetes



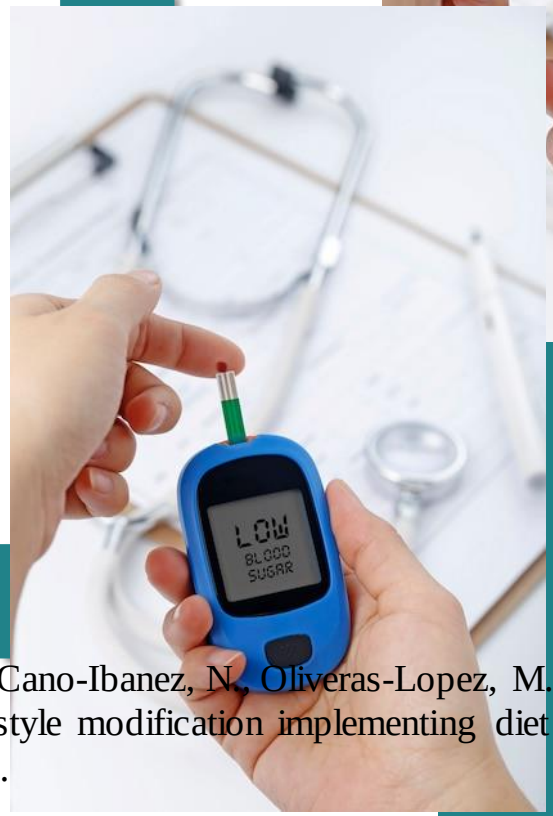
Literature review

What do new articles tell us?

A 2019 meta analysis:

A total of 28 RCT evaluating
a lifestyle intervention (based on diet, nutritional education, and physical activity) in the type 2 diabetes mellitus population.:

lifestyle interventions significantly lowered glycosylated haemoglobin (HbA_{1c}) levels compared to the usual care for patients with type 2 diabetes mellitus, overall weighted mean difference, WMD $= -0.51\ (-0.67, -0.35)$ particularly when there is a weight loss



Garcia-Molina, L., Lewis-Mikhael, A.M., Riquelme-Gallego, B., Cano-Ibanez, N., Oliveras-Lopez, M.J. and Bueno-Cavanillas, A., 2020. Improving type 2 diabetes mellitus glycaemic control through lifestyle modification implementing diet intervention: a systematic review and meta-analysis. European journal of nutrition, 59(4), pp.1313-1328.

Mediterranean diet

: Prioritize fruits, vegetables, whole grains, legumes, and nuts for fiber and nutrients

Use Healthy Fats: Choose extra-virgin olive oil as the main source of fat

Lean Proteins: Include fish (especially fatty fish), poultry, and plant-based proteins like legume

Limit Processed Foods and Sweets: Minimize intake of sugary and processed foods

Dairy and Red Meat in Moderation: Opt for low-fat dairy and limit red meat consumptio n

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Reviews

Mediterranean diet, cardiovascular disease and mortality in diabetes: A systematic review and meta-analysis of prospective cohort studies and randomized clinical trials

Nerea Becerra-Tomás, Sonia Blanco Mejía, Effie Viguiliouk, Tauseef Khan, Cyril W.C. Kendall, Hana Kahleova,
...show all

Pages 1207-1227 | Published online: 24 Jan 2019

- 2020 meta-analysis that evaluates the effect of the Mediterranean diet (MedDiet **on preventing cardiovascular disease (CVD) incidence and mortality in populations inclusive of individuals with diabetes.**

- Results that compared the highest versus lowest categories of MedDiet adherence revealed:

- An **inverse association** with total CVD mortality (RR: 0.79; 95% CI: 0.77, 0.82), coronary heart disease (CHD) incidence (RR: 0.73; 95% CI: 0.62, 0.86), CHD mortality (RR: 0.83; 95% CI: 0.75, 0.92), stroke incidence (RR: 0.80; 95% CI: 0.71, 0.90), stroke mortality (RR: 0.87; 95% CI: 0.80, 0.96) and MI incidence (RR: 0.73; 95% CI: 0.61, 0.88).

Adherence to the Mediterranean diet (MD) has been shown to positively influence blood sugar levels in individuals with diabetes, particularly type 2 diabetes mellitus (T2DM)!

Lower HbA1c Levels: Higher MEDAS scores (indicating better adherence) were associated with lower odds of having HbA1c levels ≥6% and ≥7% in T2DM patients(Bender et al., 2023).

Long-term Benefits: Sustained adherence to the MD over 20 years resulted in a 21% reduction in the risk of developing T2DM, alongside improved glycemic profiles(Kechagia et al., 2024).

Weight Management: Adherence to the MD can lead to reductions in fasting plasma glucose and improvements in body composition, which are crucial for managing diabetes(Derrick et al., 2023).

Nutr Rev. 2024 May 8:nuae045. doi: 10.1093/nutrit/nuae045. Online ahead of print.

A Mediterranean diet improves glycation markers in healthy people and in those with chronic diseases: a systematic review of clinical trials

Julia S Oliveira [1], Jessica A da Silva [1], Brenda V M de Freitas [1], Rita C G Alfenas [1], Josefina Bressan [1]

Affiliations + expand

PMID: 38719207 DOI: 10.1093/nutrit/nuae045

- The systematic review on the Mediterranean diet (MedDiet) revealed several important findings regarding its impact on glycation markers in both healthy individuals and those with chronic diseases.

The MedDiet also led to **positive effects** on the gene expression of receptors AGEs, such as RAGE and AGER1, and an enzyme involved in detoxification (glyoxalase I).

advanced glycation end products (AGEs),

εN-carboxymethyllysine

methylglyoxal

A reduction in serum concentrations after **at least 4 weeks**

Article

Comparative Evaluation of a Low-Carbohydrate Diet and a Mediterranean Diet in Overweight/Obese Patients with Type 2 Diabetes Mellitus: A 16-Week Intervention Study

Walter Currenti [1,*,†], Francesca Losavio [2,†], Stefano Quiete [3], Amer M. Alanazi [4], Giovanni Messina [2], Rita Polito [2], Fabiana Ciolli [2], Raffaela Simona Zappalà [1], Fabio Galvano [1,*] and Raffaele Ivan Cincione [2]

This trial aimed to compare the effects of a Mediterranean diet vs. a low-carbohydrate diet (carbohydrate intake < 130 g/day) on overweight/obese patients with T2DM over 16 weeks.

Method

Both dietary interventions were hypocaloric, with a focus on maintaining a 500 kcal/day energy deficit.

Result

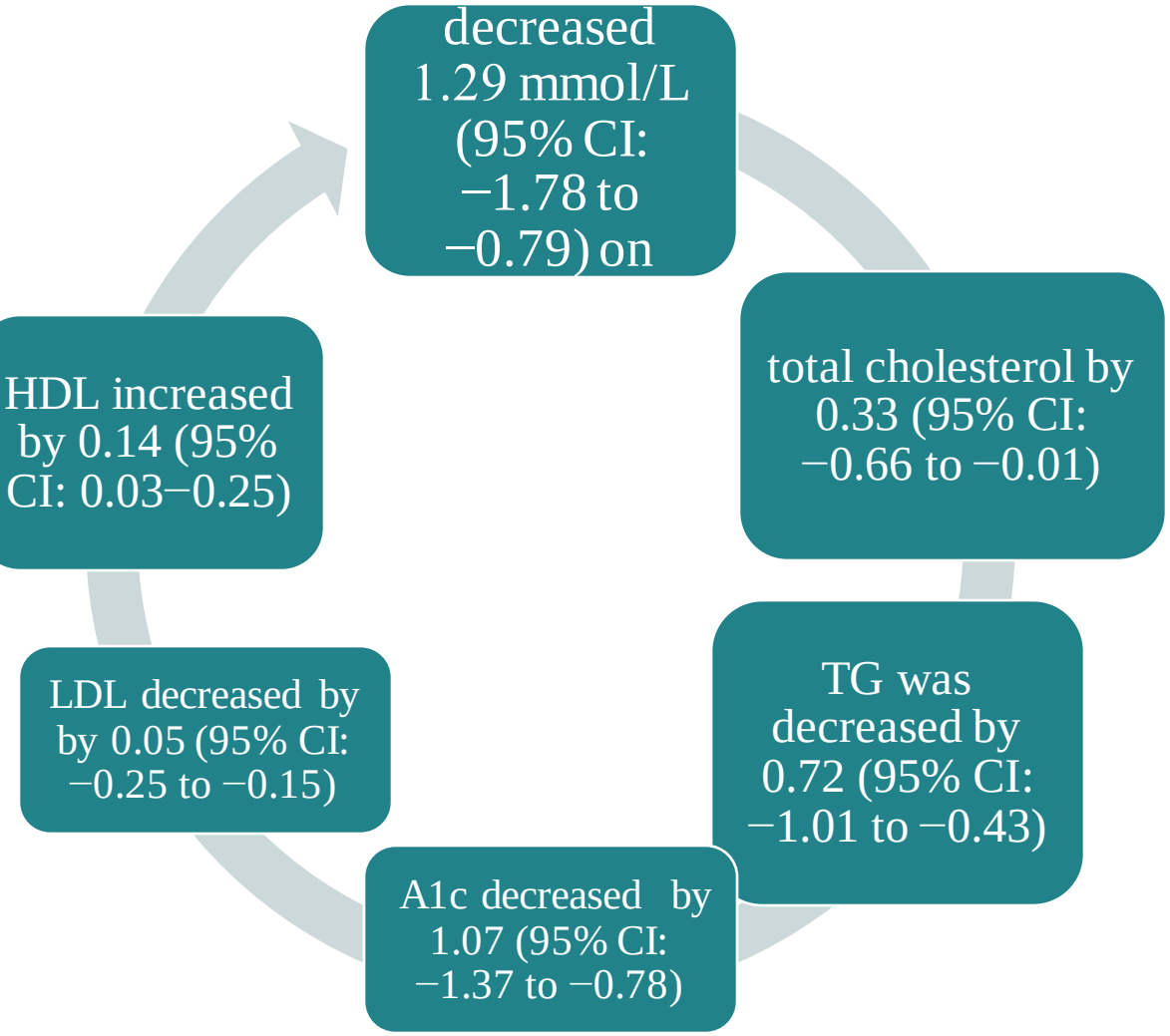
After 16 weeks, both diets had positive effects on various parameters, including weight loss, blood pressure, glucose control, lipid profile, and renal function.

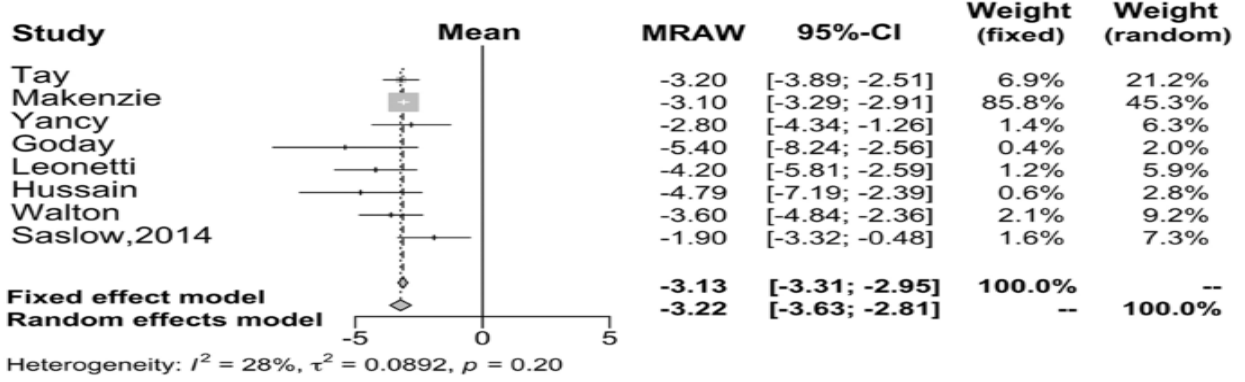
Attention

the low-carbohydrate diet **appears to result in a greater reduction** in

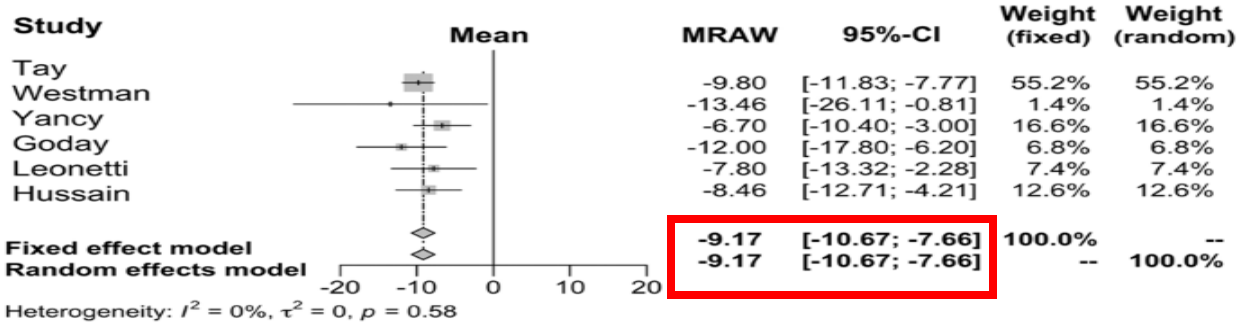
BMI, blood pressure, waist circumference, glucose levels, lipid profiles, cardiovascular risk, renal markers, and overall metabolic parameters compared to the Mediterranean diet at the 16-week follow-up

Effect of the ketogenic diet on glycemic control, insulin resistance, and lipid metabolism in patients with T2DM: a systematic review and meta-analysis

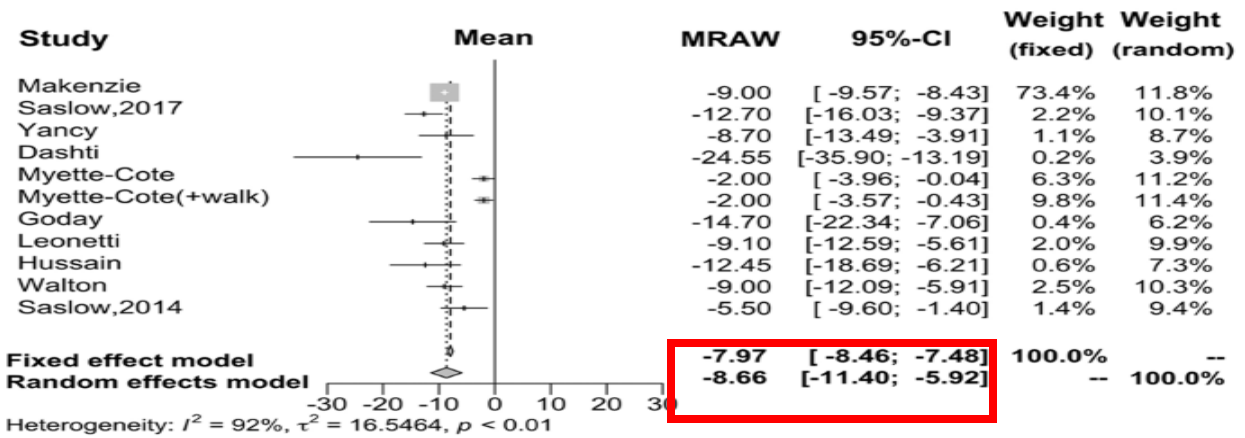




BMI



Waist circumference



Body weight

Yuan, X., Wang, J., Yang, S. et al. Effect of the ketogenic diet on glycemic control, insulin resistance, and lipid metabolism in patients with T2DM: a systematic review and meta-analysis. Nutr. Diabetes 10, 38 (2020). https://doi.org/10.1038/s41387-020-00142-z

A six-month low-carbohydrate diet high in fat does not adversely affect endothelial function or markers of low-grade inflammation in patients with type 2 diabetes: an open-label randomized controlled trial

Randomization

< 20 E% carbohydrates, 50–60 E% fat)

50–60 E% carbohydrates, 20–30 E% fat)

Flow-mediated vasodilation (FMD) and

- The FMD and NID were unaltered in both groups after six months, and

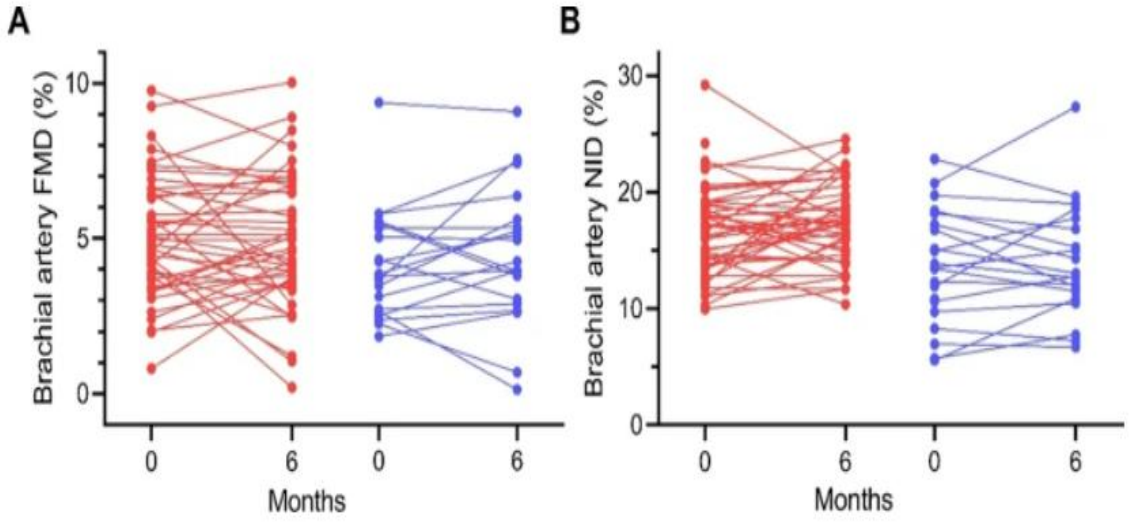
nitroglycerine-induced vasoadilation (NID)

- there were no between-group differences in change of either FMD ($p = 0.34$) or NID ($p = 0.53$) in response to the interventions

Gram-Kampmann EM, Olesen TB, Hansen CD, Hugger MB, Jensen JM, Handberg A, Beck-Nielsen H, Krag A, Olsen MH, Højlund K. A six-month low-carbohydrate diet high in fat does not adversely affect endothelial function or markers of low-grade inflammation in patients with type 2 diabetes: an open-label randomized controlled trial. Cardiovasc Diabetol. 2023 Aug 17;22(1):212. doi: 10.1186/s12933-023-01956-8. PMID: 37592243; PMCID: PMC10436534.

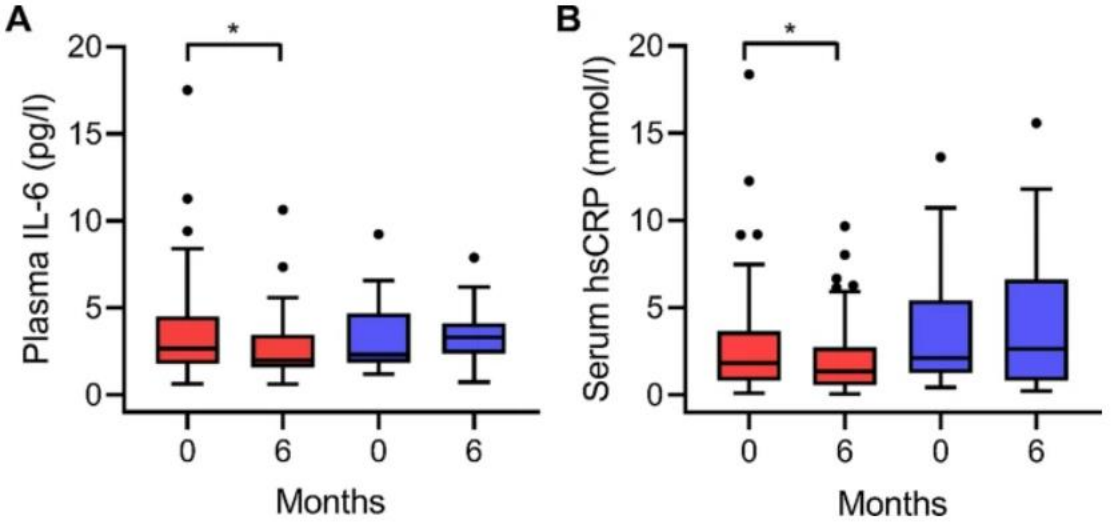
A six-month low-carbohydrate diet high in fat does not adversely affect endothelial function or markers of low-grade inflammation in patients with type 2 diabetes: an open-label randomized controlled trial

Fig. 1



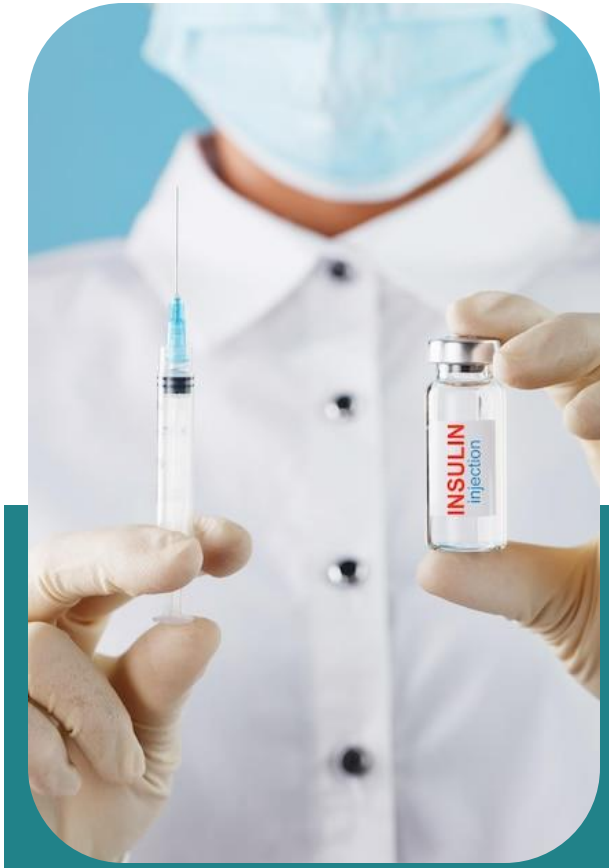
Individual changes in **A** flow-mediated vasodilation (FMD) and **B** nitroglycerine-induced dilation (NID) from baseline to 6 months in patients with type 2 diabetes randomized to either a LCD (red circles/lines) or a control diet (blue circles/lines)

Fig. 2



Changes in **A** plasma IL-6 and **B** serum hsCRP from baseline to 6 months in patients with type 2 diabetes randomized to either a LCD (red boxplots) or a control diet (blue bloxplots). *p < 0.05, within group change

14-Day Ketone Supplementation Lowers Glucose and Improves Vascular Function in Obesity: A Randomized Crossover Trial
Walsh et al.2021



In a randomized crossover design,

14 participants with **obesity (age = 56 ± 12 years; body mass index = 32.8 ± 7.7 kg/m2)**

consumed KME (12 g β-OHB) or a placebo 15 minutes before each meal for 14 days with all meals provided and matched between conditions

Postprandial glucose was 8.0% lower in KME versus placebo ($g = 0.735$; $P = 0.011$) and 24-hour average glucose reduced by 7.8% ($g = 0.686$; $P = 0.0001$)

Brachial artery flow-mediated dilation increased from 6.2 ± 1.5% to 8.9 ± 3.3% in KME ($g = 1.05$; $P = 0.0004$) with no changes in placebo (condition × time interaction, $P = 0.004$)

In adults with obesity, 14 days of premeal KME supplementation improves glucose control, enhances vascular function, and may reduce cellular inflammation

nutrients

MDPI

Review

Nutritional Strategies for the Management of Type 2 Diabetes Mellitus: A Narrative Review

Tatiana Palotta Minari [1,*], Lúcia Helena Bonalume Tácito [2], Louise Buonalumi Tácito Yugar [3], Sílvia Elaine Ferreira-Melo [4], Carolina Freitas Manzano [1], Antônio Carlos Pires [2], Heitor Moreno [4], José Fernando Vilela-Martin [1], Luciana Neves Cosenso-Martin [2] and Juan Carlos Yugar-Toledo [1]

Objective

This narrative review examines various dietary strategies for managing T2DM, including **Mediterranean diet, low-carbohydrate and low-fat diets, DASH, ketogenic diets, and plant-based eating patterns.**

Methode

A search was carried out in 2023 for randomized clinical trials, systematic reviews, meta-analyses, and guidelines.

In total, 202 articles were collected and analyzed.

Minari, T.P., et al., *Nutritional Strategies for the Management of Type 2 Diabetes Mellitus: A Narrative Review.* Nutrients, **2023**. 15(24): p. 5096.

Mediterranean Diet

- **Composition**: 40–50% carbohydrates, 15–25% proteins, 25–35% fats (with <7% saturated, 10% PUFA, and 10% MUFA).
- **Benefits**: High level of evidence supporting its long-term benefits for glycemic control and overall health.

Low-carb and ketogenic Diet

- **Composition**: Emphasizes reduced carbohydrate intake.
- **Benefits**: Can lead to significant improvements in glycemic control and weight loss.
- **Challenges**: Long-term adherence may be difficult for some individuals.

Plant-Based Diet

- **Composition**: Focuses on high-quality foods such as fruits, vegetables, legumes, whole grains, and nuts, excluding animal products.
- **Benefits**: Evidence supports improvements in glycemic control, cardiovascular health, and weight loss.
- **Challenges**: Requires careful monitoring to prevent deficiencies in micronutrients like iron, calcium, and vitamin B12.

Very Low-Fat Diet (Ornish and Pritikin Diets)

- **Composition**: Very low fat (around 10% of total energy), focusing on whole foods, vegetables, legumes, and low-fat dairy.
- **Benefits**: Potential improvements in glycemic control and cardiovascular health.
- **Challenges**: Low adherence rates and potential metabolic issues due to very low fat intake.

Paleolithic Diet

- **Composition**: Mimics the eating habits of early humans, including meats, fruits, vegetables, and nuts, while excluding processed foods.
- **Benefits**: May improve metabolic markers and promote weight loss.
- **Challenges**: Limited scientific support and potential for nutrient imbalances.

DASH Diet

- **Composition**: Similar to the Mediterranean diet, it focuses on fruits, vegetables, whole grains, lean proteins (like fish and chicken), low-fat dairy, nuts, and seeds with a focus on sodium restriction.
- **Benefits**: It is well-supported by evidence for improving HbA1C, blood pressure, total cholesterol, and weight, especially in those with T2DM and hypertension.

Conclusions

There is still no consensus on the best nutritional strategy or ideal dietary prescription, and dietary prescriptions should be individualized based on personal health goals, preferences, and metabolic needs.

However, several references show that a **Mediterranean diet may bring greater benefits in the long term,** including 40–50% carbohydrates; 15–25% proteins; 25–35% fats (<7% saturated, 10% PUFA, and 10% MUFA); at least 14 g of fiber for every 1000 kcal consumed; and <2300 mg sodium.

THE LANCET
Diabetes & Endocrinology

5-year follow-up of the randomised Diabetes Remission Clinical Trial (DiRECT) of continued support for weight loss maintenance in the UK: an extension study

Michael EJ Lean, Wilma S Leslie, Alison C Barnes, Naomi Brosnahan, George Thom, Louise McCombie, Tara Kelly, Keaton Irvine, Carl Peters, Sviatlana Zhyzhneuskaya, Kieren G Hollingsworth, Ashley J Adamson, Falko F Sniehotta, John C Mathers, Yvonne McIlvenna, Paul Welsh, Alex McConnachie, Alasdair McIntosh, Naveed Sattar, Roy Taylor**

Study Objective

evaluate the effectiveness of a structured weight management program for individuals with T2D in achieving significant weight loss (>5% of BW) and diabetes remission

DiRECT Diabetes Remission Clinical Trial

Lean, M.E., et al., *5-year follow-up of the randomised Diabetes Remission Clinical Trial (DiRECT) of continued support for weight loss maintenance in the UK: an extension study.* The Lancet Diabetes & Endocrinology, **2024**. 12(4): p. 233-246

Methods

Subjects

- The study recruited 298 individuals aged 20–65 years, diagnosed with T2D within the previous 6 years, living in Scotland and northeast England, with a BMI of 27 to 45 kg/m², and not receiving insulin

Intervention design

- Withdrawal of antidiabetic and antihypertensive medications
- Phase 1: **Very Low-Calorie Diet (825-853 kcal/d) for 12-20 weeks using a nutritionally complete formula**
- Phase 2: **Stepped Food Reintroduction over 2-8 weeks, with meals added back step-by-step**
- Phase 3: **Weight-Loss Maintenance Support provided through ongoing, low-intensity dietary guidance**

Control group

- Received standard care for T2D without any additional intervention or structured weight management program.

Primary Outcomes

- The main measure was diabetes remission, defined as achieving normal glucose levels without diabetes medications, with an emphasis on maintaining weight loss.

DiRECT
Diabetes Remission Clinical Trial

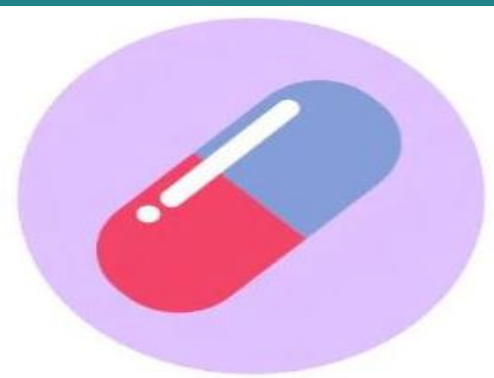
Findings

- The study found that participants in the **intervention group experienced a mean weight loss of 6.1 kg at year 5, compared to a mean weight loss of 4.6 kg in the control group** (p<0.0001).

- Additionally, **34% of the intervention group achieved remission (HbA1c <6.5% without medication) compared to 12% in the control group** (p<0.0001).

- The **intervention group also had a higher percentage of visits with HbA1c <48 mmol/mol (36% vs 17%, p=0.0004) and without glucose-lowering medication** (62% vs 30%, p<0.0001).

Interpretation: The extended DiRECT intervention was associated with greater aggregated and absolute weight loss, and suggested improved health status over 5 years.



DiRECT
Diabetes Remission Clinical Trial

ASN EST. 1928
American Society for Nutrition
Excellence in Nutrition Research and Practice

The American Journal of CLINICAL NUTRITION

journal homepage: www.journals.elsevier.com/the-american-journal-of-clinical-nutrition

Original Research Article

Effect of calorie restriction in comparison to usual diet or usual care on remission of type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials

Ahmad Jayedi [1,2], Sheida Zeraattalab-Motlagh [2], Hossein Shahinfar [3], Edward W. Gregg [4], Sakineh Shab-Bidar [2,*]

Methode

Systematic search conducted in multiple databases up to **November 2022**

Inclusion of **28 randomized trials examining calorie-restricted diets in adults with T2D over 12 weeks**, compared to usual diet or usual care

Primary Outcome: **Diabetes remission, measured by reductions in HbA1c and fasting glucose levels**

Secondary Outcomes: **Changes in body weight, blood pressure, cholesterol levels**, and quality of life indicators

Jayedi, A., et al., *Effect of calorie restriction in comparison to usual diet or usual care on remission of type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials*. The American Journal of Clinical Nutrition, **2023**, 117(5): p. 870-882

Types of calorie-restricted diets included in the meta-analysis

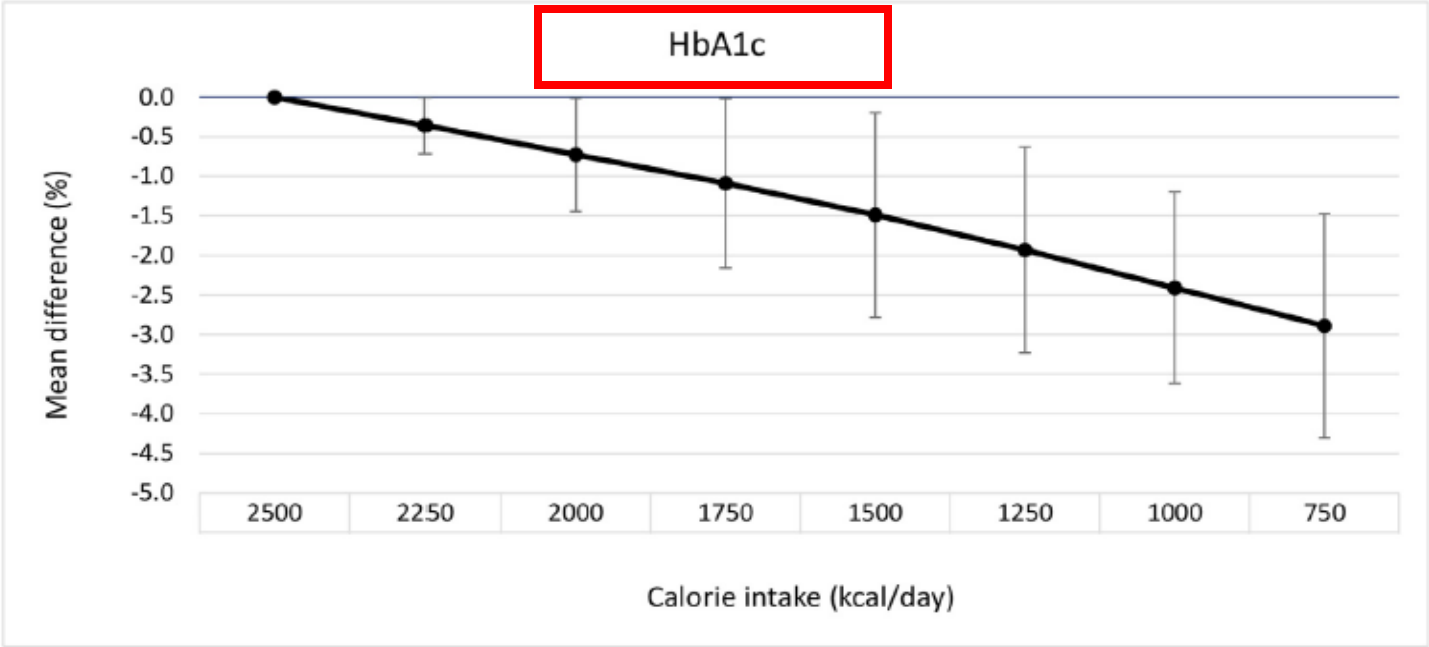
. Very low-calorie diet (500–800 kcal/d)

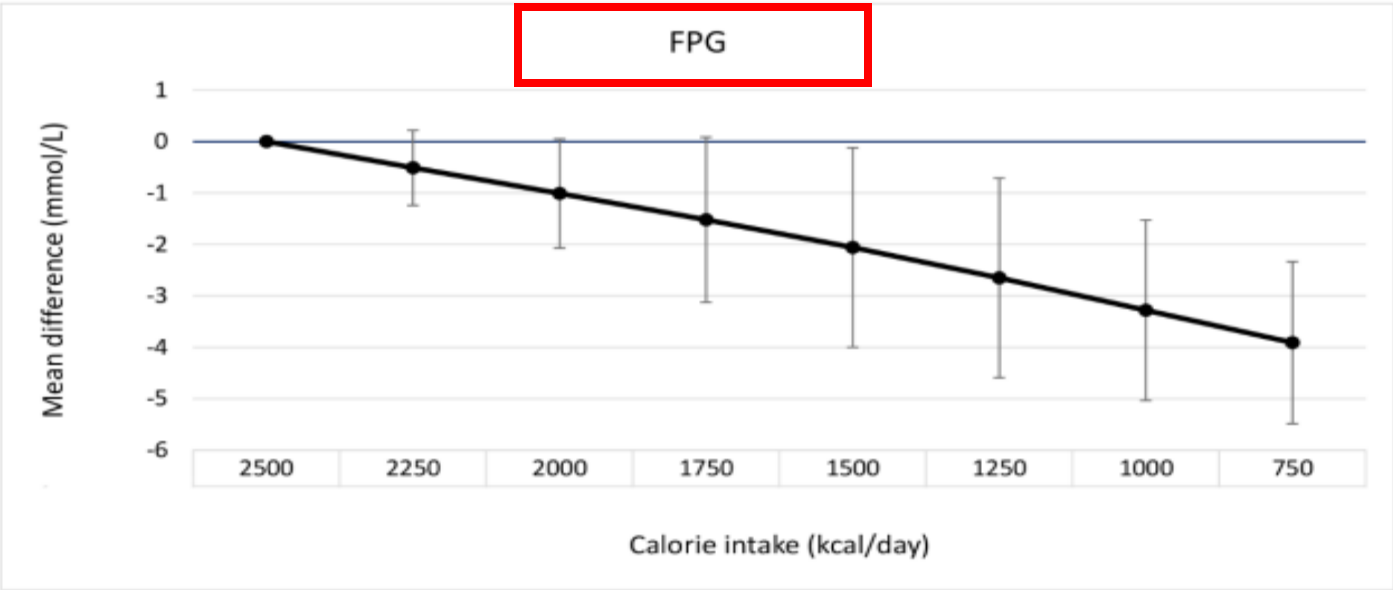
- low-calorie diet (800–1200 kcal/d)

. Moderately restricted calorie diet (1200–1500 kcal/d)

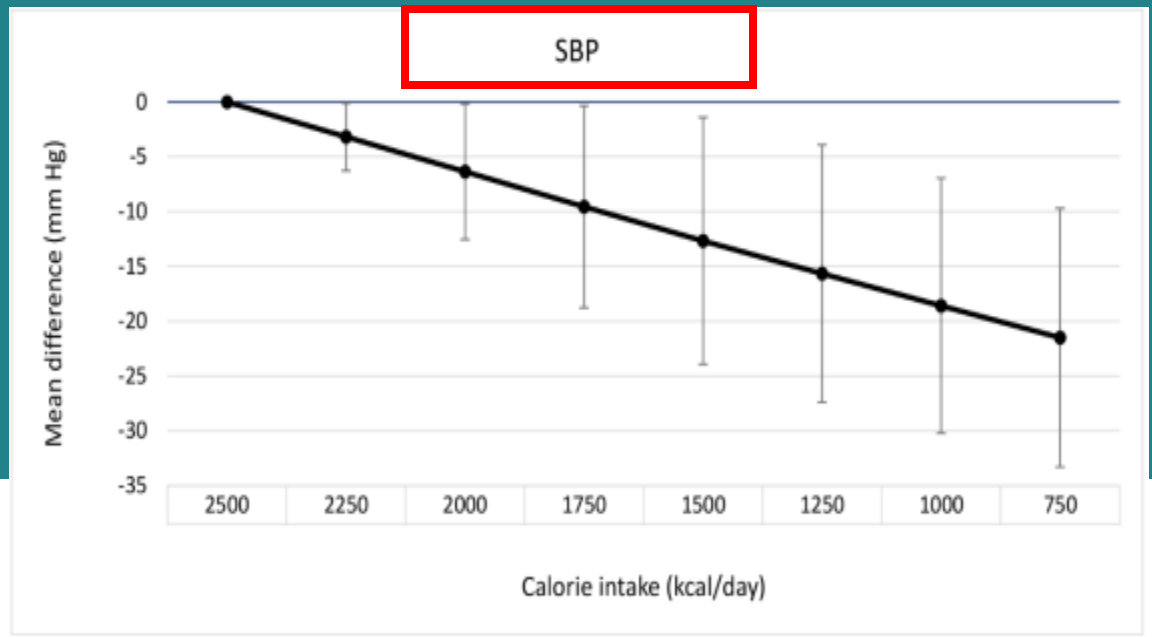
- Calorie-restricted diet with an average calorie intake of between 1500 and 1800 kcal/d

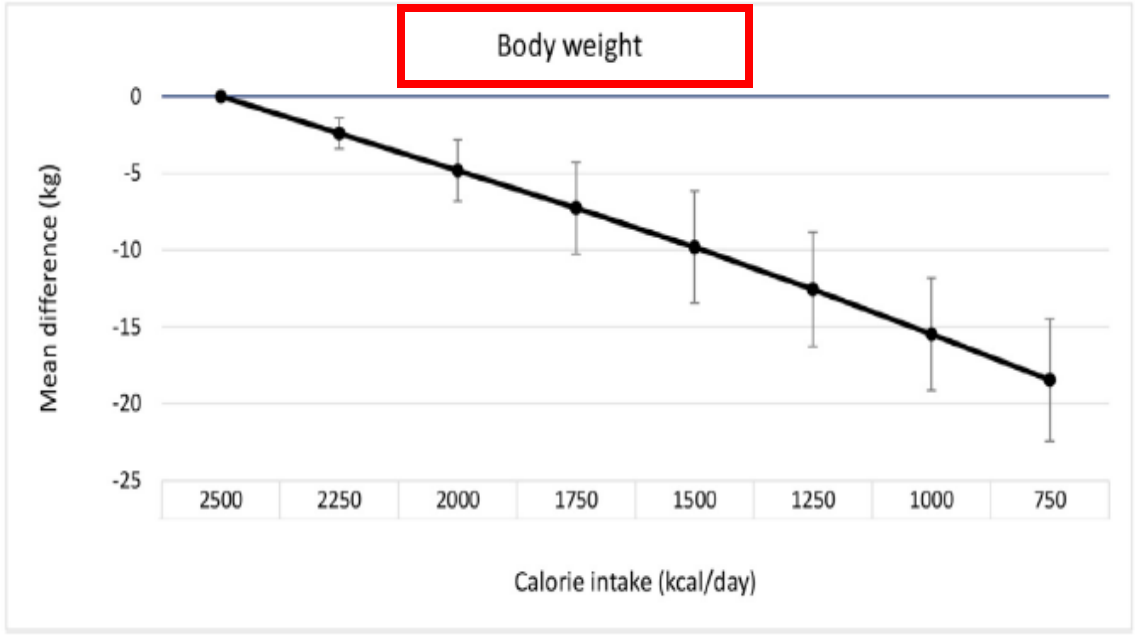
Dose-dependent effects of calorie restriction at 6-mo follow-up

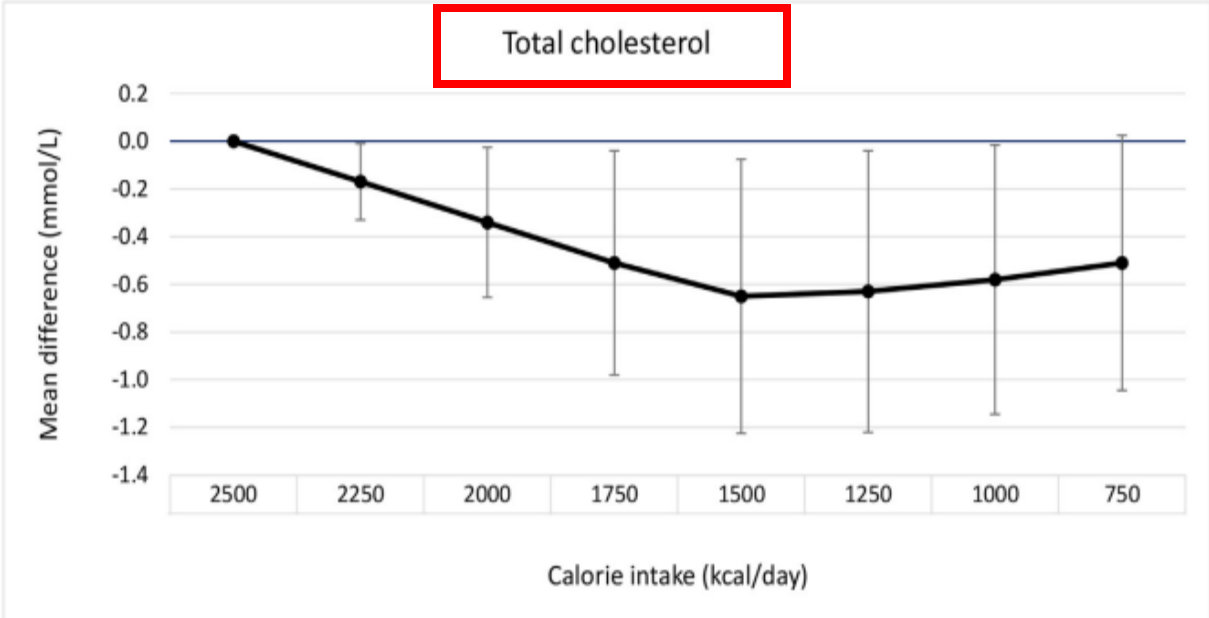




Dose-dependent effects of calorie restriction at 6-mo follow-up







+ calorie-restricted diets, regardless of macronutrient composition, can increase the remission rate in T2D at 6-mo, 12-mo, and 2-y endpoints, especially when coupled with an intensive lifestyle modification program

Review Article

Nutritional strategies for intervention of diabetes and improvement of β-cell function

Siying Wei, Chenchen Li, Zinan Wang and Yan Chen

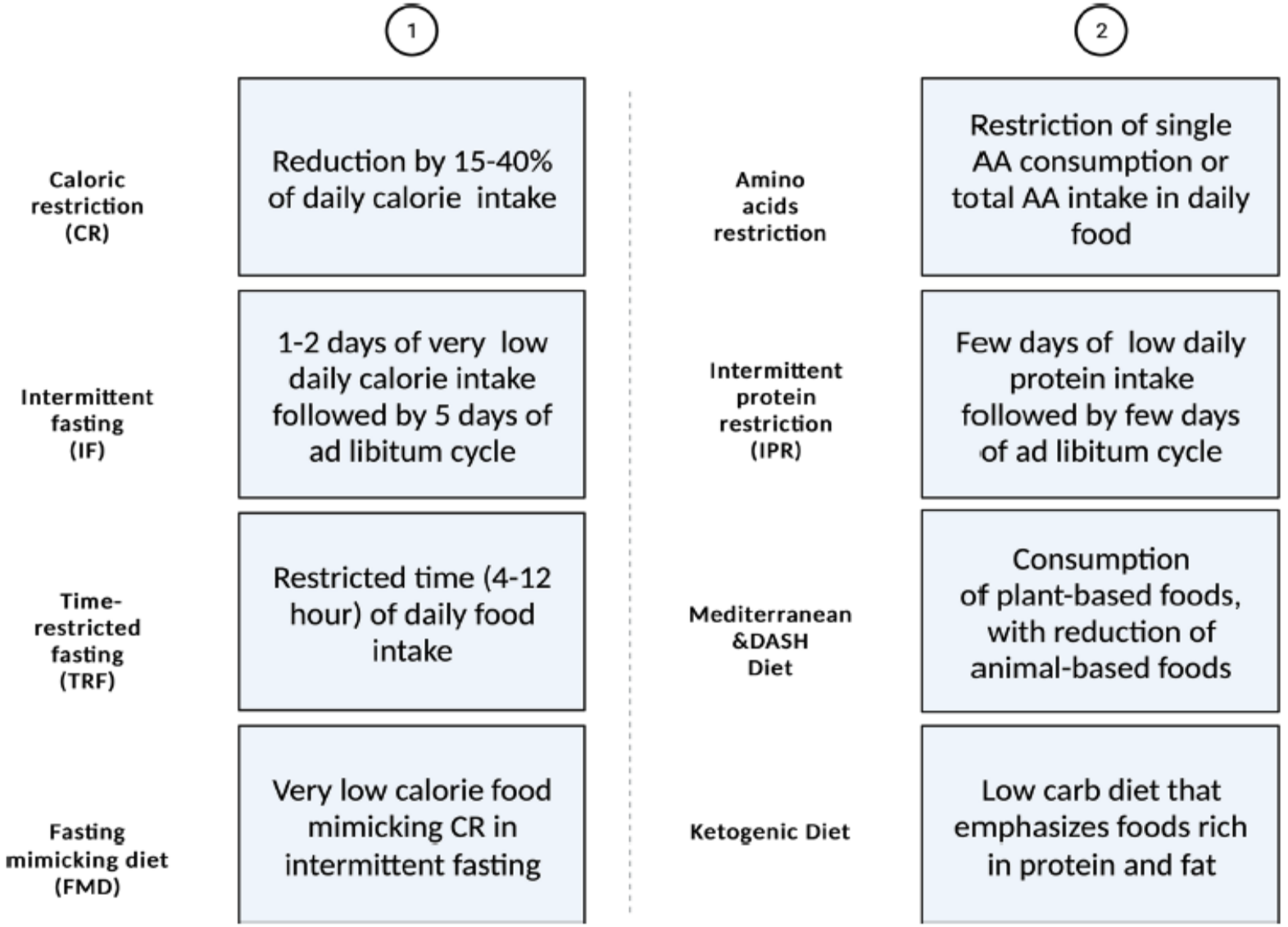
CAS Key Laboratory of Nutrition, Metabolism and Food Safety, Shanghai Institute of Nutrition and Health, University of Chinese Academy of Sciences, Chinese Academy of Sciences, Shanghai 200031, China

- In this review, some of the commonly used nutritional methods for diabetes intervention were summarized.

Wei, S., et al., *Nutritional strategies for intervention of diabetes and improvement of β-cell function.* Bioscience Reports, **2023**. 43(2): p. BSR20222151.

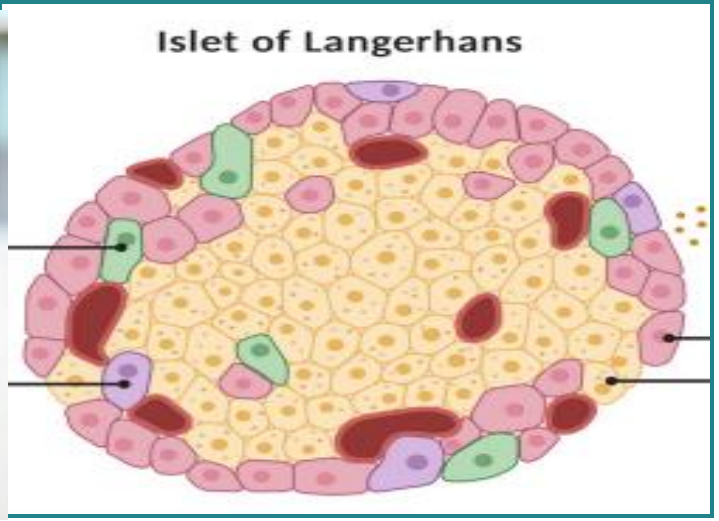
Two main nutritional strategies for T2D intervention

The first method is based on caloric restriction, which significantly reduces blood glucose and insulin resistance. Clinical studies have shown that very low-calorie diets can lead to improved insulin sensitivity.



The second method is based on the alteration of nutrients without changing total calorie intake. Studies indicate that this approach can also effectively manage blood glucose levels and improve insulin secretion.

In summarizing current nutritional intervention strategies for diabetes, it is well noted that **most of the strategies have beneficial effects** not only on **lowering blood glucose and improving insulin sensitivity** but also on the increase of β-cell mass and **improvement of β-cell function** in pancreatic islets in animal models and patients with **T2D.**



Original article

Metabolic effects of very-low calorie diet, Semaglutide, or combination of the two, in individuals with type 2 diabetes mellitus

Oluwaseun Anyiam [a, b], Bethan Phillips [a], Katie Quinn [c], Daniel Wilkinson [a], Kenneth Smith [a], Philip Atherton [a, **, 1], Iskandar Idris [a, b, *, 1]

This study was a single-center, open-label, randomized, parallel-group pilot trial aimed to compare the short-term effects of a very low-calorie diet (VLCD) and the GLP-1 receptor agonist Semaglutide, separately and together, on weight, body composition, and metabolic outcomes in patients with T2D.

Anyiam, O., et al., *Metabolic effects of very-low calorie diet, Semaglutide, or combination of the two, in individuals with type 2 diabetes mellitus.* Clinical Nutrition, **2024**. 43(8): p. 1907-1913.

Key Features of the Study Design

Participants: 32 adults aged 18-75 with a BMI of 27-50 kg/m² and a confirmed diagnosis of T2D were recruited.

Randomization: Participants were randomly assigned in a 1:1:1 ratio to one of three groups for a 12-week intervention:

Group A: **Once-weekly subcutaneous Semaglutide (SEM)**
Group B: **800 kcal per day Very Low-Calorie Diet (VLCD)**
Group C: **Combined Semaglutide and VLCD (COMB)**

Dietary Compliance: Participants maintained a 4-day diet diary to estimate habitual nutritional intake.

Measurements: Baseline and post-intervention assessments were conducted, including weight, body composition, and glycaemic measures.

Results of the Study

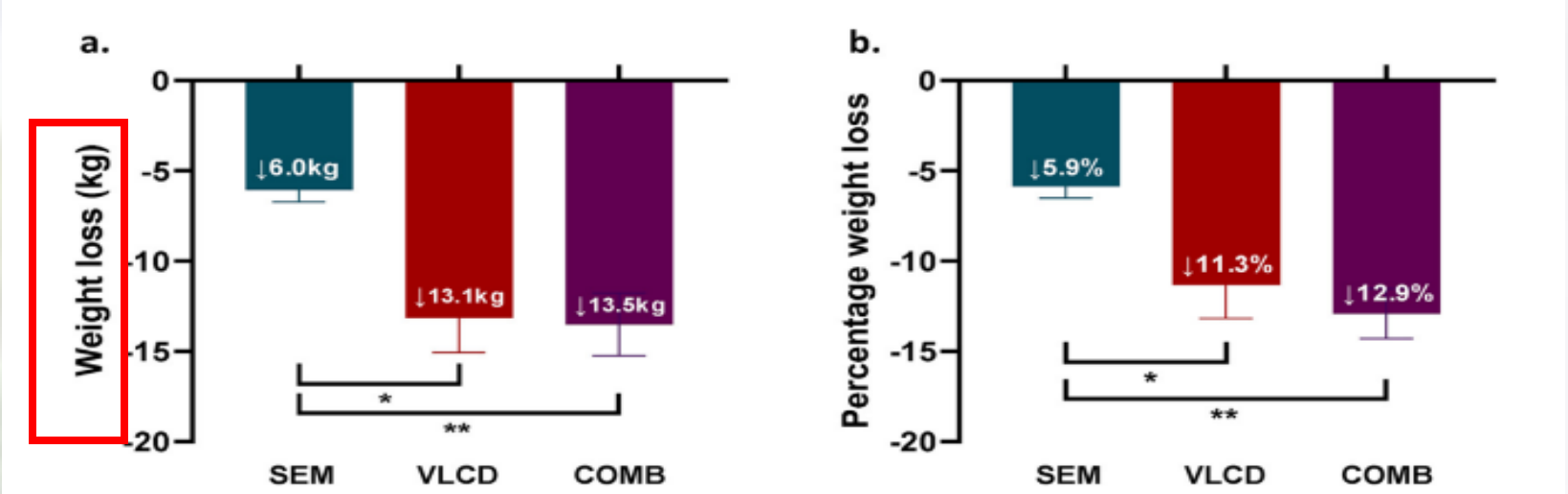


Fig. 1. Absolute weight loss (a) and percentage weight loss (b) in each group. *p < 0.05, **p < 0.01.

Fat Mass (FM)

SEM: Reduction from 43.5 ± 3.2 kg to 39.5 ± 3.3 kg ($p < 0.01$).

VLCD: Reduction from 52.3 ± 4.2 kg to 43.3 ± 5.1 kg ($p < 0.0001$).

COMB: Reduction from 44.6 ± 4.9 kg to 35.6 ± 4.6 kg ($p < 0.0001$).

Lean Body Mass (LBM)

No significant differences among groups, with reductions of SEM -1.7 ± 0.6 kg, VLCD -3.8 ± 0.8 kg, COMB -3.3 ± 1.0 kg.

Results of the Study

HbA1c and fasting glucose reduced significantly in all groups, however fasting insulin and HOMA-IR improved in VLCD and COMB only.

HbA1c Levels

SEM: Decrease of 9.7 ± 3.1 mmol/mol

VLCD: Decrease of 14.9 ± 3.6 mmol/mol

COMB: Decrease of 20.9 ± 3.9 mmol/mol

Energy Intake Changes
Total Energy Intake:

SEM: Reduced from 1603.9 ± 229.1 kcal to 1123.9 ± 90.8 kcal ($p < 0.05$)

VLCD: Reduced from 1859.1 ± 138.0 kcal to 712.5 ± 32.1 kcal ($p < 0.0001$)

COMB: Reduced from 1762.6 ± 168.7 kcal to 626.1 ± 33.7 kcal ($p < 0.0001$)

Conclusion of the Study

- **VLCD elicited greater short-term losses of weight and fat mass than Semaglutide. Adding VLCD to Semaglutide stimulated further weight loss than Semaglutide alone. The combination did not yield any additive effects on weight and body composition above VLCD alone, but did provoke greater improvements in pancreatic beta-cell function.**

- **Thus, combination of Semaglutide and VLCD warrants further exploration as a novel approach to T2D management**

Diet in the management of type 2 diabetes: umbrella review of systematic reviews with meta-analyses of randomised controlled trials

Edyta Szczerba [1,2] Janett Barbaresko [1] Tim Schiemann,[1] Anna Stahl-Pehe [1,2]
Lukas Schwingshackl [3] Sabrina Schlesinger [1,2]

Objective

To systematically summarize and evaluate the existing evidence on the effect of diet on the management of T2D and prevention of complications, with a literature search conducted from inception up to 5 June 2022.

Key findings

High-certainty evidence supports liquid meal replacement diets for reducing body weight (mean difference −2.37 kg, 95% CI: −3.30 to −1.44) and BMI (−0.87, −1.32 to −0.43), and low-carbohydrate diets (<26% energy) for lowering HbA1c (−0.47%, −0.60% to −0.34%) and triglycerides(−0.30 mmol/L, −0.43 to −0.17).

Moderate-certainty evidence also suggests benefits from plant-based and Mediterranean diets, and high protein intake for improving glycemic and lipid markers.

Szczerba, E., et al., Diet in the management of type 2 diabetes: umbrella review of systematic reviews with meta-analyses of randomised controlled trials. BMJ medicine, **2023**. 2(1).

Is it ok to drink sugar-sweetened beverages?

SYSTEMATIC REVIEW article
Front. Nutr., 14 March 2023
Sec. Clinical Nutrition
Volume 10 - 2023 | https://doi.org/10.3389/fnut.2023.1019534

Consumption of sugar sweetened beverages, artificially sweetened beverages and fruit juices and risk of type 2 diabetes, hypertension, cardiovascular disease, and mortality: A meta-analysis

Evidence regarding associations of artificially sweetened beverages (ASBs) and fruit juices with cardiometabolic diseases is mixed!

A total of 20 studies with a total of 70,674 T2D cases in 1,246,307 participants investigated the associations between beverage consumption and T2D risk

A significant positive association was found between the consumption of individual beverages and the risk of T2D

(RR: 1.27; 95% CI: 1.17, 1.38 for SSBs; RR: 1.32; 95% CI: 1.11, 1.56 for ASBs; and RR:0.98; 95% CI: 0.93, 1.03 for fruit juices)

Li, B., et al., *Consumption of sugar sweetened beverages, artificially sweetened beverages and fruit juices and risk of type 2 diabetes, hypertension, cardiovascular disease, and mortality: A meta-analysis.* Front Nutr, 2023. **10**: p. 1019534.

frontiers | Frontiers in Nutrition

TYPE Original Research
PUBLISHED 25 May 2023
DOI 10.3389/fnut.2023.1201010

How is healthy eating index-2015 related to risk factors for cardiovascular disease in patients with type 2 diabetes

Mobina Zeinalabedini[1,2], Ensieh Nasli-Esfahani[3], Ahmad Esmaillzadeh[1] and Leila Azadbakht[1,3,4]*

More adherence to HEI among diabetic patients reduces about 50% of the odds of

- atherogenic index of plasma (AIP)
- body roundness index (BRI)

Variables	Tertiles of HEI-2015			*p*-trend
	T_1 (*n*=173)	T_2 (*n*=160)	T_3 (*n*=157)	
AIP				
Crude	1.00	0.51 (0.32–0.82)	0.54 (0.34–0.87)	0.01
Model 1	1.00	0.53 (0.33–0.86)	0.56 (0.34–0.90)	0.01
Model 2	1.00	0.54 (0.33–0.88)	0.56 (0.33–0.93)	0.02
Model 3	1.00	0.55 (0.33–0.89)	0.56 (0.34–0.94)	0.02
BRI				
Crude	1.00	0.88 (0.55–1.42)	0.59 (0.37–0.94)	0.02
Model 1	1.00	0.69 (0.39–1.21)	0.42 (0.24–0.74)	0.003
Model 2	1.00	0.73 (0.41–1.30)	0.52 (0.29–0.95)	0.03

Zeinalabedini, M., Nasli-Esfahani, E., Esmaillzadeh, A. and Azadbakht, L., 2023. How is healthy eating index-2015 related to risk factors for cardiovascular disease in patients with type 2 diabetes. Frontiers in Nutrition, 10, p.1201010.

Farahmand *et al. BMC Endocrine Disorders* (2023) 23:15
https://doi.org/10.1186/s12902-022-01209-x

BMC Endocrine Disorders

RESEARCH Open Access

What is the impact of vitamin D supplementation on glycemic control in people with type-2 diabetes: a systematic review and meta-analysis of randomized controlled trails

Mohammad Ashraf Farahmand[1,2†], Elnaz Daneshzad[3†], Teresa T. Fung[4,5], Fawzia Zahidi[1], Maryam Muhammadi[6], Nick Bellissimo[7] and Leila Azadbakht[1,8*]

- **Vitamin D supplementation** might be benefcial for the reduction of FPG, HbA1c, and HOMA-IR in type 2 diabetes patients with deficient vitamin D status.
- **This effect was especially prominent when vitamin D was given in large doses and for a short period of time.**

Farahmand, M.A., Daneshzad, E., Fung, T.T., Zahidi, F., Muhammadi, M., Bellissimo, N. and Azadbakht, L., 2023. What is the impact of vitamin D supplementation on glycemic control in people with type-2 diabetes: a systematic review and meta-analysis of randomized controlled trails. BMC Endocrine Disorders, 23(1), p.15.

Association of dietary antioxidant indices with kidney function indicators in patients with type 2 diabetes: a cross-sectional study

Noushin Omid, Ensieh Nasli Esfahani, Razieh Tabaeifard, Mohsen Montazer & Leila Azadbakht

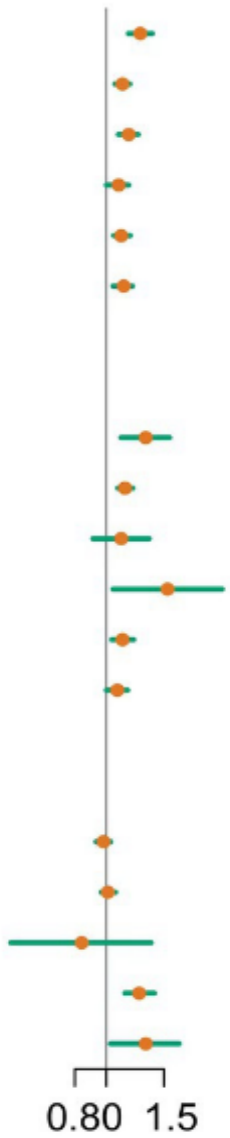
Scientific Reports **14**, Article number: 22991 (2024) | Cite this article

The results of the logistic regression analysis indicated:

- A borderline significant **inverse association** of serum urea > 20 mg/dl with dietary total antioxidant capacity (odds ratio (OR):0.28; 95% CI: 0.07–1.09; $P_{trend} = 0.06$).
- Multivariable linear regression analysis revealed a significant aligned correlation between dietary antioxidant quality scores and GFR (β: 0.20; P-value: 0.005)
- However, no significant association was observed for DTAC with GFR (β:-0.02; P-value: 0.80).

Omid, N., Esfahani, E.N., Tabaeifard, R., Montazer, M. and Azadbakht, L., 2024. Association of dietary antioxidant indices with kidney function indicators in patients with type 2 diabetes: a cross-sectional study. *Scientific Reports*, *14*(1), p.22991.

	No of Stuidies	No of events	No of participants	Relative risk (95%CI)
SSB				
T2D	17	30,666	566,178	1.27 (1.17,1.38)
Hypertension	8	82,418	258,721	1.12 (1.08,1.17)
CHD	7	16,814	590,466	1.17 (1.09,1.25)
Stroke	7	13,793	302,669	1.09 (1.00,1.17)
All−cause mortality	14	121,488	1,131,605	1.11 (1.05,1.16)
CVD mortality	9	18,846	729,644	1.13 (1.05,1.20)
ASB				
T2D	10	21,290	367,447	1.32 (1.11, 1.56)
Hypertension	4	78,225	227,254	1.14 (1.10, 1.18)
CHD	3	6,943	133,967	1.11 (0.91, 1.35)
Stroke	2	332	5,452	1.54 (1.05, 2.26)
All−cause mortality	7	95,704	836,161	1.12 (1.04, 1.21)
CVD mortality	4	8,572	209,379	1.08 (1.00, 1.16)
Fruit juice				
T2D	6	18,718	312,682	0.98 (0.93, 1.03)
Hypertension	2	46,817	86,663	1.01 (0.97, 1.04)
Stroke	2	1,705	148,939	0.84 (0.51, 1.37)
All−cause mortality	2	5,904	53,514	1.26 (1.14, 1.40)
CVD mortality	2	1,197	53,514	1.32 (1.03, 1.67)



Association between DASH and novel atherogenic risk factors, anthropometric indices and foot ulcer indicators in type 2 diabetic patients with foot ulcer: a cross-sectional study

Moharam Jalalzadeh [1 2], Ensieh Nasli-Esfahani [3], Mohsen Montazer [1 2], Faezeh Geravand [1 2], Mohammad Heidari-Seyedmahalle [1 2], Maryam Mahmoodi [4], Leila Azadbakht [1 3 5]

Methods

The study included 339 diabetic patients with foot ulcers (122 females and 217 males).

Data were collected on dietary intake, anthropometric indices , biochemistry, foot ulcers, and novel atherogenic risk factors according to international definitions.

Results

The average BMI of the participants was 29.2 ± 5.0, 28.1 ± 4.3, and 28.2 ± 4.2 in the tertiles of DASH index (P= 0.18).

By increasing the adherence to the DASH index, the monofilament score did not change significantly OR: 1.47; CI: (0.81-2.67).

Foot ulcer area did not change significantly between DASH tertiles OR: 1.01; CI: (0.56-1.83).

Atherogenic risk factors also decreased among the DASH tertiles, but statistically not significant.

Jalalzadeh, M., et al., *Association between DASH and novel atherogenic risk factors, anthropometric indices and foot ulcer indicators in type 2 diabetic patients with foot ulcer: a cross-sectional study.* J Diabetes Metab Disord, 2024. **23**(1): p. 1315-1327.

The Effect of the Dietary Approaches to Stop Hypertension (DASH) Diet on Sleep, Mental Health, and Hormonal Changes: A Randomized Clinical Trial in Women With Type 2 Diabetes

Elnaz Daneshzad [1], Javad Heshmati [2], Vahid Basirat [3], Seyed-Ali Keshavarz [4], Mostafa Qorbani [1 5], Bagher Larijani [6], Nick Bellissimo [7], Leila Azadbakht [8 9]

Methods

- This RCT involved 66 diabetic women, randomly assigned to either the DASH diet or control diet group for 3 months.

Results

- **Anthropometric indices, HbA1c, and FSH significantly decreased over 12 weeks in both the groups** (P<.0001).
- **Testosterone, 2-h postprandial glucose (2hPPG), and AGEs significantly decreased over 12 weeks in the DASH diet group** (P < 0.0001).
- **Sleep, depression, and anxiety scores significantly decreased over 12 weeks in the DASH diet group. Night sleep duration significantly increased over 12 weeks in the DASH diet group** (P < 0.0001).

Daneshzad, E., et al., The Effect of the Dietary Approaches to Stop Hypertension (DASH) Diet on Sleep, Mental Health, and Hormonal Changes: A Randomized Clinical Trial in Women With Type 2 Diabetes. Front Nutr, 2022. 9: p. 775543.

The Effect of Zinc Supplementation on Lipid Profiles in Patients with Type 2 Diabetes Mellitus: A Systematic Review and Dose–Response Meta-Analysis of Randomized Clinical Trials

Systematic search conducted in multiple databases up to **September 2022.**

Fourteen RCT consisting of 1067 patients were included in the statistical analysis.

Zinc supplementation led to significant decreases in **TC** (WMD: -16.16; 95% CI: -26.43, -5.89; *P* = 0.002), **LDL** (WMD: -6.18; 95% CI: -9.35, -3.02; *P* < 0.001), and **TG** (WMD: -13.08; 95% CI: -21.83, -4.34; *P* = 0.003). Also, a **significant increase in HDL** (WMD: 3.76; 95% CI: 1.30, 6.22; *P* = 0.003) was observed across 13 studies

In a nonlinear dose–response analysis, a significant inverse association was observed between <12 wk zinc supplementation and TC, LDL, and TG (TC: WMD: -5, Pnonlinearity < 0.001; LDL: WMD: -5, Pnonlinearity=0.07, TG: WMD: -16.5, Pnonlinearity=0.006)

Nonlinear dose–response analysis shows that the optimum elemental zinc dosage for the best response to the supplementation for TC, LDL, and TG are 120, 100, and 140 mg/d, respectively (TC: WMD: -5, Pnonlinearity <0.001; LDL: WMD: -10, Pnonlinearity = 0.006, TG: WMD: -50, Pnonlinearity = 0.031)

Heidari Seyedmahalleh, M., et al., *The Effect of Zinc Supplementation on Lipid Profiles in Patients with Type 2 Diabetes Mellitus: A Systematic Review and Dose-Response Meta-Analysis of Randomized Clinical Trials.* Adv Nutr, 2023. **14**(6): p. 1374-1388.

Any question?
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