

Academy of Nutrition and Dietetics Nutrition Practice Guideline for Type 1 and Type 2 Diabetes in Adults: Nutrition Intervention Evidence Reviews and Recommendations



Janice MacLeod, MA, RDN; Marion J. Franz, MS, RDN; Deepa Handu, PhD, RDN; Erica Gradwell, MS, RDN; Catherine Brown, MS, RDN; Alison Evert, MS, RDN; Adam Reppert, MS, RDN; Megan Robinson, MS, RDN

THE ACADEMY OF NUTRITION and Dietetics (Academy) Nutrition Practice Guideline (NPG) for Type 1 and Type 2 Diabetes in Adults is a newly developed guideline.¹ It has also been published in the Academy's Evidence Analysis Library (EAL).² The NPG updates the 2008 Diabetes Type 1 and 2 Evidence-Based NPG for Adults.^{3,4} Evidence for the effectiveness of medical nutrition therapy (MNT) provided by registered dietitian nutritionists (RDNs) and the integration of MNT into the Nutrition Care Process is reviewed in an accompanying article.¹ MNT plays a critical role in managing both types of diabetes, reducing the potential complications related to poor glycemic, lipid, and blood pressure control, and improving quality of life.^{1,2,5,6} The need to provide clients with evidence-based nutrition care is essential for providing optimum diabetes care.

Diabetes MNT recommendations for adults are often more related to the management of diabetes (nutrition therapy alone, glucose-lowering medications, and/or insulin) than the type of diabetes (type 1 or type 2). Therefore, the Academy's NPG is for adults with type 1 or type 2 diabetes. When a recommendation is specific for an adult with type 1 or type 2 diabetes it is noted.

This article summarizes nutrition interventions for type 1 and type 2 diabetes in adults (the EAL review and conclusion statements), states the

evidence-based NPG recommendations, reviews research published after the completion of the EAL review (through June 2016), and identifies limitations and gaps in knowledge that require further research.

REVIEW METHODOLOGY

The Academy has adopted a five-step process to conduct systematic reviews for the EAL and to develop NPG recommendations for RDNs and other members of health care teams.⁷

- Step 1: Formulate the evidence analysis question.
- Step 2: Gather and classify evidence (data collection).
- Step 3: Critically appraise each article (risk of bias).
- Step 4: Summarize the evidence.
- Step 5: Write and grade the conclusion statement.

Based on the systematic review and conclusion statements, NPG recommendations are made and integrated into the Nutrition Care Process (nutrition assessment, nutrition diagnosis, nutrition intervention, and nutrition monitoring and evaluation). The Academy's Evidence Based Practice Committee appointed an expert panel to update the 2008 diabetes NPG. The expert panel implemented the five-step process.⁷

Subtopics and Questions

For the review, the expert panel identified a total of 13 subtopics and 19 questions. Eight of the subtopics and 14 questions are related to nutrition therapy interventions. Five subtopics and 5 questions are related to the effectiveness of MNT provided by RDNs

and were used to formulate the Nutrition Care Process recommendations. The following are the review questions for diabetes-related nutrition interventions.

For adults with type 1 and type 2 diabetes:

1. Is there an ideal nutrition prescription?
2. What are recommendations for energy intake in an eating plan?
3. Is there a desirable macronutrient composition of an eating plan?
4. What carbohydrate management strategies (such as carbohydrate counting alone, carbohydrate counting using insulin-to-carbohydrate ratios, carbohydrate consistency, plate method, exchange lists/food lists/carbohydrate choices) are effective in terms of glycemia (glycated hemoglobin [HbA1c] or glucose), insulin (exogenous and endogenous) levels, medication adjustments (insulin and other glucose-lowering medications), and other outcomes (such as weight and quality of life)?
5. What is the relationship of differing amounts of fiber in the eating plan (excluding supplements and fiber-added foods), independent of weight loss, on glycemia and cardiovascular (CVD) risk factors (lipids and blood pressure)?
6. What is the relationship of differing levels of glycemic index (GI) intake, independent of weight loss on glycemia,

insulin, and CVD risk factors (ie, lipid levels and blood pressure)?

7. What is the relationship among differing intakes of nutritive sweeteners, independent of weight loss, on glycemia, insulin levels (exogenous and endogenous), and other outcomes?
8. What is the relationship of differing intakes and types of Food and Drug Administration (FDA)-approved nonnutritive sweeteners (steviol glycosides, sucralose, saccharin, acesulfame K [ace-K], aspartame, and neotame) on glycemia (HbA1c or glucose)?
9. What is the relationship among differing intakes of protein, independent of weight loss, on glycemia (HbA1c or glucose) and in persons with diabetic kidney disease, on glomerular filtration rate?
10. What is the relationship among differing intakes of saturated and unsaturated fatty acids, independent of weight loss, on lipid levels, glycemia (HbA1c or glucose), and insulin (exogenous and endogenous) levels?
11. What is the evidence for the effectiveness of vitamin, mineral, and/or herbal supplementation?
12. What advice and education should be provided to adults with diabetes in regard to alcohol consumption?
13. What recommendations should be provided regarding physical activity?
14. What education should be provided regarding glucose monitoring?

Study Selection

An intensive electronic search was conducted using PubMed, Medline, Cumulative Index of Nursing and Allied Health Literature, Food Science, Sport Discuss, Embase, and the EBSCO Discovery Service databases. The lists of titles and abstracts were independently reviewed and titles and abstracts selected that appeared to meet inclusion criteria. The inclusion criteria

included humans, adults, English language, subjects with diabetes, 12 weeks or longer studies, 10 subjects per study arm, and 80% completion rate.

A second round of reviews was conducted independently by the authors. Articles were marked for inclusion or exclusion (along with the reason), and any differences were resolved by discussion with a third reviewer. Full texts of articles meeting inclusion criteria were ordered and reviewed and a final list of included articles was developed. (An illustration of the search strategy and study selection process is included in Franz and colleagues¹).

Data Extraction and Quality Assessment

Using a standardized online data extraction tool,⁷ key data were extracted from each included study: study design, purpose of the study, inclusion and exclusion criteria, country where study performed, blinding, funding, size of sample population, dropout rate, age, sample population ethnicity and sex, interventions, and outcomes measured (HbA1c, lipid profile, blood pressure, insulin levels, and weight status). For the nutrition intervention questions, a total of 40 primary studies (35 randomized controlled trials [RCTs], 4 observational, and 1 systematic review) were analyzed. Risk of bias was assessed for each study using the Academy's quality criteria checklist.⁷

Data Synthesis, Grade, and Rating

From the summary of evidence, the committee wrote conclusion statements that aggregated the overall evidence presented in the summary tables and answered the research question. Conclusion statements were graded as I=Good/strong, II=Fair, III=Limited/weak, IV=Expert opinion only, and V=Grade not assignable. From the review and conclusion statements NPG recommendations were written and rated: strong (quality of evidence is grade I or II), fair (quality of evidence is II or III), weak (quality of evidence is either suspect or well-done studies show little clear advantage to one approach vs another), consensus

(expert opinion, grade IV), and insufficient evidence (lack of pertinent evidence, grade V, and/or unclear balance between benefits and harms). NPG recommendations were also rated as imperative (applies to all members of the specified guidelines population generally) or conditional (applies only under certain circumstances).

Five recommendations, as noted below, were developed based on evidence from the American Diabetes Association,⁵ an organization that uses the American Diabetes Association evidence grading system.⁵ Grade A is clear evidence from well-conducted, generalizable, randomized controlled trials that are adequately powered. Grade B is supportive evidence from well-conducted cohort studies. Grade C is supportive evidence from poorly controlled or uncontrolled studies, and Grade E is expert consensus or clinical experience.

NUTRITION INTERVENTION EVIDENCE REVIEWS AND NPG RECOMMENDATIONS

For the overall review, a total of 60 studies met study inclusion criteria. From the review, 50 conclusion statements and 30 diabetes NPG recommendations were developed. For the nutrition intervention recommendations, 38 of the 60 studies were reviewed, and 30 conclusion statements and 19 NPG intervention recommendations were developed. Five additional NPG recommendations were developed based on evidence reviewed by the American Diabetes Association.⁵ Therefore, 24 of the total 30 NPG recommendations are for nutrition interventions and are reviewed in the following sections. Six other recommendations are related to screening and referral (n=4), nutrition assessment (n=1), and nutrition monitoring and evaluation (n=1) and are reviewed in Franz and colleagues.¹

QUESTION 1: NUTRITION PRESCRIPTION

Evidence Reviewed

Evidence from the studies on effectiveness of diabetes MNT provided by RDNs indicates that a variety of nutrition prescriptions and nutrition therapy interventions are effective.¹ These

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