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DASH Eating Plan: An Eating Pattern for Diabetes Management

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IN BRIEF The DASH (Dietary Approaches to Stop Hypertension) eating plan is an acceptable eating pattern for people who have diabetes. In addition to promoting blood pressure control, this eating pattern has been shown to improve insulin resistance, hyperlipidemia, and even overweight/obesity. This balanced approach promotes consumption of a variety of foods (whole grains, fat-free or low-fat dairy products, fruits, vegetables, poultry, fish, and nuts) and is appropriate for the entire family.

The U.S. Department of Agriculture (USDA) has described several food patterns designed to help people follow the recommendations set forth in its Dietary

Guidelines. Specifically, three food patterns have been developed: the Healthy U.S.-Style Pattern, the Healthy Vegetarian Pattern, and the Healthy Mediterranean-Style Pattern. The

American Diabetes Association, in its 2013 position statement “Nutrition Therapy Recommendations for the Management of Adults With Diabetes,” also promotes the use of a variety of eating patterns to help with the management of diabetes (1).

One of the eating patterns promoted in these recommendations is the DASH (Dietary Approaches to Stop Hypertension) plan. This eating plan is one of several eating patterns that is appropriate for diabetes educators to recommend to their patients with diabetes. This dietary approach is a nutritious, balanced, and sustainable eating plan that can improve a number of health parameters, including hypertension, insulin resistance, hyperlipidemia, and overweight/obesity. People with diabetes have a higher risk of developing hypertension than people without diabetes; in addition, the percentage of adults with diabetes ≥ 18 years of age who have hypertension was 57.1% in 2009 compared to 46.2% in 1995 (2). Clearly, efforts to help prevent and manage hypertension must be increased, especially in the diabetes population.

The appeal of the DASH eating pattern for patients is that it is also practical; it does not require special foods or supplements, and it is an approach that is appropriate for patients’ entire family to follow. This article introduces diabetes educators to the DASH eating pattern in more detail, providing the evidence behind the plan and suggesting practical tips for introducing the DASH eating plan to patients.

Overview of the DASH Trial

The DASH eating plan was developed as an approach to help lower blood pressure without the use of medication. A multicenter trial, funded by the National Heart, Lung, and Blood Institute (NHLBI) and published in 1997, was conducted to study the effects of dietary patterns on blood pressure in 459 adults with a systolic blood pressure of < 160 mmHg and

a diastolic blood pressure of 80–95 mmHg. Subjects in the study initially followed a control diet low in fruits, vegetables, and dairy products, along with a fat intake of 37% of calories (representative of the typical American diet). After 3 weeks of this run-in diet, subjects were randomized to one of the following diets for 8 weeks: the control diet, a diet rich in fruits and vegetables, or a diet that combined fruits, vegetables, and low-fat dairy foods. Body weight, physical activity, and sodium intake were held constant during the trial.

The combination diet reduced systolic blood pressure by 5.5 mmHg and diastolic blood pressure by 3.0 mmHg, whereas the fruits and vegetables diet reduced systolic blood pressure by 2.8 mmHg and diastolic blood pressure by 1.1 mmHg. Subgroup analyses showed that African Americans and individuals with hypertension showed the greatest reductions in blood pressure (3).

DASH Diet: What Is It?

The NHLBI, part of the National Institutes of Health (NIH), promotes the DASH diet, or eating pattern, as a means of preventing and controlling blood pressure without the use of medication. The DASH eating pattern is also promoted as a healthful option for the general population (4–6).

The DASH eating pattern promotes blood pressure reduction by encouraging the consumption of foods that are low in saturated fat, total fat, cholesterol, and sodium and high in potassium, calcium, magnesium, fiber, and protein. In terms of actual food choices, the DASH eating pattern encourages whole grains, fat-free or low-fat dairy products, fruits, vegetables, poultry, fish, and nuts. Foods that are limited include fatty meats, full-fat dairy products, tropical oils (e.g., coconut, palm, and palm kernel oils), and sweets and sugar-sweetened beverages.

The number of servings of foods is based on a person’s estimated

calorie needs. Based on the above recommendations, Table 1 provides examples of daily and weekly servings that meet DASH targets for a 2,000-calorie eating plan (7,8).

In terms of macronutrient composition, the nutrient goals of the DASH eating pattern are as follows:

- Total fat: 27% of calories
- Saturated fat: 6% of calories
- Protein: 18% of calories
- Carbohydrates: 55% of calories
- Cholesterol: 150 mg
- Sodium: 2,300 mg (A lower goal of 1,500 mg sodium was tested and found to be even better for lowering blood pressure, particularly for middle-aged and older individuals, African Americans, and those who already had high blood pressure [9].)
- Potassium: 4,700 mg
- Calcium: 1,250 mg
- Magnesium: 500 mg
- Fiber: 30 g

The DASH eating pattern is closely aligned with the USDA’s dietary recommendations, as outlined in the *2015–2020 Dietary Guidelines for Americans*. As described in chapter 1 of the USDA guidelines, the “Key Recommendations” for healthy eating patterns are as follows:

- Consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level.
- A healthy eating pattern includes:
 - A variety of vegetables from all of the subgroups—dark green, red and orange, legumes (beans and peas), starchy, and other
 - Fruits, especially whole fruits
 - Grains, at least half of which are whole grains
 - Fat-free or low-fat dairy, including milk, yogurt, cheese, and/or fortified soy beverages
 - A variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), nuts, seeds, and soy products

TABLE 1. Examples of Daily and Weekly Servings That Meet DASH Targets for a 2,000-Calorie Eating Plan (7,8)

Food Group	Daily Servings (except as noted)	Serving Sizes
Grains and grain products	7–8	1 slice bread 1 cup ready-to-eat cereal* 1/2 cup cooked rice, pasta, or cereal
Lean meats, poultry, and fish	≤2	3 oz cooked lean meat, skinless poultry, or fish
Vegetables	4–5	1 cup raw leafy vegetable 1/2 cup cooked vegetable 6 oz vegetable juice
Fruit	4–5	1 medium piece of fruit 1/4 cup dried fruit 1/2 cup fresh, frozen, or canned fruit 6 oz fruit juice
Low-fat or fat-free dairy foods	2–3	8 oz milk 1 cup yogurt 1 1/2 oz cheese
Nuts, seeds, and dry beans	4–5 per week	1/3 cup or 1 1/2 oz nuts 1 Tbsp. or 1/2 oz seeds 1/2 cup cooked dry beans
Fats and oils†	2–3	1 tsp. soft margarine 1 tsp. low-fat mayonnaise 2 Tbsp. light salad dressing 1 tsp. vegetable oil
Sweets	≤5 per week	1 Tbsp. sugar 1 Tbsp. jelly or jam 1/2 oz jelly beans 8 oz lemonade
Sodium‡	<2,300 mg	Total from prepared/packaged foods and added during cooking or at the table

*Serving sizes vary between 1/2 and 1 1/4 cups. Check product nutrition labels.

†Fat content changes serving counts for fats and oils (e.g., 1 Tbsp. regular salad dressing is 1 serving, whereas 1 Tbsp. low-fat salad dressing is 1/2 serving, and 1 Tbsp. fat-free salad dressing is 0 servings).

‡Limiting sodium to 1,500 mg daily lowers blood pressure even further than 2,300 mg sodium daily (8).

- Oils
- A healthy eating pattern limits:
 - Saturated fats and trans fats, added sugars, and sodium

Key Recommendations that are quantitative are provided for several components of the diet that should be limited. These components are of particular public health concern in the United States, and the specified limits can help individuals achieve healthy eating patterns within calorie limits:

- Consume <10% of calories per day from added sugars
- Consume <10% of calories per day from saturated fats
- Consume <2,300 mg per day of sodium
- If alcohol is consumed, it should be consumed in moderation—≤1 drink per day for women and ≤2 drinks per day for men—and only by adults of legal drinking age

Both the USDA dietary guidelines and the DASH eating pattern strongly encourage the intake of vegetables, fruits, whole grains, and lower-fat dairy products, while limiting the intake of sugars, saturated fat, and sodium (5).

DASH–Sodium Trial

Interestingly, although the DASH diet was not low in sodium (providing 2,400 mg of sodium per day), blood pressure was still reduced. To understand the effect of sodium restriction, the DASH–Sodium trial was conducted. This trial included 412 subjects who were randomized to a control diet or the DASH diet for 90 days. Within each group, subjects were then assigned to three diets: a high-sodium diet (3.5 g/day), a moderate-sodium diet (2.3 g/day), or a low-sodium diet (1.2 g/day), each for 30 days. For those on the DASH diet, the greater the reduction in sodium, the greater was the reduction in blood pressure, although there was no significant difference on diastolic blood pressure between the high- and moderate-sodium intake levels. Furthermore, lowering sodium intake

to 1.2 g/day would be challenging, given the amount of sodium used by the food industry in food processing (4,10).

OmniHeart Study

The OmniHeart (Optimal Macronutrient Intake Trial for Heart Health) study compared three heart-healthy diets that were known to lower blood pressure and improve blood lipids. These three diets were based on the DASH diet but differed in the amount of carbohydrate, protein, and unsaturated fat, while being equivalent in calories. The higher protein (25 vs. 15% of calories) and higher unsaturated fat (10 vs. 8% of calories) diets showed the most benefit on blood pressure and blood lipids and reduced the estimated 10-year risk of heart disease compared to the higher-carbohydrate diet. Of note, the higher-protein diet emphasized plant sources of protein, which have been associated with reduced blood pressure (11). Although the OmniHeart study was not specifically geared toward diabetes or glycemic management, the fact that heart disease is the leading cause of death among people with diabetes makes its results applicable to this population.

DASH Eating Pattern for Diabetes

The DASH eating pattern has proven to be beneficial for those who are aiming to control or prevent hypertension. Nearly two out of three individuals with diabetes have hypertension (12), so it is reasonable to expect that the DASH eating plan would be of benefit for people who have both hypertension and diabetes. In a study by Paula et al. (13), 40 patients with type 2 diabetes and uncontrolled blood pressure were randomized to either the DASH diet and increased physical activity or a control diet and instructions to maintain their usual level of physical activity. Reductions in blood pressure were greater in the intervention group compared to the control group.

Is the DASH eating pattern beneficial for people who have diabetes? As previously mentioned, the DASH eating pattern can provide upwards of 55% of calories from carbohydrate, which may be too high a carbohydrate intake for some people with type 2 diabetes. Furthermore, there is little research demonstrating the glycemic benefits of the DASH eating plan for people who have diabetes. Yet, in one study of 31 subjects with type 2 diabetes (14), the DASH eating plan did improve blood lipids and blood pressure while also decreasing A1C (by 1.7 percentage points) and fasting blood glucose levels (by 29%). Of note, De Paula et al. (15) found that fruits and vegetables were the two food groups of the DASH eating plan that helped to lower blood pressure in a group of 225 subjects with type 2 diabetes.

However, the benefits of the DASH eating plan may be applicable to people who have type 2 diabetes in other ways. For example, the diets of women in the Nurses' Health Study and the Nurses' Health Study II, and of men in the Health Professionals Follow-Up Study were measured every 4 years. Adherence scores were computed for the Alternate Mediterranean Diet, the Alternate Health Eating Index–2010, and the DASH diet. Improvement in all three of these scores was associated with less weight gain, especially in younger women or overweight individuals (16). Weight control is linked with improved glycemic control in people with type 2 diabetes (17). Interestingly, the DASH diet is ranked by *U.S. News & World Report* as being “#1 in best diets overall” for helping to manage not only blood pressure but also weight (18). Although the DASH eating pattern is not specifically aimed at weight loss, its emphasis on fruits and vegetables, lower-fat dairy foods, and reduced consumption of red meat and sweets can be beneficial for patients who are aiming to lose weight or maintain their weight at a healthy level.

DASH Eating Pattern in Gestational Diabetes

A healthy eating plan is a key factor in the management of gestational diabetes mellitus (GDM); specifically, the goal is to prevent or reduce adverse maternal and newborn outcomes without instigating any short-term harmful effects. Various dietary approaches have been studied, including a low-glycemic index (GI) diet, a low-carbohydrate diet, and a calorie-restricted diet. In a systematic review and meta-analysis of randomized clinical trials of dietary interventions in GDM, Viana et al. (19) concluded that, although the low-GI eating plan was associated with less frequent insulin use and lower birth weight than the other diets, the DASH diet also holds promise for patients with GDM. In a small trial (20), women with GDM followed the DASH diet for 4 weeks. The DASH diet during pregnancy lowered insulin use, reduced cesarean rates, and lowered birth weights. Although the DASH approach looks promising for the management of GDM, further research is warranted, as, in this study, the diet was not followed throughout the pregnancies and deliveries.

DASH Eating Pattern for Diabetes Prevention

The DASH eating plan or DASH-like eating plans have also led to improvements in insulin sensitivity, further demonstrating that this type of eating plan may be helpful for individuals with prediabetes or who are at risk for type 2 diabetes (21,22). A meta-analysis (23) of prospective cohort studies looked at the differences among various diets' effects in preventing type 2 diabetes. The authors concluded that several diets, including the DASH diet and the Mediterranean diet, were associated with a 20% decrease in the risk of future type 2 diabetes.

The ADA's nutrition recommendations for adults with diabetes state that “there is no ‘ideal’ conclusive eating pattern that is expected to

benefit all individuals with diabetes” (1). Different types of eating patterns and macronutrient distributions have been shown to lead to improvements in glycemic control (24). Given the proven health benefits of the DASH eating plan, along with its recommendation to consume a variety of healthful foods, one could infer that the DASH eating plan is appropriate for those who have diabetes.

Practical Considerations

How can you help your patients get started with the DASH eating plan? Although this eating plan is healthful for anyone, it is particularly aimed at helping those with prehypertension or hypertension. A first step is to refer your patients to a registered dietitian (RD), preferably one who has experience working with people who have diabetes. Dietitians are especially skilled at determining the right “fit” of an eating plan for a specific patient, taking into account factors such as level of glycemic control, other health issues, lifestyle factors, cultural factors, and personal preference. Once it has been determined that the DASH eating plan is indeed a good fit for a patient, the following tips can help ensure success:

- Determine the appropriate calorie level for the patient, based on overall health and nutrition goals. The DASH eating plan can be geared to individuals for whom weight loss is a goal. The NIH offers a link on its website that helps patients and health care professionals calculate a person’s calorie needs (<https://www.supertracker.usda.gov/bwp/index.html>). In addition, the publication *Your Guide to Lowering Blood Pressure with DASH*, which can be printed free of charge from <http://www.nhlbi.nih.gov/health/resources/heart/hbp-dash-index>, provides serving sizes and food choices for various calorie levels.
- If weight loss is a goal, encourage patients to:
 - Reduce portion sizes

- Consider eating smaller meals more frequently during the day
- Limit intake of fatty meats, high-fat dairy, and added fats
- Drink water or seltzer water instead of sweetened beverages
- Aim for at least 150 min/week of physical activity, or about 30 min daily on most days of the week
- To help meet blood glucose and A1C targets, help patients set appropriate meal and snack carbohydrate goals. Adjust goals, as needed, based on achievement of pre- and postmeal targets. When patients begin this eating plan, suggest that they check their blood glucose levels more frequently than usual to learn how this plan affects their glycemic control.
- Discuss the benefits of planning meals ahead of time to help meet DASH plan and weight goals. Using a shopping list can help with meal planning and also help to ensure that healthful foods are purchased.
- If patients are unfamiliar with healthful cooking methods or cooking in general, suggest that they watch healthy cooking videos (available online on YouTube) or even sign up for a cooking class.
- Help patients set small goals on a weekly basis to include a fruit and/or vegetable at each meal and snack.
- Encourage patients to aim for eating at least one meatless meal each week. Meatless meals emphasize plant-based protein sources, including legumes, tofu, tempeh, and meat substitutes such as soy-based veggie burgers. Examples of tasty vegetarian meals are bean chili, beans and rice, tofu and vegetable stir-fry, and lentil soup.
- Provide healthful recipes or refer patients to the recipe section of *Your Guide to Lowering Blood Pressure with DASH*, the free online publication mentioned previously.

- Discuss tips for dining out because typical restaurant meals tend to be high in sodium and saturated fat, and portions are often large. Helpful hints include requesting that foods be prepared without added salt, asking for sauces and salad dressings on the side, substituting a vegetable for a refined carbohydrate food, limiting bread, drinking water or seltzer, and eating half of the meal and taking the rest home for another meal.

The DASH eating plan is easily adaptable to other styles of eating and dietary preferences, including vegetarian, vegan, gluten-free, and kosher. Again, a referral to an RD may be warranted for more specific guidance on adapting different styles of eating.

Duality of Interest

No potential conflicts of interest relevant to this article were reported.

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