

ORIGINAL RESEARCH

Supporting cardiovascular risk reduction in overweight and obese hypertensive patients through DASH diet and lifestyle education by primary care nurse practitioners

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Introduction

Hypertension is a leading risk factor for cardiovascular disease, and a major cause of costly morbidity and mortality (Heidenreich et al., 2011). Although hypertension should be considered a modifiable risk factor, recent analyses suggest that more than half (53.5%) of the estimated 66.9 million adults with hypertension in the United States may have poorly controlled hypertension (Valderrama et al., 2012). Obesity and hypertension are often linked in

Abstract

Purpose: To describe an intervention among overweight and obese hypertensive patients, encouraging Dietary Approaches to Stop Hypertension (DASH) diet and lifestyle changes, designed and led by a primary care nurse practitioner (NP).

Data sources: A pre- and postintervention quasi-experimental time-series design was implemented over 2 months. Intervention included three group classes and two individual counseling telephone calls. Forty-five hypertensive patients enrolled, with a mean age of 55 years and mean initial BMI of 32. Twenty-six (58%) completed the program. Standard instruments (Rapid Eating Assessment for Patients [REAP] and Partners in Health [PIH] questionnaires) were used to evaluate diet and lifestyle factors before and after the program.

Conclusions: Participants had statistically significant improvements in diet and lifestyle scores on both REAP and PIH questionnaires, as well as statistically significant weight loss (average 3.6 pounds lost) over the 2-month intervention period.

Implications for practice: This NP-led primary care intervention on diet and lifestyle showed early success in improving the health of overweight and obese hypertensive patients. Investment in NP-led diet and lifestyle counseling should be considered among high-risk patients in the primary care setting.

adults (Francischetti & Gnelhu, 2007). The challenges of healthy weight control have emerged as a growing public health crisis; as of 2007, more than 30% of U.S. adults may be considered obese and no state had achieved the U.S. Healthy People 2010 objective of reducing the prevalence of obesity to less than 15% of the adult population (Sherry, Blanck, Galuska, Dieta, & Balluz, 2010).

Opportunities may be available in the primary care setting to better address both hypertension and obesity. Nearly 90% of U.S. adults with poorly controlled

hypertension have a usual source of health care, have health insurance coverage, and have received health care in the previous year (Valderrama et al., 2012). This suggests potential missed opportunities by individuals, healthcare providers, and healthcare systems to improve cardiovascular disease prevention. Promoting healthy lifestyles, through diet, physical activity, and weight control, is an aspect of most strategies to improve hypertension control in the clinical setting (Glynn, Murphy, Smith, Schroeder, & Fahey, 2010). Nonetheless, the actual value of time-intensive counseling by primary care providers to reduce cardiovascular disease risk is not well established nor well accepted (Moyer, 2012).

Nurse practitioners (NPs) may be uniquely positioned to focus on counseling and preventive services in the primary care setting. This study evaluated whether an NP-led intervention, including counseling about diet and lifestyle, had a measurable impact on the health of a challenging group of hypertensive patients who were also overweight or obese. The intervention included education about the low-sodium Dietary Approaches to Stop Hypertension (DASH) diet (Blumenthal et al., 2010), and standard assessments of dietary and lifestyle changes, as well as weight loss, over a 2-month period.

Methods

This study was reviewed and approved by the Navy Medicine West Institutional Review Board (IRB) and was conducted in compliance with all applicable federal regulations governing the protection of human subjects in research (IRB #NHCP.2011.0101). We asked adult patients who were overweight or obese with a medical diagnosis of chronic hypertension to participate in the study. We collected data on their self-reported diet and exercise habits, capacity to manage their condition, and height and weight metrics to calculate body mass index (BMI), before and after completing the patient education program.

The patient education program, developed by a family medicine NP, took place between September 7, 2011 and November 2, 2011. The program instructed patients on the DASH diet over three 45-min in-person group classes (held on September 7, October 5, and November 2, 2011). Two 20-min individual telephone consults were conducted with participants by the NP between the group classes. Educational materials were compiled from the National Heart, Lung, and Blood Institute (USDHHS-NHLBI, 2006). Packets of all information presented in each class were distributed to all participants.

Participants completed the Rapid Eating Assessment for Patients (REAP) survey before and after the education

sessions. REAP is a 31-item survey that assesses the patient's diet and physical activity level. REAP has excellent test-retest reliability ($r = .86, p < .0001$) and adequate reliability and validity to be used in a primary care setting for nutrition assessment and counseling (Gans et al., 2006). This questionnaire takes approximately 10 min to complete. It includes 27 questions that assess intake frequency of sodium, whole grains, calcium-rich foods, fruits and vegetables, fat, saturated fat and cholesterol, sugary beverages and foods, alcoholic beverages, and physical activity. These questions are scored as follows: 1 = usually/often, 2 = sometimes, or 3 = rarely/never. As per standard scoring algorithms, if a question is skipped or answered "not applicable," then the answer is coded as "rarely/never." Three additional "yes/no" questions address concerns with shopping for food, food preparation, and special diets. A final question provides an estimate of readiness for behavior change on a 5-point scale (5 = "very willing" to 1 = "not at all willing"). The total REAP score was computed using the 27 scale questions for a possible total of 81 points. Three questions on the REAP (questions 2, 23, and 24) assessed sodium intake specifically, and were analyzed individually to determine how participants managed their sodium intake. Physical activity was measured by responses to questions 26 and 27 on the REAP.

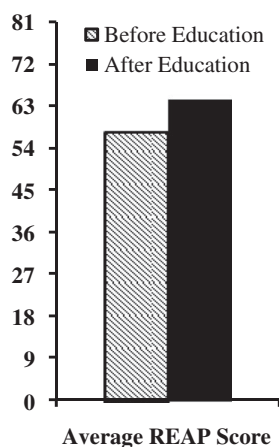
The Partners in Health (PIH) scale was used to assess patients' knowledge and behaviors related to self-management of their chronic health condition (Petkov, Harvey, & Battersby, 2010). This 12-item questionnaire has been shown to have good internal consistency (Cronbach's alpha = 0.82) and good construct validity (Petkov et al., 2010). The PIH scale was used to assess patient self-management knowledge and behavior over time. The PIH takes about 5 min to complete and is scored on a 9-point (0–8) scale, with 0 being the worst and 8 being the best response. A total score was computed for a possible total of 96 points.

BMI was calculated using height and weight measured at baseline and at the end of the third educational session. The NHLBI's BMI classification was used to define overweight and obese patients. BMI between 25.0 and 29.9 was considered overweight and BMI ≥ 30.0 was considered obese.

Statistical analysis was performed using SPSS for Windows, version 10 (SPSS Inc., Chicago, IL). Descriptive statistics and frequencies were computed to describe patients' ability to manage their condition, diet, and exercise habits. A paired-samples *t*-test was performed on BMI, PIH, and REAP scores collected before and after the intervention among participants who completed the program.

Table 1 Demographic characteristics of patients who did and did not complete the education program

Characteristics	Participants who completed the program (n = 26) number (%)	Participants who did not complete the program (n = 19) number (%)
Age in years		
Mean (range)	57 (44–73)	51 (23–69)
Initial BMI (mean and range)	31.5 (25.2–43.9)	34.0 (25.2–48.3)
Gender		
Male	12 (46)	5 (26)
Female	14 (54)	14 (74)
Race/ethnicity		
White non-Hispanic	16 (62)	8 (42)
Other	10 (38)	11 (58)
Education		
Less than a college degree	16 (62)	12 (63)
College degree or higher	10 (38)	7 (37)
Employment		
Employed	13 (50)	10 (53)
Not currently employed	13 (50)	9 (47)
Military affiliation		
Family member	13 (50)	14 (74)
Retiree	13 (50)	5 (26)

**Figure 1** REAP scores before and after DASH diet education program, among participants who completed the program.

Results

There were 45 eligible patients who consented to be in the study. Of these, 26 (58%) completed the program. Table 1 shows the characteristics of the patients who did and did not complete the education program. Most of the participants who completed the study were female, white (non-Hispanic), and had less than a college education (Table 1). Participants who completed the program did not have statistically significant differences in pre-BMI, pre-REAP, or pre-PIH scores from those

Table 2 Sodium intake before and after the education program, based on questions from the REAP scale

REAP questions	Before education N (%)	After education N (%)
In an average week, how often do you eat four or more meals from sit-down or take-out restaurants?		
Usually often	5 (19)	1 (4)
Sometimes	3 (12)	5 (19)
Rarely/never	18 (69)	20 (77)
In an average week, how often do you eat high-sodium processed foods like canned soup or pasta, frozen/package meals (TV dinners, etc.), chips?		
Usually often	6 (23)	0 (0)
Sometimes	10 (38)	10 (38)
Rarely/never	10 (38)	16 (62)
In an average week, how often do you add salt to foods during cooking or at the table?		
Usually often	6 (23)	2 (8)
Sometimes	8 (31)	5 (19)
Rarely/never	12 (46)	19 (73)

who did not complete the program. However, those who completed the program were significantly older compared to those who did not complete the program (mean age of 58 years compared to mean age of 51 years, $p = .002$).

Figure 1 shows that the average REAP score after completing the program was significantly higher compared to the average REAP score before starting the program (mean 64.5 compared to mean 57.5, $p = .001$). Table 2 presents the number of participants whose sodium intake improved based on responses to select questions on REAP. Similarly, based on responses to physical activity questions on REAP, participants reported greater physical activity after they completed the program (Table 3).

Figure 2 shows that the average PIH score after completing the program was significantly higher compared to the average PIH score before starting the program (mean 79.2 compared to mean 72.7, $p = .01$). Higher PIH scores correspond to higher perceptions of self-reported knowledge and self-efficacy in managing health.

Figure 3 shows the average BMI before and after the education program, among participants who completed the program. Overall, 20 (77%) participants lost weight over the 2-month period, and participants lost an average

Table 3 Physical activity habits before and after the education program, based on questions from the REAP scale

REAP questions	Before education N (%)	After education N (%)
In an average week, how often do you do less than 30 total minutes of physical activity 3 days a week or more?		
Usually often	7 (26)	4 (15)
Sometimes	6 (23)	5 (19)
Rarely/never	13 (50)	17 (65)
In an average week, how often do you watch more than 2 h of television or videos a day?		
Usually often	14 (54)	11 (42)
Sometimes	10 (38)	11 (42)
Rarely/never	2 (8)	4 (15)

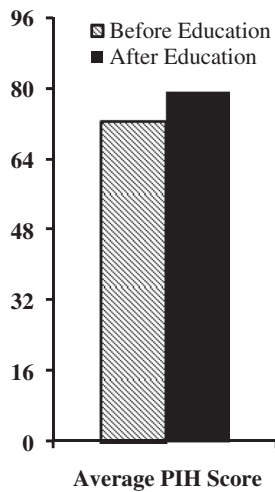


Figure 2 PIH scores before and after DASH diet education program, among participants who completed the program.

of 3.6 pounds by the end of the program. A paired *t*-test found that BMI was statistically significantly ($p < .001$) lower at the end of the program (mean 31.0) than at the start of the program (mean 31.5).

Discussion

The goal of this study was to assess the impact of an intervention, developed and led by a primary care NP, to improve healthy lifestyles in overweight and obese patients with hypertension. The DASH diet is endorsed by the NHLungBI and by the American Heart Association as an example of healthy dietary intake for weight

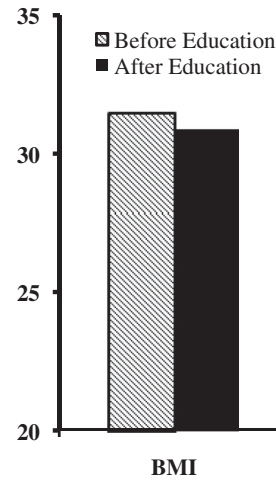


Figure 3 Average BMI before and after the DASH diet education program, among participants who completed the program.

and blood pressure control (Harnden, Frayn, & Hodson, 2009). This study demonstrated the value of promoting evidence-based practice to improve clinical outcomes in primary care, consistent with prior study results (Titler, 2010). Our results suggest that a patient education program in a primary care setting based on the DASH diet can be successfully implemented over a 2-month span.

This study has some unique features, as very few studies associated with the use of the DASH diet implemented a survey instrument such as the PIH to assess patients' knowledge and behaviors related to self-management of their chronic health conditions. Although our education program was focused on diet, it may be considered provocative that improvements in diet were associated with other improvements in understanding and management of hypertension. Improvements in activity, independent of any dietary changes, were demonstrated on both PIH and REAP instruments. This may be consistent with other successful models of nurse-led empowerment strategies for hypertensive patients (Chang, Fritschi, & Kim, 2012).

Most prior studies on DASH diets, such as the Premier study, used dietary recall to identify patients' eating patterns pre- and postintervention (Elmer et al., 2006). Our study was similar, assessing dietary recall through the use of the REAP survey, and showing significant improvement in overall dietary habits. Because a primary focus of the DASH diet is daily sodium intake, we also examined sodium intake more specifically. While current dietary guidelines recommend that hypertensive patients reduce sodium intake to <1500 mg/day, it may not be possible to achieve a very low sodium diet that is

otherwise nutritionally adequate when most supermarket and restaurant food selections have high sodium content (Maillot & Drewnowski, 2012). Our results did not quantify sodium intake in milligrams per day; however, we were able to demonstrate promising and statistically significant reductions in self-reported sodium intake among program participants.

Weight and BMI reductions have been demonstrated among other patients adhering to the DASH diet. The ENCORE (Blumenthal et al., 2010) 5-year study demonstrated weight reductions of 0.3 kg to 8.7 kg. A recent summary of eight trials that applied the DASH diet from 30-day to 3-year duration demonstrated varying degrees of weight reduction, including an average 1.0 kg weight loss over a 9-week trial (Hedayati, Elsayed, & Reilly, 2011). Our results with this NP-led intervention were similar, or perhaps slightly more promising, with an average 1.5 kg weight loss over an 8-week period. Follow-up of this and other intervention cohorts will be important to determine if weight loss was continued or maintained.

Our study included telephone contact from the NP to each participant at two times, between the group education sessions. While other studies have demonstrated the benefit of telephone contact for supporting management of hypertension over more than a decade (Friedman et al., 1996; Svetkey et al., 2009), such interventions are time- and resource-intensive. Further study may be valuable in defining the timing, length, and content of this kind of contact to optimize patient engagement. Some of the most promising research in this area leverages newer technology to keep patients engaged in the care of their chronic conditions (Piette et al., 2012).

The strengths of our study include its simplicity and reliance on standard measures of outcomes, including REAP and PIH. Furthermore, conducting the study within a single family medicine clinic allowed for consistency of application of the intervention. Overall results of this study compare favorably to other programs using the DASH diet. Of the 45 patients consented and enrolled in the study, 26 (58%) completed the program with a mean 3.6 lb weight loss. Evaluating outcomes over a 2-month period demonstrated relatively rapid value to participants. Limitations of the study include its modest sample size, including participants who were likely to be more motivated patients. Reasons for noncompletion by 42% of original participants were not assessed, but likely relate to motivation. Nonetheless, the statistical significance of changes in such a small sample may be considered promising. Our study did not assess the long-term value of the intervention, although follow-up assessments of the study participants are planned.

In an era of limited healthcare resources, debate continues about the value of clinician-led behavioral education in improving patient health. The U.S. Preventive Services Task Forces cite insufficient evidence to recommend routine clinic-based lifestyle education among lower risk patients (Lin, O'Connor, Whitlock, & Beil, 2010; Moyer, 2012). This highlights the importance of this project, and similar studies, in informing policymakers and providers on these challenging issues. We demonstrated that this NP-led education intervention was associated with some promising short-term success among patients who chose to participate. Further study is clearly needed to identify the factors that are most efficiently and effectively associated with sustained success and, perhaps most challenging, what factors might motivate more patients to engage in healthier lifestyles.

Conclusion

The current obesity–hypertension crisis in the United States imposes a significant burden on society and healthcare costs. It is critical that both patients and the healthcare industry recognize obesity as a disease. As the number of people with obesity and hypertension in the general population increases, there is a greater need for research in this area. Attaining and maintaining healthy lifestyles is clearly challenging but may be essential to successfully address chronic conditions like obesity and hypertension. This project revealed how a clinical NP-led DASH diet intervention may be applied to effectively educate motivated overweight and obese patients with hypertension and improve their health.

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