Published in final edited form as:

J Cardiovasc Nurs. 2013 ; 28(6): 514–523. doi:10.1097/JCN.0b013e318262c0c1.

Translation and Validation of the Dietary Approaches to Stop Hypertension for Koreans Intervention:

Culturally Tailored Dietary Guidelines for Korean Americans With High Blood Pressure

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Abstract

Background—Lifestyle modification strategies such as adoption of the Dietary Approaches to Stop Hypertension (DASH) diet are now recognized as an integral part of high blood pressure (HBP) management. Although the high prevalence of HBP among Korean Americans (KAs) is well documented, few dietary interventions have been implemented in this population, in part because of a lack of culturally relevant nutrition education guidelines. Translating and testing the efficacy of culturally relevant dietary recommendations using a well-established dietary guideline such as DASH are imperative for promoting better cardiovascular health for this high-risk cultural group.

Objective—The aims of this study were to systematically translate and validate a culturally modified DASH for Koreans (K-DASH) and obtain preliminary evidence of efficacy.

Methods—A 2-step approach of intervention translation and efficacy testing, together with close adherence to principles of community-based participatory research, was used to maximize community input. A 1-group pre-post design with 24-hour urine and 24-hour ambulatory blood pressure monitoring comparisons was used to test the initial feasibility and efficacy of the K-DASH intervention.

Results—A total of 28 KAs with HBP participated in a 10-week dietary intervention consisting of group education sessions and individual counseling. Both systolic blood pressure and diastolic

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The authors have no conflicts of interest to disclose.

blood pressure, as measured by ambulatory blood pressure monitoring, were significantly decreased at postintervention evaluation (systolic blood pressure, -4.5 mm Hg; diastolic blood pressure, -2.6 mm Hg; $P < .05$). Serum low-density lipoprotein cholesterol was significantly decreased (-7.3 mg/dL; $P < .05$). Serum potassium and ascorbic acid levels were also improved in the reference range. Urine potassium level was significantly increased, supporting increased fruit and vegetable consumption.

Conclusion—This pilot study has (a) demonstrated that a cultural adaptation of DASH using community-based participatory research methodology produced a culturally relevant and efficacious dietary intervention for the KAs with HBP and (b) provided strong preliminary evidence for the efficacy of the K-DASH intervention in reducing HBP in hypertensive KAs.

Keywords

CBPR; DASH; hypertension; Korean American

Recent empirical studies have revealed an alarming increase in morbidity and mortality from cardiovascular disease as well as an increase in relevant risk factors such as high blood pressure (HBP) in Asians living in Western countries, including Korean Americans (KAs).^{1–3} The overall prevalence of HBP in KAs is higher than that in their white counterparts and is comparable with that in African Americans.⁴ This phenomenon is seemingly paradoxical because Koreans as a whole are considered a relatively lean population, and their traditional diet has been considered “healthy” in terms of its balance of macronutrients (carbohydrate, protein, and fat).^{5–11} The level of micronutrients such as potassium, magnesium, and vitamin C in the traditional Korean diet, however, is not optimally balanced because most of the KAs’ traditional dishes contain highly salted or cooked vegetables.^{8,10,12} Given that recent clinical data have highlighted the important role of adequate micronutrient intake in managing HBP,¹³ finding effective ways to improve micronutrient intake is an important endeavor for translational researchers and clinicians.

The most recent guidelines from the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure have endorsed the Dietary Approaches to Stop Hypertension (DASH) diet for individuals with HBP, in addition to engagement in other self-care activities, such as adherence to antihypertensive medication regimens, and in regular physical activity. They emphasize increased intake of low-fat dairy products; fish, chicken, and lean meats; and nuts, fruits, whole grains, vegetables, and legumes.¹⁴ Evidence supporting the efficacy of this diet, from a series of feeding studies as well as studies under free-living conditions,^{15–17} has indicated that the consumption of a diet that incorporates large quantities of low-fat dairy products, fruits, and vegetables and is relatively low in fat content and rich in fiber can produce the greatest reduction in blood pressure (BP). The DASH diet has reduced levels of total fat, saturated fat, and cholesterol and increased levels of potassium, calcium, magnesium, fiber, and protein.

Although ample evidence of the beneficial effect of DASH in improving BP has been obtained through research in well-controlled settings (eg, feeding studies), a lack of community-based research has imposed serious barriers to translating and implementing such nonpharmacological approaches in hypertensive individuals from ethnic minority

backgrounds. In particular, immigrant population consuming bicultural diets, such as KAs, require special attention. These individuals' dietary patterns tend to change after their immigration to the United States. In particular, many KAs going through the acculturation process increase their consumption of animal protein, fats, and refined sugar.¹⁰ At the same time, they retain the taste for salt to which they were accustomed and continue to consume traditional high-salt foods (eg, pickled vegetables as well as soy and other high-sodium sauces). This bicultural diet can be particularly detrimental to people who have or are at risk for HBP.^{18–20}

In response to the high prevalence of HBP in KA communities and the dietary patterns that provide these individuals with an inadequate micronutrient balance,^{4,8,21} we have developed a culturally relevant, micronutrient-enhanced dietary educational and counseling intervention, K-DASH, for KAs with HBP that is based on the principles of the DASH diet, and we have successfully completed a feasibility trial to evaluate the initial efficacy of this intervention.

The aims of this article were to (a) describe the process of developing a Korean version of DASH, (b) present the evidence for the efficacy of this intervention from pilot testing, and (c) share lessons learned during the development of this cultural guideline, to help fill the existing clinical and translational scientific gaps in the area of HBP control and health promotion guidelines targeting underserved populations.

Methods

Design, Setting, and Sample

The study describes a 2-step intervention involving translation and efficacy testing that was guided by the core principles of community-based participatory research (CBPR).^{22–24} Community-based participatory research has been widely used in public health research as an interdisciplinary research methodology that features a collaborative partnership between researchers and communities and focuses on health promotion through lifestyle changes, including uncovering barriers to care and self-management and developing culturally tailored interventions and collaborative research processes.^{25–28} The CBPR approach is considered one of the most effective approaches for translating behavioral interventions for priority populations, including constructing culturally appropriate programs for ethnic minority groups.^{26,27,29–31} A centrally located community-based organization in the Baltimore-Washington metropolitan area, The Korean Resource Center, was selected as the education venue for this study. In this community-based setting, researchers, clinicians, study participants, their family members, and community health workers were able to actively engage in multidirectional communication to construct and implement a culturally relevant education program while creating synergy in an adapting tailored dietary modification program to achieve individual dietary goals.

In the intervention translation phase, we used a methodology similar to the one we previously used to develop culturally sensitive dietary guidelines for KAs with diabetes mellitus.³² This approach follows a step-wise pattern: (1) identifying the cultural needs of the target population, (2) evaluating existing research and evidence, (3) determining the core

principles of the intervention, (4) translating the core principles into culturally applicable practice, and (5) assessing the content validity of the translated intervention. By using this systematic process, we developed the initial K-DASH educational guidelines that encompass popular ethnic food items and serving sizes for each food group available to the KA population residing in the United States.

The content validity and equivalence of the K-DASH were assessed through a series of focus groups composed of bilingual researchers, clinicians, and KA participants and their family members. The operational principles of this validity assessment were similar to those used for instrument testing.^{32,33} The individuals participating in the focus group meetings were asked to assess the cultural relevance of each educational objective and strategy. A bicultural research team convened a final meeting to resolve any discrepancies that had not been resolved in earlier meetings. These focus groups were useful not only in assessing the content validity of the translated educational intervention protocol but also in obtaining important social and cultural information and insights regarding perceived barriers to and strategies for building a healthy lifestyle for KAs with HBP.

To test the efficacy and feasibility of the K-DASH education intervention, we used a pre-post intervention evaluation design and a purposive sample of 30 KAs with HBP. Inclusion criteria were (a) self-identified KA 21 years or older; (b) HBP (systolic blood pressure [SBP] 140 mm Hg and/or diastolic blood pressure [DBP] 90 mm Hg or on HBP medication); if on antihypertensive medication, receiving stable doses for at least 2 months before the beginning of the study; and (c) ability to follow all trial procedures. We excluded individuals with any of the following conditions: (a) a cardiovascular event within the past 6 months, (b) a chronic disease that might interfere with trial participation (eg, chronic kidney disease, defined as an estimated glomerular filtration rate <60 mL/min/1.73m², or poorly controlled diabetes [hemoglobin A1c >9%]), (c) a blood potassium level of 5 mEq/L or higher at screening visit, (d) unwillingness or inability to adopt a DASH-like diet, and (e) consumption of more than 14 alcoholic drinks per week.

Procedure

After approval had been obtained from the institutional review board, participants were recruited through advertisements in community newspapers, personal networks, and referrals from community physician networks in the Baltimore-Washington metropolitan area. The study was briefly explained by trained research staff, and individuals were asked if they were interested in learning more about the program. If the answer was affirmative, an appointment was scheduled for an eligibility evaluation. After the identification of potential participants, a trained researcher met with each potential participant to explain the purpose of the study and obtain informed written consent for participation.

The study was conducted from March to August 2011. The participants received two 2-hour nutrition education sessions at 2 and 3 weeks and 4 individual nutrition counseling sessions with a bilingual dietitian at a local community center over the course of the 10-week intervention period. Participants were asked to attend in-person follow-up visits at 4 and 10 weeks after baseline. At in-person follow-up visits, anthropometry (body weight, height, and waist-to-hip ratio), biochemistry evaluation (fasting blood test and 24-hour urine analysis),

24-hour ambulatory BP monitoring (ABPM), and dietary assessment using a 3-day dietary record were conducted to evaluate the effectiveness of the nutrition education and counseling.

Description of the Dietary Approach to Stop Hypertension for Koreans

The K-DASH was guided by the original DASH eating plan and was expanded by incorporating culturally familiar dietary concepts and traditional food examples. Developing a culturally relevant dietary guideline for KAs involved examining the relevance and acceptability of the existing dietary guidelines, the DASH eating plan (established by the National Heart, Lung, and Blood Institute) and The Korean Nutrition Society meal plan (Table 1). A comparison of the similarities and differences between these guidelines was helpful in identifying key aspects that needed to be translated, so that an effective and culturally relevant nutrition education program could be developed for our target population. The process of developing culturally relevant strategies for delivering the core DASH principles and relevant examples are illustrated in Table 1. The key differences in these guidelines included the macronutrient distribution, the number of servings of some food groups, and the recommendations for fat intake.

The 10-week K-DASH intervention consisted of 2 structured in-class education sessions with interactive group activities, 3 individually tailored nutrition consultations with a bilingual nurse/dietician team, and 1 follow-up telephone call (Table 2).

Structured Group Education—Once-weekly 2-hour structured group education sessions were held for 2 weeks to provide the participants with a fundamental overview of what constitutes a healthy diet; an introduction to the K-DASH diet (particularly emphasizing the importance of increased fruit and fresh vegetable consumption and a reduction in sodium intake from the traditional Korean diet); the basic concepts of calorie balance, serving size, and food label content; and strategies to consume the desirable amount of each micronutrient were presented. Culture-specific food models consisting of 78 life-size models of frequently consumed Korean foods were used to enhance the sessions' educational effectiveness. In addition, interactive group activities were conducted in various formats, including culturally tailored group games, pop quizzes, recipe sharing, and demonstrations of meal plans. In particular, the best practices to reduce sodium intake when eating out and to increase fruit and vegetable consumption in the daily diet were shared and extensively discussed as a group. The group education was delivered in a community-based setting to actively promote interaction among the study participants, family members, community health workers, and educators while creating synergy and providing social support to the KAs in achieving their individual nutrition goals.

Individual Counseling—After the weekly 2-hour structured group education sessions, the nurse/dietician team met one-on-one with each patient at 4, 5, and 10 weeks (for 30–60 minutes per visit). Individual counseling was conducted to help individuals develop customized dietary goals and meal plans, reinforce the K-DASH recommendation at the individual level, and discuss individual barriers and facilitators to adhering to the diet regimen. Individual counseling (3 in-person sessions and 1 telephone session) was devoted

to meeting the individual's nutritional needs, based on (a) daily caloric intake, calculated on the basis of gender, height, weight, and physical activity level, and (b) individual dietary analysis of information from multiple 24-hour recalls at baseline and follow-up. In particular, dietary analysis results based on a 3-day dietary record at each follow-up were used during counseling to reinforce the effects of the nutrition education and to facilitate adherence to individual dietary goals.

Individualized dietary recommendations were specifically tailored to the participant's caloric needs, dietary preferences, lifestyle context, and acculturation level. For example, less acculturated KAs whose dietary pattern was similar to that of Koreans in Korea were advised to reduce the normally high sodium intake caused by consuming traditional Korean foods, including soybean paste-based soup, kimchi, and salted pickles; more acculturated KAs were advised to reduce their intake of processed food, which is a major dietary source of sodium in the United States. At week 10, the last nutrition consultation was held to support the maintenance phase as the participants prepared for the transition to independence in sustaining their individual dietary strategies. Appropriate meal planning and healthy food selection were reinforced, and challenging situations (eg, eating out or socializing) were addressed. As an additional reinforcement strategy to ensure adherence to the diet regimen, a brief follow-up telephone call was made at 8 weeks.

Measurement

Fasting blood tests were conducted at baseline and at 4 and 10 weeks to examine the time course of any changes in serum lipid profile and as a safety check for hyperkalemia. A 24-hour urine test was conducted at baseline and again at 10 weeks to assess compliance with the dietary modification (proper instruction was given for obtaining a complete 24-hour urine collection).

Ambulatory BP monitoring (Space Labs, Redmond, Washington) 24-hour recordings were obtained at baseline (end of run-in, week 0) and at 10 weeks after the intervention. Blood pressure readings were recorded every 30 minutes between 7:00 AM and 11:00 PM and hourly between 11:30 PM and 7:30 AM. Daytime BP was reported as the average of BPs measured between 6:30 AM and 11:30 PM, and nighttime BP was the average of measurements between 11:30 PM and 6:30 AM. Participants who worked night shifts or had irregular evening shifts were excluded from the daytime and nighttime analyses but were included in the 24-hour overall BP analyses. Daytime ambulatory SBP, as determined by 24-hour ABPM, was the primary outcome measure, with average 24-hour and nighttime BP as secondary measures.

To assess the level of adherence to the K-DASH education guideline, a 3-day dietary record was obtained at each time of data collection. The participants were carefully instructed about how to record the amounts of foods and snacks ingested, as assessed using household measures, and they were instructed on how to determine the capacity of the utensils before they began recording. The food items and amounts of food consumed as indicated in the diet records were verified by the same person using food models. An experienced clinical dietician reviewed and analyzed all diet records and provided individually tailored feedback to the participants in individual counseling.

All diet records were analyzed using the Computer-Aided Nutritional Analysis program version 3.0 (The Korean Nutrition Society, Korea) for the traditional Korean food items and the food composition databases from the US Department of Agriculture for the Western food items.

Statistical Analyses

Descriptive statistics were used to summarize sample characteristics and to compare differences in primary and secondary outcomes at 10 weeks. Continuous variables were presented as mean (SD), and discrete variables, as n (%). Differences in biochemical analysis between baseline and each data collection time (at 4 and 10 weeks) were assessed by repeated-measures analysis of variance. Changes in BP from baseline to week 10 of the intervention were assessed by paired *t* tests. All statistical analysis was performed using IBM SPSS version 19 (SPSS Inc, Chicago, Illinois). Statistical significance was determined at $\alpha = .05$.

Results

Participant Characteristics

A total of 30 KA volunteers with HBP were recruited for the study. Of the 30 recruited, 28 KAs with HBP (16 men, 12 women) completed the 10-week intervention that consisted of 2 group education sessions and 4 individual counseling sessions (Table 3). The mean (SD) age of the study participants was 55.3 (6.8) years, and the mean (SD) length of stay in the United States was 18.5 (9.8) years. The mean (SD) duration of the HBP diagnosis in this group was 5.7 (5.8) years, and 21 (75%) of the study participants were on HBP medication(s) and had not changed their medication dose during the intervention period.

Blood Pressure Outcomes

Descriptive statistics yielded a mean (SD) baseline SBP and DBP of 144.4 (10.0) and 88.0 (8.4) mm Hg, respectively. Our primary outcomes, daytime ambulatory SBPs and DBPs as measured by ABPM, were both statistically and clinically significantly decreased at the 10-week postintervention evaluation (SBP, -4.5 mm Hg; DBP, -2.5 mm Hg). The 24-hour ABPM revealed a small but significant decrease in 24-hour overall SBP (133.0 [10.2] vs 129.2 [9.7] mm Hg; $P = .004$) and DBP (83.8 [6.7] vs 81.8 [7.2] mm Hg; $P = .010$) after 10 weeks of intervention. Although there were no statistically significant changes in nighttime SBP or DBP, the decreases in SBP (136.1 [11.2] to 131.6 [10.8] mm Hg; $P = .002$) and DBP (86.0 [6.9] to 83.5 [7.8] mm Hg; $P = .003$) during the daytime were significant (Figure).

Biochemistry Parameters

At baseline, many participants were found to be consuming less than 75% of the recommended levels of micronutrients; at least 50% of the participants consumed less than 75% of the recommended intake of fiber (14/28, 50%), vitamin C (13/28, 50%), folate (16/28, 60%), calcium (24/28, 90%), and potassium (16/28, 60%) (data not shown). Dietary intake analysis after 10 weeks of intervention revealed a reduction in calories (-131.8 kcal/d), sodium (-169 mg/d), and cholesterol (-171.2 mg/d). The consumption of all targeted micronutrients was slightly enhanced but not significant except for calcium

(potassium, 236 mg/d; vitamin C, 11.1 mg/d; calcium, 152 mg/d [$P < .05$]; and dietary fiber, 4.8 g/d).

The results from both urine and blood tests revealed similar results: As compared with baseline, at week 10 of the intervention, serum low-density lipoprotein cholesterol levels were significantly decreased (124.2 [19.9] to 116.9 [25.2] mg/dL; $P = .047$), and both potassium (4.0 [0.3] to 4.2 [0.4] mEq/L; $P = .040$) and ascorbic acid (0.6 [0.3] to 0.8 [0.3] mg/dL; $P = .008$) levels were significantly increased to the reference range (Table 4). Urine phosphate excretion was also significantly increased (63.9 [30.5] to 78.1 [26.6] mEq/L; $P = .025$).

Process Evaluation

Because this study represented the first pilot testing of a micronutrient-related educational intervention for a KA sample, we conducted a systematic process evaluation of the intervention. In general, participants were satisfied with the content of the education. The educational intervention was the first opportunity they had had to participate in a culturally relevant dietary education and counseling process. Although most of the participants were also satisfied with the other components of the intervention process (the time allocations of the educational classes and counseling, the intervener characteristics, and the educational facility), the research team concluded that a thoughtful integration of the qualitative data for this intervention (particularly the intensity and dose of the intervention) with an in-depth analysis of data from a larger sample is warranted before definitive recommendations can be made to clinicians in the field.

Discussion

This study has demonstrated that a CBPR framework-guided, systematic translational adaptation of a well-established dietary guideline can be a useful approach to producing a culturally relevant nutrition education program for an ethnic minority group with culturally distinct dietary patterns. The results of this study also suggest that the K-DASH, a community-based, culturally tailored nutrition intervention for KAs, is efficacious in improving HBP control in a sample of KA immigrants with HBP.

Our important findings can shed light on several areas of HBP intervention: First, the positive outcomes of this study reinforce the important role of micronutrients in HBP control; in particular, our results have the potential to fill significant knowledge gaps in the literature regarding the role of micronutrients in controlling HBP. Although a large body of evidence exists concerning the effects of dietary interventions, including antioxidant and mineral supplementation, on BP and cardiovascular disease outcomes, many of the relevant studies have suffered from systematic measurement errors that may explain the inconsistencies that have been observed across trials in terms of BP outcome.^{34–42} The present study was designed to provide the empirical data needed to evaluate the potential use of a micronutrient-enhanced diet in reducing health disparity gaps related to HBP control in minority groups such as KAs who have a high prevalence of HBP and cultural dietary patterns associated with poor micronutrient balance. Specifically, we believe that this study

has optimized the characterization of the main outcomes (SBP and DBP) by using ABPMs. It is well recognized in the field of BP measurement that ABPM use considerably reduces measurement variability and produces a BP variance that is equivalent to that obtained by 5 days of BP measurement with a standard digital device.⁴³

In addition, the findings of this study provide clues for understanding why certain groups such as KAs are more vulnerable to HBP despite their normal body weight. Although not entirely conclusive, the available evidence indicates that the mechanisms by which unhealthy dietary consumption patterns lead to HBP are related, in part, to deficiencies in micronutrients (eg, potassium, magnesium, and vitamin C).^{44,45} Nevertheless, the independent effects of micronutrients on BP control have not been well investigated in traditionally lean populations whose HBP prevalence is unusually high, such as KAs. Although our study sample was small, our results also confirmed that the typical dietary pattern of this group is characterized by a seriously insufficient intake of micronutrients, especially fiber, vitamin C, folate, calcium, and potassium. Although the traditional dietary pattern of KAs is generally grain based, with a relatively small amount of animal fat, it is also clear that their consumption of fruits, fresh vegetables, and dairy products is very low, and their sodium intake is extremely high. It seems that these culturally embedded dietary habits may be responsible for the high prevalence of HBP in this population.

In general, serum potassium level is insensitive to changes in dietary intake, and potassium homeostasis is tightly maintained.^{46–48} The present study findings, however, presented that change in dietary potassium intake results in increased serum potassium level in the reference range. Although further investigation is needed, this suggests that a micronutrient-enhanced diet might be more effective in controlling HBP in the sodium-sensitive subgroup.

Another unique contribution of this study in the field of nonpharmacological interventions for HBP is that ours is one of the very first translational studies of the DASH intervention in a community setting; most DASH trials have been conducted in well-controlled metabolic study settings (ie, feeding studies). Our pilot study was designed to implement the K-DASH adaptation in a community setting, thus improving its external validity (especially ecological validity) and its translational effectiveness in noncontrolled settings. Not surprisingly, the BP change (eg, SBP, -4.5 mm Hg) produced by our study was much more moderate than the BP changes (eg, SBP, -11.4 and -11.5 mm Hg) produced by the previously published, highly controlled DASH feeding studies.^{17,49} In the future, translational researchers need to pay attention to the strength of this type of intervention and particularly its intensity in community settings: The appropriate frequency and duration of this type of intervention for producing optimal outcomes, including the appropriate time for administering 1 or more booster interventions, also need to be discussed among researchers.

The inherent limitations of a small-scale pilot study such as ours prevent us from making strong inferences from our findings: Because this study was a 1-group, nonrandomized design with a relatively small sample, the findings could have been influenced by as yet unidentified biases. Future studies should be conducted to cross-validate the findings of this study by means of full-scale randomized, community-based effectiveness trials. In addition, because of the relatively short follow-up period (10 weeks), the long-term efficacy of this

type of intervention is unknown. Future research with larger sample sizes and longer follow-up periods is therefore warranted.

Despite these potential limitations, the present study plays an important role in filling both clinical and translational methodological gaps in the areas of HBP control and health promotion guidelines targeting underserved populations. In particular, we hope that by articulating a systematic intervention translation process, we will stimulate methodological discussions among intervention researchers focused on health disparity populations.

To summarize, the aim of this study was to evaluate the efficacy of a culturally tailored dietary modification program, validating a newly translated intervention (culturally tailored DASH for KAs). To determine the efficacy of this intervention, daytime ABPM was used as primary outcome measure. The magnitude of the changes in daytime SBP (−4.5 mm Hg) and daytime DBP (−2.5 mm Hg), as measured by 24-hour ABPM, demonstrated statistically and clinically significant decreases because of the 10-week intervention. Despite overwhelming evidence for the effectiveness of pharmacological interventions in reducing BP, many people with HBP intentionally delay or avoid pharmacological treatment for their condition.^{21,50,51} Certain cultural groups such as KAs prefer dietary changes or supplements to pharmacological therapy for the treatment of hypertension.^{52,53} Demonstrating the effectiveness of such nonpharmacological approaches is an important area of intervention research. Considering the inexpensive and empowering nature of self-care strategies such as the DASH approach, more rigorous efforts should be made to translate and evaluate these guidelines in a manner that is culturally meaningful for specific clinical or ethnic communities, with the ultimate goal of promoting better cardiovascular health in all Americans.

Acknowledgments

Editorial support was provided by Dr Deborah McClellan through the Johns Hopkins University School of Nursing Center for Excellence for Cardiovascular Health in Vulnerable Populations (P30 NR011409).

This publication was made possible by grant no. UL1 RR 025005 from the National Center for Research Resources (NCRR), a component of the National Institutes of Health (NIH), and NIH Roadmap for Medical Research. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of NCRR or NIH.

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What's New and Important

- This is one of the very first translational studies of the Dietary Approaches to Stop Hypertension (DASH) intervention in a community setting; most of the previous DASH trials have been conducted in well-controlled metabolic study settings.
- This study is also the first study of a dietary intervention conducted in a sample of Korean Americans (KAs) with high blood pressure (HBP), a high-risk group that experiences both a high prevalence of HBP and suboptimal dietary patterns for managing HBP: a low micronutrient and high sodium content.
- This article addresses methodological aspects of the currently underdocumented health disparity research, presenting a systematic way to translate evidence-based behavioral or educational interventions to suit the needs of an ethnic minority group with distinctly different cultural contexts for the target behaviors.
- Although this is the report of small-scale pilot study, the findings of this study will stimulate scientific dialogue among intervention researchers, particularly researchers and clinicians who are exploring the ways to find a translatable, inexpensive, and safe approach to managing HBP in KAs and similar cultural groups that share related dietary patterns.

FIGURE.

Changes in blood pressure, as measured by 24-hour ambulatory blood pressure monitoring (ABPM), from baseline to 10 weeks of intervention. A, systolic blood pressure (SBP) change. B, diastolic blood pressure (DBP) change. The statistical significance of changes between baseline and 10 weeks was assessed by paired *t* test. **P* < .05; ***P* < .01.

TABLE 1

Development of Culturally Relevant Strategies for Delivering Education Content Through Nutrition Education Programs by Translating Existing Dietary Guidelines

Category	DASH	KDA/KNS	Examples of Culturally Relevant Strategies
Measurement unit of 1 serving	Based on cup and ounce units	Base on gram units	Culturally familiar units of measure (cups, ounces, and grams) were used to explain the serving size of each food item based on the individual's understanding.
Concept of serving size in the grain group	All food in the grain group (1 serving = about 100 kcal)	Two subcategories in the grain group: staple foods (1 serving = 300 kcal) and side dishes (1 serving = 100 kcal)	To make it easy to count the daily total serving size, 1 serving of grain was standardized to 100 kcal, regardless of the food item.
Number of servings	More servings of fruits and dairy	More servings of grains and vegetables	To reflect the traditional vegetable-centered dietary pattern of KA, a total number of servings of fruits and vegetables was suggested in place of respective servings of fruits and vegetables, while the fundamental frame of the DASH guidelines was maintained.
Food examples	Targeted to the general American population	Targeted to Koreans in Korea	Based on the framework of the DASH guideline, adopting culturally familiar nutritional concepts and traditional Korean food examples from the KNS.
	Consists of a majority of foods frequently consumed by Americans in the United States	Consists of traditional Korean foods to address the dietary pattern of Koreans	Taking into consideration the acculturated dietary status of KAs, the food example list was expanded by including both traditional Korean food and American food items available for or frequently used by KAs.
Beans and bean products	Not specified, but generally beans and peas are considered part of both the protein foods group and the vegetable group.	Beans and bean products are considered part of protein foods group, which includes meat, poultry, and fish.	Making use of culturally familiar nutrition concepts (beans and bean products are very familiar food items as protein sources for Koreans), beans and bean products were considered part of meat, poultry, and fish group, and KAs were encouraged to use this plant protein source as an alternative to red meat.
Meal planning	Counting of serving sizes according to the individual's level of calorie intake using food groups	Counting of serving sizes according to the individual's level of calorie intake using a food pyramid	Integrating meal-planning methods to introduce basic nutrition information and meet the educational needs of the target population; a culturally tailored food pyramid was used for fundamental nutrition information; calorie and nutrient counting skills were taught as part of interpreting nutrition facts on food labels.

Abbreviations: DASH, Dietary Approach to Stop Hypertension; KDA, Korean Dietetic Association; KNS, Korean Nutrition Society.

TABLE 2**The Dietary Approach to Stop Hypertension for Koreans Intervention**

Week	Contents
Week 1 (2 h)	Structured group education I Overview of a fundamentally healthy diet Introduction to the K-DASH diet Calorie balance, serving vs portion size
Week 2 (2 h)	Structured group education II Introduction of strategies to consume the desirable amount of each micronutrient Reading food labels Identifying barriers to and facilitators of a healthy diet
Week 4 (0.5–1 h)	Individualized nutrition consultation Developing an individual meal plan Planning meals, shopping, healthier cooking
Week 5 (0.5–1 h)	Individualized nutrition consultation Reinforcing nutrition-related knowledge Individual practice in interpreting food labels Individual barriers to and facilitators of following K-DASH
Week 8 (0.5 h)	Follow-up telephone call
Week 10 (0.5–1 h)	Individualized nutrition consultation for long-term sustainability Preparing for a transition to independence Maintenance strategies and relapse prevention

Abbreviation: K-DASH, Dietary Approach to Stop Hypertension for Koreans.

TABLE 3

General Characteristics

Variables	Total (n = 28)
Age, mean (SD), y	55.3 (6.8)
Gender, n (%)	
Male	16 (55.2)
Female	12 (41.4)
Years of education, mean (SD)	14.4 (4.2)
Marital status, n (%)	
Married	26 (89.7)
Divorced	1 (3.4)
Partnered	1 (3.4)
Length of stay in the United States, mean (SD), y	18.5 (9.8)
Employment, n (%)	
Working full-time	18 (62.1)
Working part-time	5 (17.2)
Unemployed	1 (3.4)
Housekeeper	4 (13.8)
Insurance, yes, n (%) ^a	11 (37.9)
Medicaid	—
Medicare	2 (6.9)
Private	9 (31.0)
HBP duration, mean (SD), y	5.7 (5.8)
On antihypertensive medication, n (%)	21 (75.0)
Medication duration, mean (SD), y	4.8 (4.8)

Abbreviation: HBP, high blood pressure.

^a Multiple-response question.

TABLE 4

Changes in Biochemistry Parameters (n = 28)

	Reference	0 wk	4 wk	10 wk	P
Total cholesterol, mg/dL ^a	130–200	205.8 (22.2)	197.6 (24.5)	200.4 (24.6)	.056
HDL-cholesterol, mg/dL	Men: 30–65 Women: 38–73	54.4 (14.8)	51.5 (14.7)	51.3 (16.5)	.034
LDL-cholesterol, mg/dL	<130	124.2 (19.9)	115.4 (25.0)	116.9 (25.2)	.047
Triglyceride, mg/dL	34–143	167.3 (134.6)	180.4 (143.2)	175.0 (101.8)	.661
Na, mEq/L	135–148	140.6 (1.9)	140.4 (2.0)	140.2 (1.8)	.688
K, mEq/L	3.5–5.1	4.0 (0.3)	4.0 (0.3)	4.2 (0.4)	.040
Ca, mEq/dL	8.4–10.5	9.3 (0.3)	9.3 (0.3)	9.3 (0.3)	.556
Ascorbic acid, mg/dL	0.2–1.9	0.6 (0.3)	0.7 (0.3)	0.8 (0.3)	.008
Urine Na, mEq/L ^b	15–237	155.7 (63.5)	–	162.4 (51.5)	.697
Urine P, mEq/L	22–164	63.9 (30.5)	–	78.1 (26.6)	.025
Urine Mg, mEq/L	0.4–15.0	7.5 (2.3)	–	8.1 (2.7)	.388

Abbreviations: HDL, high-density lipoprotein; KA, Korean American; LDL, low-density lipoprotein.

Data are presented as mean (SD).

^aThe significances of changes in blood chemistry outcomes from baseline to 10 weeks of intervention were examined by repeated-measures analysis of variance.^bThe significances of changes in urine analysis between baseline and 10 weeks were examined by paired *t* test.