Behavioral Counseling Promotes Diet Quality and Cardiovascular Risk Factors in Residents of Rural Appalachia

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BACKGROUND

- Cardiovascular disease remains the leading cause of death across the U.S. and across Kentucky, despite improvements in recent decades.
- Kentucky is ranked 6th in terms of heart disease mortality in 2012 (208.2 per 100,000; U.S. average: 170.5).
- U.S. Preventive Services Task Force recommends that adults who are overweight or obese and have additional cardiovascular disease (CVD) risk factors be offered intensive behavioral counseling that includes a healthy diet to promote CVD prevention.

PURPOSE

- To determine the impact of an intensive CVD risk factor self-management intervention that included strategies for improving diet quality on the level of Healthy Eating Index (HEI) and CVD risk factors in adults at high risk for CVD living rural Appalachia.

METHODS

- Randomized waitlist-controlled trial.
- A prospective 6 month Individualized education and goal setting intervention to promote heart healthy lifestyles that included diet modification.
- Eligibility: 1) resident of 1 of 4 counties in Eastern Appalachian Kentucky. 2) having CVD or at least 2 of the following CVD risk factors: age men > 44 and women > 55 years, family history of CVD, history of hypertension, abnormal lipids, or diabetes, body mass index > 25 kg/m^2, diet high in saturated fat or low in fruits and vegetables, or sedentary life style. No history of any disease that required specialized diets or interfered with lipid metabolism.
- Recruited from a community center and an Federally Qualified Health Center in Eastern Appalachian Kentucky that served the 4 county region.
- Data were collected at baseline and post-intervention by trained research nurses (Table 1).
- CVD risk factors: Lipid profile (Total cholesterol, high- and low-density lipoprotein cholesterols, and triglycerides), Blood pressure (systolic and diastolic), Hemoglobin A1c, Body Mass Index (BMI)
- Diet Quality: Healthy Eating Index (HEI)-2005
  - A measure of diet quality that assesses compliance with the US Dietary Guidelines for Americans
  - Total score ranges from 0 to 100; Higher scores indicate better diet quality (Table 1.)

Table1.Healthy Eating Index–2005 Components and standards for scoring[1]

Component	Maximum points	Standard for maximum score	Standard for minimum score of zero
Total Fruit (includes 100% juice)	5	≥0.8 cup equiv. per 1,000 kcal	No Fruit
Whole Fruit (not juice)	5	≥0.4 cup equiv. per 1,000 kcal	No Whole Fruit
Total Vegetables	5	≥1.1 cup equiv. per 1,000 kcal	No Vegetables
Dark Green and Orange Vegetables and Legumes[2]	5	≥0.4 cup equiv. per 1,000 kcal	No Dark Green or Orange Vegetables or Legumes
Total Grains	5	≥3.0 oz equiv. per 1,000 kcal	No Grains
Whole Grains	5	≥1.5 oz equiv. per 1,000 kcal	No Whole Grains
Milk[3]	10	≥1.3 cup equiv. per 1,000 kcal	No Milk
Meat and Beans	10	≥2.5 oz equiv. per 1,000 kcal	No Meat or Beans
Oils[4]	10	≥12 grams per 1,000 kcal	No Oil
Saturated Fat	10	≤7% of energy[5]	≥15% of energy
Sodium	10	≤0.7 gram per 1,000 kcal[5]	≥2.0 grams per 1,000 kcal
Calories from Solid Fats, Alcoholic beverages, and Added Sugars (SoFAAS)	20	≤20% of energy	≥50% of energy

[1]Intakes between the minimum and maximum levels are scored proportionately, except for Saturated Fat and Sodium (see note 5).
[2]Legumes counted as vegetables only after Meat and Beans standard is met.
[3]Includes all milk products, such as fluid milk, yogurt, and cheese, and soy beverages.

Guenther et al. (2008). J of the American Dietetic Association, 108;1854-1864

- Data Analyses:
  - Paired t-tests were used to compare pre-intervention and post-intervention.

RESULTS

- Characteristics of participants who completed the intervention (Table 2).

Table 2. Participant Characteristics, N=715

Characteristic	Mean ± SD or N (%)
Age (years)	54 ± 14
Race (Caucasian)	689 (96%)
Married/co-habitate	513 (71%)
Born in Kentucky	494 (69%)
Years live in Kentucky (years)	44 ± 19
Body mass index (kg/m^2)	32.3 ± 7.5
Systolic BP (mm Hg)	128.8 ± 16
Diastolic BP (mm Hg)	79.1 ± 10
Triglycerides (mg/dL)	184.7 ± 108
Total cholesterol (mg/dL)	193.5 ± 39
HgA1c (%)	5.8 ± 1

- The majority of the participants were lifetime resident of Kentucky.
- Healthy Eating Index (HEI) comparisons between baseline and post-intervention is shown in Table 3.
  - HEI total score increased 8% from 63.3±11.6 to 68.5±11.4.
  - HEI scores for total fruit; whole fruit; total vegetable; legumes, orange and dark green vegetables; whole grain; and milk increased by 31%, 28%, 7%, 20%, 15%, and 3% ,respectively, post intervention compared to the baseline.
  - Diet quality for saturated fat; and calories from solid fats, alcoholic beverages and added sugar also improved by 28% and 12%, respectively.

Table 3. Healthy Eating Index, N=715

HEI Scores	Pre-intervention	Post-intervention	P-value
Total HEI score	63.3 ± 11.6	68.5 ± 11.4	<.001
Total Fruit	2.5 ± 1.6	3.3 ± 1.7	<.001
Whole Fruit	2.9 ± 1.6	3.7 ± 1.5	<.001
Dark Green and Orange Vegetables and Legumes	4.1 ± 1.0	4.0 ± 1.1	<.001
Total Grains	1.8 ± 1.5	2.1 ± 1.6	.003
Milk	6.9 ± 2.6	7.1 ± 2.5	.035
Meat and Beans	9.0 ± 1.7	9.0 ± 1.6	.602
Oils	8.9 ± 1.9	8.7 ± 1.9	.014
Saturated Fat	4.8 ± 3.4	6.2 ± 3.2	<.001
Sodium	2.6 ± 2.3	2.3 ± 2.2	<.001
Calories from Solid Fats, Alcoholic beverages and Added Sugars (SoFAAS)	12.8 ± 5.3	14.3 ± 5.0	<.001

- Figures 1 through 6 depict results from CVD risk factor comparisons between baseline and post-intervention.
  - Total cholesterol, low-density lipoprotein cholesterol, triglycerides, systolic and diastolic blood pressure, and hemoglobin A1c levels significantly decreased post-intervention compared to pre-intervention.
  - Body Mass Index also significantly decreased post-intervention compared to pre-intervention (32.3 ± 7.5 kg/m^2 vs 32.0 ± 7.4 kg/m^2, respectively; p<.001)
  - High-density lipoprotein cholesterol levels did not change significantly (p=.105).

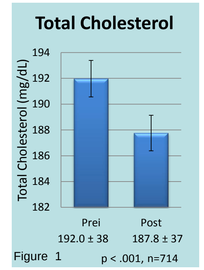

Figure 1 p < .001, n=714

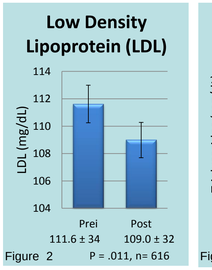

Figure 2 P = .011, n= 616

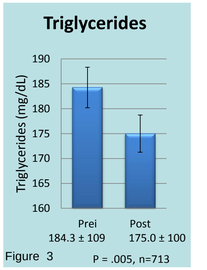

Figure 3 P = .005, n=713

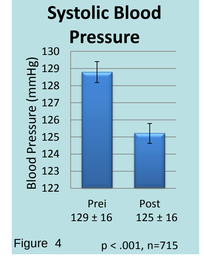

Figure 4 p < .001, n=715

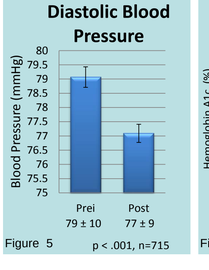

Figure 5 p < .001, n=715

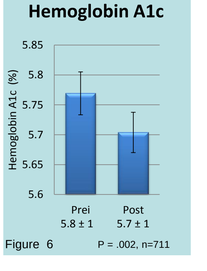

Figure 6 P = .002, n=711

CONCLUSIONS

- The intervention was effective in improving diet quality and CVD risk reduction in adults living in a rural Appalachian Kentucky.
- The results provide evidence that an intensive behavioral counseling intervention outcome corresponds with U.S. Preventive Services Task Force Recommendation.
- Further research is needed to determine if the intensive self-management intervention leads to sustained improvements in eating habits and CVD risk factors.

REFERENCES

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