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A culturally specific dietary plan to manage weight gain among African American breast cancer survivors: A feasibility study

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Abstract

Breast cancer survival rates are lower in African Americans (AAs) than in Caucasians, owing in part to a higher prevalence of obesity in the former, which increases the risk of recurrence and mortality. The Women's Intervention Nutrition Study (WINS) found that Caucasian women who followed a low-fat eating plan experienced a lower rate of cancer recurrence than women who maintained their usual diets. The purpose of this study was to test the feasibility of a WINS plan tailored to the cultural needs of AA breast cancer survivors. This feasibility pilot study was conducted at a university National Cancer Institute-designated comprehensive cancer center outpatient clinic with AA breast cancer survivors. The culturally specific WINS (WINS-c) plan included eight individual counseling sessions, five educational group meetings, and follow-up telephone calls over a 1-year period. Outcome measures included dietary fat, triglyceride, insulin and glucose levels, and fruit and vegetable intake. Participants (n = 8) had a mean age of 61.1 years (standard error of the mean (SEM) 3.1 years) and a mean BMI of 32 kg/m^2 (SEM 4.25 kg/m)^2. Baseline daily fat consumption decreased from 64.6 g (range 36.8–119.6g) to 44.0 g (21.6–73.4g) at 52 weeks (p = 0.07). Mean daily consumption of fruits and vegetables increased by 36% and 15%, respectively. Mean triglyceride levels decreased at 12 months ($p < 0.05$). Sustained hyperinsulinemia was noted in most participants, including those without diabetes. Mean calcium and vitamin D consumption decreased over the 1-year study period. In AA breast cancer survivors, the WINS-c program resulted in a trend toward reduced fat consumption and may represent a sustainable approach in this population for improvement of diet quality after breast cancer.

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Keywords

Health disparities; breast cancer; cancer survivorship; weight gain

Introduction

There has been a steady decline in breast cancer deaths among African American (AA) women since 1992, but the reduction has been less than that for Caucasian women, increasing the disparity in relative mortality rates. Between the years 2003 and 2007, AA women had a 39% higher death rate from breast cancer than white women (American Cancer Society, 2011).

Up to 50% of breast cancer deaths among post menopausal women in the United States are attributable to overweight (Boyd et al., 1981; Chlebowski et al., 2002; Goodwin et al., 2002; Irwin et al., 2005; Kumar et al., 2000; Newman et al., 1986; Rock and Demark-Wahnefried, 2002). Low-fat food consumption, an important component of weight loss, has been associated with a reduced risk of breast cancer recurrence and mortality (Beasley et al., 2011; Chlebowski et al., 2002; Hauner and Hauner, 2010; Winters et al., 2004). In particular, the Women's Intervention Nutrition Study (WINS) demonstrated a lower risk of breast cancer recurrence in hormone receptor-negative women who consumed a low-fat diet, consisting of 20% of daily calories from fat, than in those who continued their usual diets ($p < 0.01$) (Chlebowski et al., 2006). WINS participants were predominantly white, and the role of low-fat eating in reducing recurrence risk for AA women remains unclear. In another large randomized trial, the Women's Healthy Eating and Living (WHEL) trial (Pierce et al., 2007), subgroup analysis of AA women ($n = 118$) who reduced their fat intake by 4% over the first year from a mean of 29.6% (standard deviation (SD) 6.1) to 25.6% of daily calories, while increasing fruit, vegetable, and fiber consumption, did not experience a survival benefit at 7.3 years of follow-up compared with control subjects (Paxton et al., 2011). The dietary intervention in the WHEL study was not culturally specific, and it is possible that the return of mean daily percentage of calories from fat after 4 years had some influence on lack of mortality benefit.

This pilot study was conducted to determine whether low- to middle-income AA breast cancer survivors could adopt and maintain a culturally specific low-fat eating plan, based on the WINS, reducing dietary fat to 20% of total daily calories, while increasing fruit and vegetable consumption.

Methods

Following study approval by the University of Maryland, Baltimore Institutional Review Board, recruitment and screening for this study occurred between December, 2008 and March, 2009. Eligible participants were self-identified AA females between 30 and 75 years with stage 0–III. A primary breast cancer who had completed surgery, chemotherapy, and/or radiation treatment 3 months to 8 years prior to recruitment. All participants received medical clearance from a healthcare provider confirming that they were well enough for study participation.

Study procedures

The study intervention included eight 45- to 60-minute individual nutritional counseling sessions with a registered dietician or diet technician (conducted between weeks 2 and 39), five group sessions (weeks 3, 8, 16, 24, and 34) and telephone follow-up every 1–3 weeks (weeks 8 through 47). Nutritional counseling sessions included a review of 3-day food records, discussion of strategies to decrease the amount of fat in the diet through goal setting, identification of barriers to dietary goals, and delivery of cognitive approaches shown to be effective in the WINS (Winters et al., 2004). Participants were given a copy of the culturally specific WINS (WINS-c) plan, modified from the original WINS for the particular cooking and eating preferences of AA breast cancer survivors. The contents of the WINS-c eating plan were developed from information obtained during our earlier focus groups carried out for this purpose and included the following major recommendations during focus groups: (a) reduce the amount of oils, high-fat spreads, dressing, and sauces; (b) choose low-fat dairy products; (c) choose low-fat fish, poultry, meat, and egg whites or egg substitutes, and eat smaller portions; (d) eat more fruits, vegetables, legumes, and grain products; and (e) substitute high-fat desserts, snacks, and beverages for low-fat items.

Educational group meetings were designed to facilitate behavior change and included discussion of basic nutrition principles, demonstration of low-fat cooking principles using recipes for low-fat dishes, and a grocery store tour which focused on reading food labels and choosing heart-healthy items. Dietary staff also contacted participants by telephone to address any concerns or difficulties encountered while on the WINS-c plan, and to receive updates on any changes in health.

Data collected at the baseline visit included medical history, anthropometrics, 3-day food records, and fasting lipid, glucose, and insulin levels. Plasma glucose concentrations were measured using the glucose oxidase method (2300 STAT Plus; YSI, Yellow Springs, OH). Insulin was determined by radioimmunoassay (Linco Research, St. Charles, MO). At 26 and 52 weeks, measurement of anthropometrics, fasting blood lipid, glucose, and insulin levels, and 3-day food records were repeated.

Statistical analyses

This project was a feasibility study to determine whether low- to middle-income AA breast cancer survivors could adopt and maintain a culturally specific low-fat eating plan. Because pilot studies are not designed to test hypotheses, the sample size was estimated based on the ability to test an intervention for acceptability (Leon et al., 2011). Given the intensity and duration of the intervention, the participation of 8-10 women was determined to be adequate for the goals of this study.

Analysis of food records was completed using Nutritionist Pro™ (Axxya Systems, Stafford, TX, USA), a computerized dietary collection system linked to a comprehensive food and nutrient database. Energy from fat was compared with the Institute of Medicine dietary reference intakes, which recommend fat consumption of between 20% and 35% of daily calories (Institute of Medicine, 2006; United States Department of Agriculture and United States Department of Health and Human Services, 2010). Compliance with the WINS-c plan

was defined as dietary fat intake less than or equal to 20% of total calories, consistent with the fat intake goal of the original WLEP study (Chlebowski et al., 2006). Mean cup equivalents were calculated for fruits and vegetables and compared with recommended daily intakes, based on age, gender, and sedentary/activity level (United States Department of Agriculture and United States Department of Health and Human Services, 2010). Consumption of nutrients, fruits, and vegetables was determined based on dietary food records. Paired t-tests were used to compare mean values of each measurement at baseline, 6 months, and 12 months. All analyses were done using SAS 9.2 (SAS Institute, Inc., Cary, NC, USA). Statistical significance was set at $p < 0.05$.

Results

Twenty-four women were screened for eligibility, and nine were eligible and enrolled in the study. One participant withdrew from the study at baseline, leaving a total of eight evaluable participants. The mean age was 61.1 years (range 47–74 years), and most had early-stage breast cancer, with a mean time since diagnosis of 7.2 years (range 3–19 years). BMI varied greatly, with 37.5% meeting criteria each for obesity and overweight and 12.5% each for normal weight and underweight (United States Preventive Services Task Force, 2003).

Comorbidities of note included hyperlipidemia ($n = 3$), for which cholesterol-lowering drugs were prescribed in all cases, osteoporosis ($n = 3$), for which bisphosphonates were being given, and diabetes ($n = 3$). Other participant characteristics are found in Table 1. In accordance with the WINS, one goal of the present study was weight maintenance, and 62.5% of women stayed within + 5% of their baseline weight after 52 weeks. Of the remaining three participants, one lost less than 10% of her body weight and two gained between 8% and 20% of initial body weight.

Dietary intake of fat and other nutrients

At baseline, 62.5% of participants were consuming the recommended 20–35% of daily calories from fat, and the remaining three women had consumption of more than 35% (Table 2). Overall, mean daily dietary fat intake decreased nearly one-third between baseline and study end at 1 year. The mean percentage of daily calories derived from fat decreased from 35% at baseline to 32% at 26 weeks, a level which was maintained at 1 year ($p = 0.20$). Although at 1 year only 12.5% reached the WINS-c goal of ≤ 20% of energy from fat, over half reported a daily fat intake of ≤30%, two of whom were consuming < 25%. For calcium, mean daily intake decreased by 25% over the 52-week study course ($p = 0.02$). There was a concomitant 13% reduction in vitamin D consumption over the same time period, which was not significant.

Overall, mean fruit consumption was 1.1 cups per day at baseline (range 0–3.5 cups), with 37.5% of participants meeting or exceeding the daily recommendation of 1.5 cups of fruit. Mean baseline vegetable intake was 0.7 cups per day (range 0–1.3 cups), with none of the subjects meeting the daily recommended 2 cups of vegetables. An increase in both fruit and vegetable consumption was noted in 62.5% of participants, who were consuming between 0.5 and 3.3 additional cups per day at 26 weeks, four of whom maintained that increase at 52 weeks. Participants consuming the recommended 1.5 cups of fruit daily increased from

37.5% at baseline to 62.5% after 13 weeks, with 37.5% maintaining consumption at ≥26 weeks. Individuals consuming the recommended 2 cups of vegetables daily increased from 0% (at baseline) to 25% after 13 weeks, and 37.5% at 26 weeks.

Triglyceride levels declined from 103.4 mg/dl (95% confidence interval (CI) 62.2–144.7) at baseline to 88.4 mg/dl (95% CI 50.5–125.4) at 12 months ($p < 0.05$), and, although not significant, there was an overall mean decrease in total cholesterol from 184 g/dl (range 143–233) to 181 mg/dl (range 126–219). A total of six subjects had fasting blood drawn for the measurement of insulin and glucose concentrations at baseline, 6 months, and 1 year (Table 3). Of these individuals, one-third demonstrated had diabetes by fasting glucose and had sustained elevated fasting glucose levels at most time points. The other four women demonstrated fasting hyperinsulinemia across the study, suggesting newly discovered abnormal glucose metabolism or insulin resistance in this small sample.

Discussion

In this feasibility study of a WINS-c diet, the combination of individual and group dietary counseling was well-received, given the 100% participation in group and individual sessions for the duration of the 1-year study. At the end of the study period, only one participant was able to meet the WINS-c goal of less than 20% of daily calories from fat. The majority of women in the study, however, were able to reduce or maintain fat intake below 35% of daily calories. An overall mean reduction in daily calories from fat to 32% demonstrates a trend in reducing percentage daily fat consumption below the recommended maximum of 35% (Institute of Medicine, 2006). These results support previous findings in AAs ($n = 118$) who participated in the WHEL study, in which calories derived from fat were reduced by over 4% following 1 year of a low-fat dietary intervention compared with those who were in the comparison group (Paxton et al., 2011). Furthermore, a significant reduction in triglyceride levels at 1 year in response to fat reduction is encouraging and demonstrates favorable changes in lipid profiles even when goal fat consumption was not met. Because most women did not gain or lose weight, we can assume that calorie consumption did not change for those who remained stable, suggesting that healthy food substitutions were made. These results support the feasibility of participant retainment in a 1-year low-fat dietary intervention in AA breast cancer survivors.

A larger study of greater duration in AA women is necessary in order to confirm their ability to sustain a low-fat diet at 1 year and beyond, as well as to determine whether dietary changes will result in reductions in cancer recurrence equivalent to those documented among Caucasians in the WINS, which reported results based upon a median follow-up of 5 years. A randomized clinical trial of the WINS-c diet in AA breast cancer survivors, in which the WINS-c diet is compared with a usual diet, will allow comparison of dietary intake (e.g. fruits and vegetables) and fat reduction between groups.

A reduction in daily calcium consumption was observed between baseline and 12 months, suggesting that, in order to reduce fat, some participants decreased or eliminated higher-fat dairy products without substituting lower-fat products. Future counseling regarding low-fat

dietary changes should stress the benefits of maintaining or increasing calcium and vitamin D consumption and supplementation if appropriate.

Although about half of the women had normal fasting glucose levels, fasting insulin levels were elevated in five of the six subjects evaluated. The combination of normal fasting glucose and elevated insulin may indicate the presence of insulin resistance, a prediabetic condition in which additional insulin is released into the circulation to stimulate desensitized cells to increase glucose uptake. Persistence of increased insulin levels over all three study time points reinforces findings in the literature that in up to one-third of AAs with type 2 diabetes or insulin resistance, conditions associated with overweight and obesity, the condition remains undiagnosed (Ioannou et al., 2007; Ntyintyane et al., 2006). Careful attention to the presence of high insulin levels relative to glucose in non-diabetics is warranted in future study.

Study limitations

The primary purpose of this study was to evaluate the WINS-c diet for feasibility, and therefore a small sample was recruited. Thus, generalization of our findings cannot be made and instead a larger trial is needed to extrapolate findings to a wider group. Regarding 3-day food records, because participants developed close relationships with the dieticians over time, social desirability bias could have played a role in foods and quantities that were recorded other than at baseline.

Conclusions

Low- to middle-income AA breast cancer survivors with limited resources showed compliance with the WINS-c diet. Study results support the need for additional work among members of this underserved group who are at a higher risk of breast cancer recurrence and death than the general breast cancer population.

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Table 1

Participant characteristics

Characteristic	Value
Body mass index	Mean (range)
	30.7 (17.1–54.2)
Annual income	N (%)
<$20,000	3 (37.5)
$30,000-$39,000	3 (37.5)
$40,000-$49,000	2 (25)
Marital status	
Married	3 (37.5)
Divorced	1 (12.5)
Single	2 (25)
Widowed	2 (25)
Insurance	
Medicare	4 (50)
Private	4 (50)
Breast cancer stage	
0 (DCIS)	2 (25)
1	1 (12.5)
2	4 (50)
Not recorded	1 (12.5)
Received radiation	4 (50)
Received chemotherapy	5 (62.5)
History of previous or current hormonal therapy use	6 (75)
Diabetes	3 (37.5)
Hypertension	6 (75)
Heart disease	3 (37.5)
Osteoporosis	3 (37.5)
Hyperlipidemia	3 (37.5)

Table 2

Mean daily consumption of fat, calcium, and vitamin D at study baseline and 52 weeks

Nutrient or food	Consumption at baseline (range)	Consumption at 52 weeks (range)
Fat (g/day)	64.6 (36.8–119.6)	44.4 (21.6–73.4)
Percentage of daily calories from fat	35% (20–50%)	32% (10–50%)
Calcium (mg/day)[a]	654 (462–921)	491.8 (260–912)
Vitamin D (μg/day)	3 (0.5–6.7)	2.6 (0.6–4.9)
Vegetables (cups/day)	0.7 (0–1.3)	1.1 (0–3.3)
Fruit (cups/day)	1.1 (0–3.5)	1.3 (0–3.5)

[a] Denotes significance at $p=0.02$.

Table 3

Mean fasting insulin and glucose levels (*n*=6)

Baseline		26 weeks		52 weeks	
Glucose (mg/dl) (SEM; range)	**Insulin (pmol/l) (SEM; range)**	**Glucose (mg/dl) (SEM; range)**	**Insulin (pmol/l) (SEM; range)**	**Glucose (mg/dl) (SEM; range)**	**Insulin (pmol/l) (SEM; range)**
100.2 (10.2; 82–142)	236 (132; 36–894)	115.5 (16.3; 88–175)	259.3 (158.3; 54–1048)	118.5 (14.9; 89–171)	158.2 (58.6; 58–446)

SEM, standard error of the mean.