Interventions of Diet and Physical Activity in Obese Peri- and Post-Menopausal African-American Women in the Community Health Setting

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Abstract
Although various studies have investigated the effect of behavioral interventions on body weight, few have reported community interventions for peri- and post-menopausal women. Consequently, questions remain concerning the effectiveness of weight loss interventions for this group of women. The objective of this study was to provide an educational program to improve diet and physical activity levels to promote behavior changes that will improve overall health. A pilot study of obese peri- and post-menopausal African-American women was conducted to assess an educational intervention. Pre and post-tests questionnaires were given to assess eating habits and physical activity and to measure body mass index (BMI) as well as waist circumference. Each participant completed an eight-week behavior modification intervention program designed to increase physical activity levels and encourage healthy dietary choices. A paired-samples t-tests established that after the intervention there were large improvements in diet and exercise as well as small improvements in BMI and waist circumference. The educational intervention was associated with large improvements in diet and exercise and small improvements in BMI and waist circumference. A community setting is a viable option in promoting and improving health behaviors.

Background
African-American women have an enormous rate of obesity, which is not like different groups of women in the United States. Approximately 58% of African-American females ages 20 to 70 years are obese or have a body mass index (BMI) greater than or equal to 30.0 (Centers for Disease Control and Prevention [CDC], 2013). Middle-aged women, especially those around the time of menopause, have a high risk for increased obesity and a shift in fat distribution towards an increased abdominal fat deposition. The decline in physical activity for women experiencing the peri and post menopause leads to food intake being stored as excess visceral fat. The drop levels of estrogen that accompany the peri-menopausal years and subsequent loss of estrogen that accompanies menopause may place the women at risk for numerous physiological alterations (Manjusha & Madhavi, 2014).

Most middle-aged women do not regularly participate in exercise and or fail to report healthy nutrition practices such as consuming five or more vegetables and fruits per day (Jull et al., 2014). African-Americans report particularly low rates of physical activity. In fact, African-American women are the least active demographic group, with only 36% meeting the physical activity recommendations (Centers for Disease Control & Prevention, 2010). Along with declining physical activity levels in peri and post-menopausal women, poor dietary habits also contribute to the obesity issue. Despite of these recommendations, it is unclear what effect lifestyle interventions such as exercise and healthy nutrition have on weight gain if
performed during the menopause stage (Jull et al., 2014).

Obesity is a persistent condition in which a person carries excess body weight. For adults, body mass index (BMI), a height to weight ratio, is equally used to figure out the differences of overweight and obesity. Obesity may increase individuals’ risk of illness and reduces their life expectancy (Mastellos et al., 2011). BMI is a common measure used in classifying overweight and obesity in adults and conforms to the World Health Organization (WHO) standard. It is defined as the weight in kilograms divided by the square of the height in meters (Mastellos et al., 2011).

Menopause is a woman’s last menstrual period, while the period immediately prior to menopause is referred to as “peri-menopause” and the time following menopause is referred to as “post-menopause” (Manjusha & Madhavi, 2014). Women transitioning from peri-menopause to post-menopause experience many hormonal changes (Manjusha & Madhavi, 2014). Peri-menopause is a period in life that represents decrease in ovarian function with menstrual irregularities, symptoms commonly start or become annoying, and this period lasts until the end of menses. The lowering levels of estrogen that occur during the peri-menopausal period and following the loss of estrogen that occur during menopause may put the women at risk for several physiological changes.

Increased stress and other emotional issues are associated with menopause and with ageing in general (Becker et al., 2013), and stress can interfere with one's ability to regulate eating habits and find the time to exercise (Lewis & Sutton, 2011). The way one copes with stress depends on several factors, including age, financial status, ethnicity, and gender (Tanyi & Werner, 2007).

The hormonal changes in peri-menopausal women leads to diminished physical activity which in turn leads to decreased cardiovascular fitness & increase the incidence of obesity, most of which can be lessened by improving physical activity. Physical activity is characterized as bodily movement caused by skeletal muscles that result in energy expenditure beyond resting expenditure. Regular physical activity can prevent or lessen the impact of many of the physical and psychological changes in women experienced at this time (Manjusha & Madhavi, 2014).

Materials and Methods
Many weight loss trials have concentrated on in-person interventions in highly selected participants. This often involves several office encounters, requires significant amount of time for both the patient and the provider, and is expensive, all of which contribute to a high attrition rate. Other barriers to the application of many weight loss interventions have included issues with transportation and/or time contention with school and other life commitments. It is recommended that primary care providers offer moderate to intensive counseling and behavioral support to their overweight and obese patients, providers lack effective, empirically supported models of treatment to guide their efforts in helping at-risk patients lose weight (Appel et al., 2011).

Transposing a favorable outcome of weight loss interventions into cost-effectiveness programs is a vital obligation. Keller, Robinson, Beverly, and Pickens (2004) compared two regimens of light exercise for post-menopausal African-American women. The form of exercise was walking, and the difference between the two regimens pertained only to the frequency of exercise. One group walked three days each week, and the other walked five days each week. The researchers used a randomized experimental design and found that both groups showed that low intensity exercise can bring about an improvement in body mass index scores and yield other health benefits associated with weight loss, such as decreased risk of heart results of this study are not as strong as they could be, however, because the researchers needed to rely on self-reported data. Additionally, the reliability of the study is diminished because there were times when participants could not exercise because of their work schedules or other factors. However, despite the limitations that detract from the credibility of the results pertaining to the comparison of the groups, it is significant that the
researchers were able to show measurable improvement without any dietary restrictions.

Problem Statement

Obesity is severe among African American women relative to other racial/ethnic groups, which can accelerate to a higher prevalence of obesity-related chronic diseases. There is a high prevalence of obesity existing among peri and post-menopausal women (Manjusha & Madhavi, 2014). Many of the risks of weight gain are well known: high blood pressure, heart disease, and diabetes, to name a few. The physiological changes that occur during menopause increase the risk of obesity, and the emotional stress associated with menopause may interfere with motivation or consistency in dieting or exercise (Becker, Black, Diedrichs, Jankowski, & Werchan, 2013). African-American women are particularly at risk for complications associated with obesity, such as heart disease, because they represent a demographic with the highest rates of obesity in the nation (Jull et al., 2014) as well as low frequency of exercise (Centers for Disease Control & Prevention, 2010). For these reasons, it is particularly useful to study the effectiveness of various interventions for prevention of obesity during this period.

Objective of current Study

The purpose of this study is to measure the effectiveness of interventions, including nutrition and physical activity education for peri and post-menopausal African-American women. Behavior modification interventions are intended to increase healthy dietary choices and physical activity practices, and these healthy lifestyle habits can in turn bring about weight loss. By measuring the effectiveness of various interventions in this area, it is possible for researchers to contribute to the constant improvement of outcomes for African-American women.

Research Questions

This research will collect data to answer the following research questions: Will an eight-week, community health clinic based educational program for a group of obese peri and post-menopausal African-American women that addresses a combination of healthy nutrition and physical exercise modifications result in statistically significant changes in the following areas: BMI, waist circumference, dietary selection and level of physical activity.

Significance

The physiological changes that occur during menopause increase the risk of obesity associated with menopause may interfere with motivation or consistency in dieting or exercise and African-American women are particularly at risk for complications associated with obesity, such as heart disease, because they represent a demographic with the highest rates of obesity in the nation. Healthy People 2020 identify nutrition and weight status as one of their major objectives in “promote health and reduce chronic disease risk through the consumption of healthful diets and achievement and maintenance of healthy body weights” (U.S. Department of Health & Human Services, 2010, p X). This assessment will provide valuable information of knowledge and behaviors related to healthy nutrition and physical activity.

Methodology

Research Design

This is a quantitative, prospective intervention study using a descriptive pre and posttest design. The purpose of using a pre and posttest design is to acquire a measure of the desired outcome before the intervention so that it can be compared to a measure taken after the intervention. The measures will include questionnaires to assess current health practices and knowledge as well as anthropomorphic measures of physical changes that occur during the study period. Quantitative analysis will be used with the data from the study in such a way that it can be reproduced by further applications of this and similar research projects. After receiving approval from The University of Alabama Institutional Review Board, the researcher conducted the study at the Community Health of South Florida, Inc. health center.

Setting

The study was conducted at the Community Health of South Florida, Inc. (CHI). CHI is a health center that serves south Florida residents.
of all socioeconomic classes and a wide array of cultures. It offers several proactive health and educational programs, including wellness, depression intervention, and migrant health programs (for seasonal and migrant farm workers). CHI is federally qualified, and its diverse patients include citizens from urban and rural areas representing more than 30 different cultures. The center also hosts a residency program for training physicians under the guidance of the experienced professionals who operate it. The Community Health of South Florida Health Clinic (CHI) is a non-profit health care organization/medical home providing primary and behavioral health care services to the uninsured and underinsured adults and children of south Miami-Dade County. In 2014, the clinic provided care for approximately 74,000 patients (CHI, 2014).

Sample
Participants are African American females from ages 35 to 70 years. Inclusion: Able to speak and read English, BMI of 30 or greater, self-report as being either peri-menopausal or post-menopausal, based on last menstruation and symptoms. Exclusion: Unable to perform physical activity or unable to attend three educational sessions.

Determination of sample size. A prior determination of the number of participants needed to detect a medium effect for the level of the data and the specific statistical test was calculated using G*Power (Heinrich Heine Universidad Dusseldorf, 2014) with parameters of a two-tailed test, effect of 0.5, alpha of 0.05 and power of 0.80. For the non-parametric test of statistical significance for use with the same subjects on a before and after measure, Wilcoxon signed rank test, a sample of 25 individuals is required.

Procedures
Twenty-five participants were recruited by referrals from their providers and flyers posted in the health center will participate in this study. Twenty-three participants completed an eight-week behavior modification intervention program designed to increase physical activity levels and promote healthy dietary choices. At baseline each participant provided basic demographic information include age, education level, marital status, occupational status, and the date of first and last menstrual cycle. Pre and post intervention questionnaires along with anthropomorphic measurement were collected.

Questionnaires were given to the subject to assess baseline knowledge of physical activity and nutrition, as well as their current health behaviors. A Rapid Eating Assessment for Patient (REAP), Rate Your Plate (RYP) and a Rapid Assessment of Physical Activity (RAPA) questionnaire will assess dietary intake and physical activity. REAP has adequate reliability and validity to be used in primary care practices for nutrition assessment and counseling, and is user-friendly for providers (Gans et al., 2006). The questionnaires were the most suitable tool to assess diet behavior in the community health setting. The RYP and REAP tools were validated and shown to be an effective part of an intervention program (Gans et al., 2003). The RAPA questionnaire has proven valid measures for quickly assessing physical activity (Medina, Barquera, & Janssen, 2013).

Participants attended three- thirty minutes nutrition and physical educational sessions. Nutrition and physical activity education sessions included topics on healthy eating choices, portion sizes, food, and fitness, how to increase physical and independent physical activity. Participants will receive directions on keeping a daily food dairy and physical activity log. Participants were encouraged to increase their physical activity levels at least three times weekly. The participants’ time were recorded at regular intervals three times weekly. The participants kept a detailed food log. Data was used to assess the dietary intake. Physical activity, nutrition, and general health knowledge was assessed using a pre- and post-program questionnaire. However, two of the recruited participants did not complete the post-intervention questionnaire because they were hospitalized. Consequently, the sample analyzed included 23 individuals.

Instrumentation
Pre and post intervention anthropomorphic measurement and measures of nutrition and physical activity were collected. The Rapid Eating Assessment for Patient (REAP), Rate
Your Plate (RYP) and a Rapid Assessment of Physical Activity (RAPA) questionnaires will assess dietary intake and physical activity. The questionnaires were the most suitable tool to assess diet behavior in the community health setting. At baseline, each participant will provide basic demographic information. All participants will be measured for height, weight; waist circumference and BMI were calculated.

**Scoring.**

**Rapid Eating Assessment for Patient** - The REAP is designed to illicit a short dietary assessment. The Rapid Eating and Activity Assessment for Patients (REAP) is a brief validated questionnaire that is designed to aid providers in performing a brief assessment of diet and physical activity. REAP can be helpful tools to facilitate nutrition assessment and counseling in the providers office. The Eating Pattern Questionnaire assesses behaviors such as how an individual’s food is typically prepared (e.g., baked, broiled), frequency of eating outside the home, favorite snack foods, and typical daily frequency of starches, fruits, vegetables, dairy, meat, fats, and sweets, depending on patients’ health priorities and how much time is available, these tools can be used in a variety of ways to discuss nutrition with patients (Gans et al., 2006). REAP has undergone a series of evaluations, including a feasibility study with medical students, and practicing physicians, a validation study with medical students and cognitive assessment testing with consumers. REAP was then modified to improve its look, utility and efficacy, and a reliability and validation study was done with the public (Gans et al., 2006).

**Psychometric estimates.** The instrument has been reported to be a valid measure of dietary patterns among various populations including college athletes (Kurka, Buman, & Ainsworth, 2014), medical students and the public (Gans et al., 2002). REAP has adequate reliability and validity to be used in primary care practices for nutrition assessment and counselling, and is also user-friendly for providers (Gans et al., 2006).

**Scoring.** The instrument contains 31 items. Of these, 27 items address the frequency of specific dietary behaviors to which the participant may answer usually/often, sometimes, rarely/never or does not apply to me. Questions are phrased so that higher scores indicate healthier eating behaviors. Three additional questions assess behaviors that may indicate risk and may be answered as yes/no. One final question gives an estimate of readiness for behavior change and is answered on a 5-point Likert scale with higher responses indicating a higher willingness to make changes to eat healthier. In the current study, only nutrition questions were examined. Answers were coded according to previous studies with usually/often = one, sometimes = two, rarely/never = three, and blank answers = three. Questions are phrased so higher scores indicate healthier eating behaviors (Kurka, Buman, & Ainsworth, 2014; Miller, 2005).

**Rate Your Plate** - The (RYP) Rate Your Plate was developed by Gans et al. in the late 1980s (periodically updated thereafter) as a paper-based, self-administered assessment tool of the eating pattern that would allow a quick evaluation of dietary habits. This tool has been validated and shown to be an effective part of a program to lower patient’s cholesterol (Kulick et al., 2013). Diet was assessed using a version of the Rate-Your-Plate (RYP) questionnaire modified for web-based use. Gans et al. developed the RYP in the late 1980s (periodically updated thereafter) as a paper-based, self-administered assessment tool of the eating-pattern that would allow a quick evaluation of dietary habits related to heart disease prevention. This tool has been validated and shown to be an effective part of a program to lower patient’s cholesterol. The answers in this questionnaire are displayed in three columns: column A includes the least “heart-healthy” choices; column C includes the most “heart-healthy” choices; and Column B is a “middle ground”. The RYP assigns points to these answers (1 point for answers in column A, 2 points and 3 points for the answers in column B and C, respectively. The sum of all the points produces an overall total diet score (on a scale of 25 to 75). The overall diet score is separated into textiles that define three levels of overall diet quality: A = least heart healthy, C = heart healthy and B = in -between diet quality.

**Psychometric estimates.**
**Scoring.** The 27 items provide for a possible of three response columns. The total checks in each column are then tallied and multiplied by 1 for responses in column a, 2 for responses in column B and 3 for responses in column C. These values are summed, and then total scores are then categorized based on the score with 27 to 45 indicating that there are many ways that the individual could improve their eating habits, 46 to 63 indicating that there are some ways to improve eating habits and a score from 64 to 81 indicating that the participant is currently making many health eating choices (Brown University Institute for Community Health Promotion, 2005).

**Rapid Assessment of Physical Activity-** The Rapid Assessment of Physical Activity (RAPA) was designed to provide an easily administered and interpreted means of assessing levels of physical activity. The RAPA questionnaire with the response options of yes or no to questions covers the range of levels of physical activity from sedentary to regular vigorous physical activity as well as strength training and flexibility. The instructions for completing the questionnaire provide a brief description of three levels of physical activity (light, moderate, and vigorous) with graphic and text depictions of the types of activities that fall into each category. Clinicians are encouraged to use this information to have a brief conversation with their patients about their current level of physical activity (Topolski et al, 2006).

**Psychometric estimates.** The RAPA questionnaire has proven valid measures for quickly assessing physical activity (Medina, Barquera, & Janssen, 2013).

**Scoring.** The total score of the first seven items is from 1 to 7 points, with the respondent’s score categorized into one of five levels of physical activity: 1 = sedentary, 2 = underactive, 3 = regular underactive (light activities), 4 = regular underactive, and 5 = regular active. Responses to the strength training and flexibility items are scored separately, with strength training = one, flexibility = two, or both = three.

**Results**

**Description of Sample**

There is a high proportion of single women (48%) which is characteristic of this population, see Table 1. Participants ranged in age from 36 to 70 with the typical participant in her late 50s or early 60s (M = 56.5, SD = 10.0), see Table 2. Despite the older population, 78% of the women were in the labor force. These women are more educated than the population with 44% having some post-secondary education. Participants’ education may be a source of bias because women that are more educated might respond better to the interventions since they have a better understanding of the importance of health outcomes. One quarter of the women had their last menstrual cycle at 45 or younger which is an unusually large proportion for women in this population. These women probably had concerns about early menopause and this may have affected their motivation while participating in the study.

Pre-intervention aerobic scores showed all the women in the sample had suboptimal levels of aerobic activity with two thirds being sedentary. Pre-intervention strength and flexibility scores indicated nearly all (91%) did no strength or flexibility exercise at all before the intervention. The average rate your plate score (M = 51.4, SD = 10.8) indicated, “There are some ways you can make your eating habits healthier.” This was healthier eating than would have been expected.

**Table 1**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>56.5</td>
<td>10.0</td>
<td>36 to 70</td>
</tr>
<tr>
<td>Rate Your Plate</td>
<td>51.4</td>
<td>10.8</td>
<td>37 to 76</td>
</tr>
<tr>
<td>REAP</td>
<td>55.0</td>
<td>4.8</td>
<td>48 to 64</td>
</tr>
</tbody>
</table>
Assessment of Instruments
Based on Cronbach’s alpha, both the REAP instrument, \( \alpha = .81 \), and the Rate Your Plate instrument, \( \alpha = .88 \), are reliable for this sample. The REAP score and the RYP score were strongly positive correlated, \( r = .702, p < .001 \), as would be expected if the instruments are valid for this sample. The aerobic exercise instrument (RAPA) is only one question with seven choices even though it is presented as seven yes/no questions. As a result, it is not meaningful to assess the reliability of this instrument. Similarly, RAPA has one question for strength and one question for flexibility.

Assessment of Intervention
A paired-samples T-test was conducted to evaluate the hypothesis that there were no improvements in healthy diet after the intervention, see Table 3. This hypothesis was tested for both the REAP and RYP. The test for RYP was significant, \( t (22) = 5.92, p < .001 \). On average participants were eating less healthy diets before the intervention (\( M = 51.4, SD = 10.8 \)) than after the intervention (\( M = 65.3, SD = 3.05 \)). The score increased 13.9 points, which is 1.32 standard deviations, a large effect size. On average, respondents went from “There are some ways you can make your eating habits healthier” to “You are making many healthy choices.” The test for REAP was significant, \( t (22) = 13.9, p < .001 \). On average participants were eating less healthy diets before the intervention (\( M = 55.0, SD = 4.77 \)) than after the intervention (\( M = 69.1, SD = 3.04 \)). The score increased 14.1 points, which is 1.75 standard deviations, a large effect size.

A chi-squared test was conducted to evaluate the hypothesis that there were no improvements in exercise after the intervention. There was significant improvement in both aerobic exercise, \( \chi^2 (1) = 48.0, p < .001 \) and strength/flexibility, \( \chi^2 (3) = 40.83, p < .001 \).

Table 2
Healthy Diet Before and After Intervention

<table>
<thead>
<tr>
<th>Diet measure</th>
<th>Before</th>
<th>After</th>
<th>( t (22) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>RYP</td>
<td>51.4</td>
<td>10.8</td>
<td>65.3</td>
</tr>
<tr>
<td>REAP</td>
<td>55.0</td>
<td>4.77</td>
<td>69.1</td>
</tr>
</tbody>
</table>

***p < .001

For aerobic exercise, before the intervention 100% of the women had suboptimal scores. After the intervention, 100% of the women had optimal scores. Before the intervention 92% of the women did neither strength nor flexibility exercise. After the intervention, 100% of the women did either strength or flexibility exercise or both.

A paired-samples T-test was conducted to evaluate the hypothesis that there were no improvements in obesity measures after the intervention, see Table 4. This hypothesis was tested for both BMI and waist circumference. The test for BMI was significant, \( t (22) = 9.93, p < .001 \). On average participants had higher BMI before the intervention (\( M = 36.3, SD = 4.36 \)) than after the intervention (\( M = 35.0, SD = 4.29 \)), see Figure 1. The BMI decreased 1.28 points, which is 0.29 standard deviations, a small effect size. The test for waist circumference was significant, \( t (22) = 9.03, p < .001 \). On average participants had larger waists before the intervention (\( M = 38.9, SD = 7.27 \)) than after the intervention (\( M = 37.1, SD = 7.06 \)). The waist circumference decreased 1.84 inches, which is 0.26 standard deviations, a small effect size.
Table 3
BMI and Waist Circumference Before and After Intervention

<table>
<thead>
<tr>
<th>Obesity measure</th>
<th>Before</th>
<th></th>
<th>After</th>
<th></th>
<th>t (22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>51.4</td>
<td>10.8</td>
<td>65.3</td>
<td>3.05</td>
<td>5.92***</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>55.0</td>
<td>4.77</td>
<td>69.1</td>
<td>3.04</td>
<td>13.9***</td>
</tr>
</tbody>
</table>

***p < .001

Discussion

The main aim of this study is to assess the effectiveness of nutrition and physical activity education for obese peri- and post-menopausal African American women. The intervention was associated with large improvements in dietary selection and physical activity practices, which may promote reduction in obesity over a longer period. However, in the eight-week period of this study, reductions in both BMI and waist circumferences were small but statistically significant. A community setting is a viable option in promoting and improving health behaviors.

Limitations

This study is limited by the fact that many factors other than the intervention may influence the results. Since this study is based on a convenience sample, it does not establish a causal link between the intervention and the changes in health practice and health outcomes. Health practices, diet, and exercise were self-reported and may not be objective. The sample is more educated than the population and may have responded better to the intervention. Even before the intervention, these women were unusually willing to make
changes in their lifestyle with 91% of the women rating themselves four or five on a five-point scale of willingness to make healthy change. Probably this sample made greater changes than the typical woman in the population would. To mitigate these limitations, other studies that are like this one and use a large enough sample size should be conducted to support or challenge the results.

**Conclusions**

The educational intervention was associated with large improvements in diet and exercise and small improvements in BMI and waist circumference. Weight loss interventions that provide techniques to record daily meals, calories and physical activity levels may contribute to a clear perception for daily intake of calories and physical activity, thereby leading to increased self-efficacy for weight loss. Providers’ support for dietary self-management is important for dietary and physical activity changes in patients. Providers will continue to play a pivotal role in all types of preventive strategies, either through direct intervention or as advocates for changes. Ongoing research effort is needed to provide evidence, which will drive the prevention strategies of the future.

**References**


