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Research Article

Whole Foods Plant-based Nutrition Education

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Abstract

The purpose of the whole foods plant-based education was to raise awareness and to educate participants with current, evidence-based practices for reversing obesity and to make lifestyle changes by adopting the whole foods plant-based diet. A study was conducted to determine if an education seminar for reversing obesity with whole foods plant-based nutrition would be effective. The study used a quasi-experimental design and measured pre-test and post-test participants' knowledge, perception of health benefits, and likeliness to use whole foods plant- based nutrition to reverse obesity. The study introduced an educational intervention for obesity that is both affordable and easily adopted into an individual's lifestyle eating choices. The pre-test and the post-test mean score comparison revealed a 45% positive difference for increased knowledge, perceived health benefits and likeliness to adopt whole foods plant-based lifestyle. The results from the whole foods plant-based education indicate a significant shift for participants' disagreement to agreement for improved knowledge, perception of health benefits, and likeliness to follow a whole foods plant-based diet, including lifestyle changes to support a normal body mass index. The whole foods plant-based nutrition is a potential new standard of care to reverse obesity, improve health, and reduce health complications.

Keywords: Obesity, Whole Foods Plant-Based Nutrition, Body Mass Index.

Introduction

The United States is in an emergency health crisis. Obesity and its impact across all areas of health are profound [1]. The Centers for Disease Control and Prevention in 2019 reported the cost of obesity is $147 billion annually. Costs for medical care, hospital bed spaces, and support staff to manage patients are at critical levels [2]. Insurance costs and consequential pharmaceutical interventions are likewise prohibitive [1]. This project introduced an educational intervention to obesity that is both affordable and easily adopted into an individual's lifestyle eating choices. This educational intervention is supported by multiple studies in the literature and these studies are followed closely by the United States (U.S.) Department of Health and Human Services. The U.S. Department of Health and Human Services monitors the nation's health through the Healthy People initiative and objectives [3].

The U.S. Department of Health and Human Services launched Healthy People in 2010 to provide science-based strategies for improving the health of all Americans. Additionally, Healthy People established national health standards which monitor health related progress over time. Healthy People evaluate progress by completing a mid-course review every five years to assess the nation's progress towards meeting the national health objectives. The purpose of Healthy People is to encourage communities to work together on improving population health, empower individuals to make informed health care decisions, and measure the magnitude of prevention activities [3].

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The Healthy People nutrition and weight status objective focuses on reducing the proportion of obese American adults aged 20 or older. Obesity is defined as a body mass index greater than 30 [4]. The Healthy People nutrition and weight status target is to reduce the adult obese population to 30.5% or less and to increase the proportion of obese adults to a healthy weight. When Healthy People initially assessed obesity in 2010, the obesity baseline rate for nutrition and weight status was 33.9%. In 2015, Healthy People completed a midcourse review for nutrition and weight status which revealed the obesity rate had climbed to 35.3%. The Healthy People dashboard reflects little progress for achieving the nutrition and weight status objective among the obese adult population [3]. Since 2015, the adult obesity rate continues to climb and the nation's adult obesity rate is now 36.5% [5,6,7].

As the obesity rate climbs, the financial implications of obese adults are monumental. Obesity is strongly associated with developing chronic disease [5,6]. Financing the healthcare management of chronic disease brought on by obesity is overburdening healthcare. America spends more on healthcare than any other leading nation [5,6]. The Centers for Disease Control and Prevention stated that the annual medical cost of obesity was $147 billion. Just for employers alone, obesity costs them $3 – $6 billion annually in lost employee productivity [5,6].

Literature Review

The Agency for Healthcare Research and Quality recommends the body mass index (BMI) as best screening practices for obesity [8]. The U.S. Preventative Services Task Force recommends health care providers use the body mass index to screen adults for obesity [9]. The BMI is calculated from a person's weight and height to identify possible weight related health risks in adults. A normal BMI is 18.5-24.9, overweight is 25-29.9 and over 30 is obese [4].

Directly contributing to the national obesity epidemic and the individual BMI is the current American diet that consists of 55% refined or processed foods, 30 % animal products, and only 15% from whole, unprocessed grains and plants [10]. The U.S. Department of Health and Human Services confirmed Americans eat excessively high amounts of sugar, salt, saturated fat, and more than enough protein and grains [11]. Most Americans do not meet the requirements for adequate fruit and vegetable intake of daily five fresh fruit or vegetable servings [11]. The decreased amount of plant consumption leads to inadequacies of micronutrients, which are vital components for optimal health, weight, and BMI [10].

Micronutrients are powerful antioxidants and phytochemicals supporting health, cellular respiration, immune function, ideal weight, and BMI [10]. According to the U.S. Department of Health and Human Services, the whole foods plant diet not only supports optimal micronutrient levels necessary for fighting obesity and improving health but also confirmed nutrient dense foods such as dark green, orange, red vegetables, fruit, legumes, and whole grains support a healthy body weight and reduce chronic disease risk [11].

A whole foods plant-based diet that focuses on the quality of nutrients was developed and named the Nutritarian Diet by Dr. Joel Fuhrman [10]. The Nutritarian Diet consists of nutrient dense plant-based foods that include dark, leafy green vegetables and colorful produce.

Additionally, beans, nuts and seeds are included in the Nutritarian diet. Fuhrman also researched specific types of plant-based whole foods in multiple, non-randomized studies and found significant positive outcomes [10]. Fuhrman's participants consumed seeds and nuts as part of the regular meal which resulted in reduced body mass index, weight loss, improved cardiovascular health, and overall mortality of participants [10]. Fuhrman also discovered that when beans and legumes were consumed on a regular basis, participants sustained a significant weight loss and experienced a plethora of other health benefits such as protective factors for cancer, coronary artery disease, hypertension, and reported better quality lives [10].

The whole foods plant-based diet is currently accepted in medical practice as an alternative lifestyle medicine [12-17]. Other medical doctors across the country used the whole foods plant-based diet as a medical treatment for chronic diseases including obesity [12,14,15,16]. Fuhrman prescribed the whole foods plant-based diet to his patients for over twenty years [10]. The lifestyle dietary medicine supported successful and sustained patient weight loss with reduced BMI over a six-month period. Fuhrman replicated multiple non- randomized control studies investigating the whole foods plant-based diet. The studies were conducted at various employer worksites. Employees participated on a volunteer basis and reported weekly weight progress. The multiple studies were the second highest level of research and unanimously supported weight loss and improved BMI by participants following a whole foods plant-based diet. The results supported weight loss, reduced BMI, decreased hyperlipidemia, hypertension, insulin resistance, and fasting glucose levels [18-21].

The whole foods plant-based diet expands further than Fuhrman's private medical practice. Dunaief et al. subjected participants to the whole foods plant-based diet. All the participants reduced their BMI to some degree during the study [18]. Within seven months of changing to the whole foods plant-based diet, 46% of the participants reached a normal BMI range. Additionally, 38% of the participants reduced their BMI by ten or more points on the BMI scale [18]. Dunaief et al.'s study was limited to only include 13 participants, wherein such a small sample size increases the risk for misrepresentation of the population and decreases the power to produce reliability [18,22].

In a 2016 study, Sutliffe et al. piloted the whole foods plant-based diet at a local work site as part of the employer's health promotion program [20]. The inclusion criteria required the employees' BMI be greater than 25. The sample size included 35 participants who adopted the whole foods plant-based diet for six weeks. At the conclusion of the pilot study, the participant average weight loss was eleven pounds, and their BMI decreased 1.5 points [20]. The limitations of the 2016 Sutliffe et al. study were the failures to include controls over physical activity influencing the weight loss and no plan for sustainability after the pilot ended which limited the study's validity [20,22].

Fuhrman and Singer followed 2,273 participants adopting a whole foods plant-based diet for a year [19]. The participants reported multiple health improvements including significant weight loss. The average weight loss was 55 pounds for participants who had a starting BMI greater than 30. Limitations to the study include no controls for physical activity influencing the weight loss and the participants provided the information through self-reports [22].

In a 2018 study, Sutliffe et al. piloted the whole foods plant-based diet over 12-weeks to 77 employees of a local employer [21]. The inclusion criteria required participants to have a BMI greater than 28. After the 12-week pilot study, the average weight loss was 21 pounds per person. The weight loss rate in the 12-week pilot is congruent with the weight loss rate reported in the six-week pilot conducted two years earlier. Limitations to the study included self-report of physical activity influencing weight loss. The participants may have underreported their physical activity level. The study did not consider participants physical activity as an external factor effecting weight loss [22].

The body of research strongly supports a relationship between nutrition and obesity.

Current science supports a viable answer to which improved nutritional intake is most appropriate for decreasing obesity. Several studies revealed a significant improvement in decreasing body weight and BMI, and the best nutrition to reduce obesity [10,18-21]. The gap in the current body of literature are studies that compare the importance and effectiveness of animal-based nutrition to plant-based sources. Within the whole foods plant-based nutrition diet, the body of the literature identifies a reliable method of weight loss from plant sources [10,18-21].

Types of Plant-Based Diets

Current medical practice uses whole foods plant-based nutrition in treatment for type 2 diabetes management, coronary artery disease, and autoimmune disorder such as multiple sclerosis. The American Association of Clinical Endocrinologists [AACE] and American College of Endocrinology [ACE] published the Comprehensive Type 2 Diabetes Management Algorithm 2019 as a scientifically based clinical guideline for type 2 diabetes management [23]. AACE/ACE recommends plant-based nutrition, high in polyunsaturated and monounsaturated fatty acids [23]. The clinical guidelines support plant-based nutrition including whole fruits, vegetables, nuts, seeds, soy and plant-based oils for type 2 diabetes treatment. The clinical guideline recommends type 2 diabetic patients avoid processed foods and limit saturated fatty acids found in animal products.

Esselstyn, cardiologist with the Cleveland Mayo Clinic, studied the longitudinal effect of whole foods plant-based nutrition on patients with severe coronary artery disease [24]. A non- random sample of 24 patients were prescribed whole foods plant-based diet along with individualized cholesterol medication to achieve a total serum cholesterol of 150 mg/dl or less. Patients received permission to consume non-fat yogurt and skim milk and were asked to abstain from all other animal products. Patients were encouraged to consume grains, legumes, lentils, vegetables, and fruit. Within five years, the coronary artery disease stopped progression in the compliant patients, either eliminated or improved their angina and the average total cholesterol had decreased 100 points from 227 to 127 mg/dl. At five years, eight compliant patients had completely reversed the coronary artery disease. The compliant patients experienced no new cardiac events. Six noncompliant patients continued with standard care after dismissal from the study. Within 5 years of dismissal from the study, the noncompliant patients experienced thirteen new cardiac related events. Whole foods plant-based nutrition augmented with individualized cholesterol reducing medication successfully treated or reversed coronary artery disease [24].

Yadav et al. studied the longitudinal effects of low fat, plant-based nutrition with participants diagnosed with multiple sclerosis [25]. There were 61 participants in the study, and they were randomly assigned to the low fat, plant-based diet intervention group or the control group and monitored for a year. Within six months, the low fat, plant-based diet intervention group decreased their BMI, total cholesterol, insulin, and fatigue levels. The study concluded the low fat, plant-based nutrition was an effective treatment for multiple sclerosis patients in reducing fatigue levels, BMI, and metabolic biomarkers. Long-term benefits of adopting low fat, plant-based nutrition anticipated better vascular health by the reduced BMI and lipid panel [25].

The Mediterranean diet is typically comprised of consuming high amounts of whole, plant-based foods such as vegetables, fruits, whole grains, beans, nuts, seeds and olive oil [26]. Sofi et al. conducted a meta-analysis to evaluate the effect of the Mediterranean diet on mortality and incidence of chronic diseases [27]. The meta-analysis reviewed 42 years of studies where the association between following a Mediterranean diet compared with mortality and incidence of diseases of the participants. The meta-analysis determined strong association between participants following a Mediterranean diet and a clinically significant health status. Clinical relevance supports the use of the Mediterranean diet as primary prevention for reduction to overall mortality, cardiovascular mortality, cancer mortality, Parkinson's, and Alzheimer's disease incidences.

Garvey et al. conducted a systematic review and developed the American Association of Clinical Endocrinologists practice guidelines for the treatment of obesity [28]. The systematic review included 1,790 references. Most of the references were the highest level of evidence of either level 1 (30%) or level 2 (34%) along with 18% at level 3 evidence, only 19% were level 7 evidence. Garvey et al.'s systematic review confirmed that the Mediterranean diet reduced obesity, BMI, lipids, hypertension, and type 2 diabetes [28]. Garvey et al. determined the increased consumption of plant-based foods and decreased consumption of processed food, fast food, and meat attributed greatly to the Mediterranean diet success [28].

The National Institute of Health [NIH] supported consuming a healthy diet with most foods consumed as whole foods sources from vegetables, fruits, whole grains, and protein-rich foods such as nuts, seeds, soy, and legumes [29]. The NIH is not exclusive to whole foods plant- based nutrition and does include lean and low-fat animal products [29]. Jensen et al. found vegetarian and vegan whole foods plant-based diet was just as successful with weight loss as calorie restricted diets [30]. Weight loss introduced as a lifestyle change positively encouraged the participants to make and sustain the dietary changes, achieve satisfactory weight loss, and improve BMI [30].

The American Nurses Association [ANA] through their Healthy Nurse, Healthy Nation campaign supports dietary practices encouraging a balanced diet with a whole foods plant-based approach including more whole grains, fresh fruits and vegetables and minimizing less nutritive foods [31]. The ANA's campaign encourages nurses to maintain a healthy BMI and weight resulting in a better quality of life and the ability to provide the highest level of patient care [31].

On a global level, plant-based nutrition is recognized for longevity and associated with blue zones [32]. There are five blue zones in the world, and they are Loma Linda, California; Okinawa, Japan; Sardinia, Italy; Nicoya, Costa Rica; and Icaria, Greece [32]. Blue zones have a higher concentration of centurions in their population [32]. These blue zone centurions have a high quality of life, live independently and are generally in good health [33]. There are food commonalities between

three of the blue zones, Loma Linda, California; Okinawa, Japan and Sardinia, Italy in that they all share plant-based diet including legumes [32,33]. Future implications for practice are a broader world view of using plant-based nutrition for longevity, better quality of life and the power to heal patients through lifestyle medicine [1,12-17, 32, 33].

Traditional health care providers have little education or experience in treating obesity with lifestyle modifications [34]. Health care providers are more likely to provide nutrition education to their clients based upon their own experiences than from formal education. Typical physician education curriculum only requires a 25-hour minimum for nutrition [34]. Health care providers turn to resources they are familiar with and their own personal experiences rather than from evidence-based practice [34]. Clients seeking treatment for obesity are less likely to receive interventions based on sound clinical practice [34]. Therefore, the multiplicity of providers who follow various standards, influence the effectiveness of the recommendations for obesity treatment and intervention.

Purpose

The purpose of the whole foods plant-based education is to raise awareness and to educate participants with current, evidence-based practices for reversing obesity and to make lifestyle changes by adopting the whole foods plant-based diet.
The research question in the PICOT format is as follows:

- How does whole foods plant-based diet education from a one-day seminar increase participant's knowledge, perception of health benefits, and likeliness to change dietary practices to a whole foods plant-based diet?
- Population is obese or overweight adults with a body mass index between 25 and 40 points.
- Intervention is health education of whole foods plants-based diet.
- Comparison is pre-test and post-test knowledge, perception of health benefits, and likeliness to adopt whole foods plant-based diet.
- Outcome is increased knowledge, perception of health benefits and likeliness of following a whole foods plant-based diet.
- Timeframe is a one-day health education seminar

Goal

The goal of the whole foods plant-based health education is to increase the participant's knowledge, perception of health benefits, and likeliness to follow a whole foods plant-based diet. The outcome is the participant's increased knowledge, perception of health benefits, and likeliness to follow a whole foods plant-based diet.

Objectives

The objectives of the whole foods plant-based diet health education are

1. The participant will identify the whole foods plant-based diet.
2. The participant will acknowledge the health benefits of a whole foods plant-based diet.
3. The participant will seek opportunities for modifying lifestyle behaviors and adopt a whole foods plant-based diet.

Materials and Methods.

Project design

The method for evaluating the effectiveness of the whole foods plant-based health education used a comparison of pre-test and post-test. The instrument used was a self-report survey tool. The survey tool was created by the researcher. The survey tool asked participants to answer three questions. The answer responses were based upon a 5-point Likert scale. The participants completed the pre-test surveys before receiving the whole foods plant-based health education and completed the post-test survey after receiving the whole foods plant-based health education. The participants submitted information anonymously The pre-test and post-test survey measured the participants knowledge, perception of health benefits, and likeliness to make dietary changes to adopt the whole foods plant-based diet. An internal review of the survey tool included readability using the Flesch-Kincaid score [22]. The Flesch reading ease score was 64.8 and the Flesch-Kincaid grade level was 7.0. The Flesch reading ease score and grade level scores indicate 12 to 15-year-old persons generally understand the pre-test and post-test questions [22].

There were significant differences in the mean scores between the pre-test and the post- test. The descriptive statistics pre-test and post-test mean scores comparison revealed a 45% positive difference for increased knowledge, perceived health benefits and likeliness to adopt whole foods plant-based lifestyle. The results from the whole foods plant-based education seminar indicate a significant shift of the participants' responses from disagreement to agreement for improved knowledge, perception of health benefits, and likeliness to follow a whole foods plant-based diet, including lifestyle changes to support a normal body mass index. The results indicate that education may be a positive tool to change behaviors promoting a healthier lifestyle.

The course evaluation was summative and appraised the whole foods plant-based education goal. The participants completed the course evaluation after receiving the whole foods plant-based education. Met or not met was the goal evaluation criteria. The course goal was listed on the evaluation and participants either selected met or not met.

Sample

The sample included adults over the age of 18 with a BMI between 25 and 40. The participants were hospital staff and administrative employees. The whole foods plant-based education was conducted at the Kettering Health Dayton hospital. The hospital is a regional healthcare network and operates nine hospitals in the greater Dayton, Ohio area. The participants were recruited through project flyers distributed by email. Recruitment included soliciting employees on a volunteer basis from the Kettering Health Dayton hospital employee population. Participation in the whole foods plant-based education was voluntary. Recruitment materials included printed handouts detailing the whole foods plant-based education seminar. The estimated sample size was thirty participants.

Northern Kentucky University's Institutional Review Board and Kettering Health's Institutional Review Board ensured the protection of human subjects. Both organizations issued letters of determination that the whole foods plant-based education was approved to collect data and granted permission to proceed with completing the whole foods plant-based education.

Locational setting for an educational module
The education was conducted onsite at the health care organization using an established training room. There were minimal costs and resources associated with the whole foods plant- based education. The whole foods plant-based seminar subjected participants to education

through a multi-sensory approach. The teaching modalities included an electronic presentation with colorful images, texts and verbal annotation. Participants experienced whole foods plant- based foods samples first-hand along with recipe handouts.

Applied theoretical model to classroom education

The education design applied Motivational Interviewing (MI) concepts [35] and Pender's Health Belief Model [HBM] [35,36]. Motivational Interviewing involves identifying a person's ambivalence about lifestyle change and Prochaska & DiClemente's Five Stages of Change theory [35]. When someone feels ambivalence, they are uncertain, have mixed feelings, or contradictory ideas about the change. Prochaska & DiClemente's Five Stages of Change theory includes precontemplation, contemplation, preparation, action, and maintenance. During the precontemplation phase, individuals will not consider change. When a person considers a change, the person advances to the contemplation phase. The next phase is preparation where the individual plans for change by creating a grocery list, gathering recipes, and rearranging the kitchen environment. During the action phase, the person follows the plan by making the recipes and eating the whole foods plant-based nutrition. The maintenance phase is achieved when the change is followed for six months or longer. If a person relapses, the person cycles through the five stages of change again [35].

The premise of the whole foods plant-based seminar was for participants to contemplate the idea of how to change their diet and how to adopt the lifestyle change by attending the educational seminar. The seminar included whole foods plant-based nutrition education, recipes, and lifestyle preparation changes to equip the participants to address any ambiguities they may have felt about changing. The participants were prepared to move from contemplation (considering the change) to preparation (planning the change) to action (making the change) upon completion of the seminar. The whole foods plant-based education identified appropriate nutrition for weight loss as indicated by current, scientific evidence. This educational seminar informed the participants how to adopt a whole food, plant-based nutrition by making changes to their diet with the provided seminar handouts for meal plans, food samples, restaurant meal planning tips, and kitchen environment changes to transition easily to plant based living.

Pender's Health Belief Model makes four assumptions about health promotion. The first assumption is that people take a considerable amount of effort to control what they do. Secondly, people want to improve themselves and their environment either where they live or work.
Thirdly, health professionals, including nurses and health care providers are part of an interpersonal environment which influences a person's health behavior. Lastly, changing an environment is instrumental with changing a person's behavior [37].

There are thirteen theoretical statements that support Pender's Health Belief Model. A person's historical behavior, character and values determine his or her ability to perform health promotion activities. People will participate in health activities when they believe they will receive personal and valuable benefits from the changed behavior. When people see change as a barrier, they are less likely to commit to making the behavior modification. If a person believes he or she can make a health promotion behavior change, that person is more likely to commit to the change and adopt the new lifestyle. The more a person believes he or she can change, the less the barriers are viewed as hindering his or her behavior change [37].

When a person feels the positive results of health promoting behaviors, that person is more likely to increase their effort in following health promoting behaviors. The positive emotions reinforce the notion to engage in health promotion activities. When people see others modeling their behavior and receive support to make behavior changes, they are more likely to engage and perform the health promotion activities. Families, peers, and health care professionals have significant interpersonal influence over an individual's commitment to change. The greater the commitment to change, the more likely one is to sustain the change long term. Competing demands outside of the person's control can interfere with health promotion behaviors. People can change their knowledge, attitude, environment, and receive the benefits of health promoting behaviors [37].

This educational project addressed obesity based on potential health complications and health risks; thus, participants were made aware of obesity related health consequences, and perceived threats to overall wellness. The seminar identified whole foods plant-based nutrition health benefits, addressed challenges for adopting lifestyle changes, and practical interventions to remove barriers.

At the beginning of the education module, participants were introduced to the course objectives. Participants received instruction to complete the pre-test to evaluate their knowledge, perception of health benefits, and likeliness to follow a whole foods plant-based diet. The education introduced participants to the obesity epidemic across the country and compared them to the regional and local levels. Obesity related health risks, chronic illness, healthcare and employer costs were addressed. Participants received instructions how to calculate their BMI. The height and weight were collected anonymously on the pre-test and post-test data collection tool. The benefits of whole foods plant-based nutrition were shared with the participants including the scientific evidence used in current practice as alternative lifestyle medicine for reversing obesity.

Foods samples, ingredient lists and preparation instructions were included in the education to acknowledge the benefits, remove barriers, and empower the participants to embrace a whole foods plant-based nutrition. Food samples were selected based upon taste, appearance, smell, simplicity to make, and accessibility of the ingredients at the local grocery. Printed food lists and instructions were included in the participants' handouts to increase likeliness to act and adopt a whole foods plant-based lifestyle after receiving the education.

The duration of the education seminar was limited to 45 minutes. To accommodate the restricted time, the food samples were prepped and packaged in two-ounce containers before the seminar. Each participant received a lunch bag with food samples. The food samples included eggless egg salad, mock tuna salad, creamy coleslaw, banana oat cookies and whole grain bread. A hot potato soup was served separate in a heatproof cup. The food ingredients were discussed prior to the participants sampling the food.

The education included information on rearranging the kitchen area to create a food preparation area conducive for cutting fresh fruits and vegetables. Kitchen tool recommendations included a good, exceedingly sharp knife, cutting board, food storage containers, and blender.

Meal and grocery planning suggestions included designating a certain day to grocery shop and prepare food for the week. Considerations for eating out included looking up restaurant menus online to determine the availability of whole foods plant-based options, supplementing restaurant meals with nuts or fruit or consider only eating at restaurants that serve whole food plant-based options.

Results and Analysis

Course Evaluations

The course evaluation statistical analysis included the frequency of "met" [indicating the past tense verb to meet] or "not met" to evaluate the whole foods plant-based diet education goal. Participants evaluated the whole foods plant-based nutrition education they received with the course objectives. Fifteen-course evaluations were completed. The whole foods plant-based education seminar did meet the course objectives with a 93% "met" and a 7% "not met" response rate. The whole foods plant-based education seminar did meet the project goal based upon the 93% course evaluation results.

Pre-test and post-test scores

The pre-test and post-test statistical data analysis used descriptive statistics. The statistical analysis identified differences between the mean of the scored pre-test and post-test results. The whole foods plant-based education seminar did improve participant knowledge, perception of health benefits, and likeliness to follow a whole foods plant-based diet.

Discussion

Strengths and Limitations of the Project

The strengths of the whole foods plant-based education were multi-faceted. The education included the use of various teaching strategies. The teaching strategies used an in- person presentation, electronic media with colorful imagery, handouts, and tasting whole foods plant-based food samples. The pre-test and post-test comparison used a within-subjects design where participants served as their own controls [22]. The within-subjects design ensures the highest possible equivalence among participants as the participants are in comparison to their selves [22]. When participants serve as their own controls, the comparison is to their own baseline and increases reliability of the pre-test and post-test comparison [22]. The advantage increased the reliability of the pre-test and post-test results and supported the credibility of the project results. The whole foods plant-based education suggests increased nutritional knowledge for patients with obesity.

The limitations of the project were the small, nonrandom sample size, and increased risk for selection bias. The self-reported pre-test and post-test results may have self-reporting bias influencing the validity of the project results [22]. The self-report results may underestimate or overestimate the participants' knowledge, perception of health benefits, and likeliness to follow a whole foods plant-based diet. Physical activity is a confounding variable not controlled in the pre-test and post-test data collection tool and affects reliability of the results.

An internal review of the pre-test and post-test data collection tool confirmed the readability of the survey. The course evaluation combined the course objectives as either all were met or not met and limits the reliability of the results. Considerations for the course evaluation tools are to allow each course objective individual evaluation and increase the reliability of the results. The cross-sectional design of the one-day education seminar limits the reliability of the results as pre-test and post-test data collection occurred in the same day [22]. A longitudinal design with periodical follow-up with the participants increases the reliability and validity of the education seminar [22].

Recommendations and Implications for Future Practice

Evidence from this current study supports the use of whole foods plant-based diet for nutrition education to potentially reverse obesity [10]. This study's results support the use of the whole foods plant-based seminar as an effective teaching strategy for increasing participants' knowledge, health benefits perception, and likeliness to adopt whole foods plant-based lifestyle.

Obesity is a prevalent and widespread health issue contributing extensively to U.S. healthcare costs, morbidity and mortality. Informed clients are empowered to choose whole foods plant- based nutrition as an alternative lifestyle behavior. The whole foods plant-based education results justify the need for future whole foods plant-based education. Replication of the whole foods plant-based education will confirm an increase in knowledge, perception and likeliness to change dietary practices.

The whole foods plant-based project confirms the education seminar is an effective strategy for increasing participants' knowledge and likeliness to adopt dietary practices associated with reversing obesity. The whole foods plant-based diet has minimal risk to the participant and encourages positive lifestyle behaviors promoting health and longevity in addition to the reduced obesity and BMI rates. The project results from the whole foods plant- based education provide valuable information for healthcare organizations regarding nutrition education focused on lifestyle modifications for obesity.

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