Vegan Diet Preventing Recurrence of Breast Cancer

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Vegan Diet Preventing Recurrence of Breast Cancer

Abstract

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Abstract

This paper reviews the evidence that a vegan diet can potentially decrease the risk of further breast cancer events after primary diagnosis. Many studies have identified different dietary components that have been associated with decreasing breast cancer risk. Additionally, studies have been conducted on the health benefits of a vegan diet in preventing CHD, prostate cancer, pancreatic cancer, colon cancer and improving diabetes. However, no studies have been done with prevention of breast cancer recurrence by incorporating a vegan dietary pattern. Incorporating a plant-based diet with increased fiber, soy (a phytoestrogen), and decreased fat content could potentially be a viable preventive measure to educate breast cancer survivors.

Key Words: Breast cancer, prevention, recurrence, diet, vegan, vegetarian.
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Vegan diet preventing recurrence of breast cancer

The Centers for Disease Control and Prevention (CDC, 2011) stated that breast cancer is the second leading cause of death in women of all ethnicities in the United States. In 2007, the CDC reported 202,964 women in the United States were diagnosed with breast cancer and that 40,598 women in the United States died from breast cancer (2011). In a woman’s lifetime the chance of developing breast cancer is one in eight or 12% according to the American Cancer Society (Morris, 2009; Campbell, 2006; ACS, 2011). Many lifestyle factors influence the risk of developing primary and recurrent breast cancer. These risks include smoking, obesity, hormone replacement therapy (HRT), alcohol consumption, lack of physical activity, complementary and alternative medicine (CAM), and diet (De Michele et al., 2007). Despite current research on breast cancer, there is a lack of epidemiologic research, which addresses breast cancer and the vegan diet.

The purpose of this paper is to investigate the evidence that a vegan diet prevents primary incidence or the recurrence of breast cancer in women who previously obtained their dietary protein from non-plant based diets. Fraser (2009) defined vegan diets as those containing no animal or fish products. Compared to lactoovovegetarians who do not eat any meat, but do eat eggs and dairy products, pescovegetarians who eat fish and meat less than one time per month, and finally the semivegetarians who eat meat occasionally, but less than weekly, the vegan diet is the most plant-based diet of the “vegetarian” diets (Fraser, 2009). Diets may include foods rich in isoflavones or phytoestrogens which are found in soy (Hilakivi-Clarke & Messina, 2009), retinoids (Crisci, Divisi, Di, Garramone, & Salvemini, 2006) and carotenoids (Al-Delaimy et al., 2009), which are found in various fruits and vegetables, antioxidants from the vitamins and micronutrients of plants and legumes (Barancokova et al., 2004) and plant-based proteins.
(Mangels, 2011) found in all fruits, vegetables, grains, nuts, and legumes. These have all been shown to be protective elements against various types of cancers. Breast cancer is a major health concern and should be studied in the context of prevention through incorporating a vegan diet.

In a prospective cohort study by Allen, Appleby, Crowe, and Key (2011), diet and risk of diverticular disease in vegetarians and non-vegetarians was conducted on 47,033 men and women living in Scotland or England. Of this study group, 15,459 participants or 33% reported to be consuming a vegetarian diet at the time of recruitment. The researchers reported a median fiber intake of 21 g/day in the vegetarian groups and 18 g/day, slightly lower for the meat eating dietary group. During the years 1993-1999, there were 57,446 women and men aged 20 and older that completed the baseline questionnaire. In the pilot phase of the study, women were recruited from general practices in Scotland (Allen et al., 2011). The second phase of the study included recruitment of all women and men, ages 35-69. The participants recruited for the study were consented, completed validated semiquantitative food frequency questionnaires on diet and lifestyle and then followed up in clinic for collection of blood sampling, anthropometric measurements and review of their questionnaires (Allen et al., 2011). The study had a mean 11.6 year follow-up and accounted for many different variables such as smoking status, alcohol consumption, socioeconomic status, oral contraceptive or hormone therapy use, educational level, exercise, current diseases (e.g. diabetes, hypertension, and hyperlipidemia) and medications (Allen et al., 2011).

The strengths of this study included the large number of participants (47,033), the prospective design of the study, and the large variability of fiber intake (Allen et al., 2011). One limitation Allen et al. (2011) identified was that the researchers used information from hospital admissions records and therefore the reported incidence of diverticular disease is likely to be
underestimated. Additionally, participants that ate meat may have had more colonic symptoms, for example diarrhea or constipation. As a result, this may have prompted them to seek medical care and further diagnostic workups, discovering the diverticular disease compared to the vegetarian dietary groups who may have had less colonic symptoms and therefore less diagnostic tests (Allen et al., 2011).

Allen, Appleby, Crowe, and Key (2011) concluded that a vegetarian diet and a high consumption of fiber was associated with a lower risk for hospital admission or death from diverticular related diseases such as diverticulosis, diverticulum of the small or large intestine, and diverticulitis. Researchers followed up in 2009 to identify participant's causes of death or previous hospital admissions using ICD-9 562 and ICD-10 K57 codes, morbidity records, and Hospital Episode Statistics (Allen et al., 2011). In follow-up, Allen et al., (2011) identified 812 cases of “diverticular disease without abscess or perforation,” 6 of which it was their diagnosis for cause of death. Allen et al., (2011) reported a 31% lower risk for developing diverticular disease for the vegetarian or vegan groups compared to the meat eater groups after assessing adherence to vegetarian diets and various categories and adjusting for variables such as BMI. This finding that a vegetarian or vegan diet could possibly be protective against diverticular disease due to the increased fiber content may also be protective against breast cancer.

Anderson et al. (2011) researched fruit and vegetable consumption and its association to pancreatic cancer in 1,367 participants. This case-control study was clinic-based and included 983 control participants and 384 ascertained cases. The participants completed 144-item food frequency questionnaires in addition to epidemiologic surveys. Anderson et al. (2011) used logistic regression to adjust for energy intake, alcohol consumption, age, body mass index, sex, and smoking. The highest and lowest quintiles were compared and an inverse association was
observed with significant trends for various fruits, vegetables, and whole grains. After adjusting for total sugar intake and diabetes, the results were similar. The strengths of this study included adenocarcinoma confirmation by pathology or through medical records in 99% of the cases. The researchers attempted to minimize bias due to effect of disease on dietary intake by excluding those whom reported a dietary change in a 5-year period, prior to entry into the study (Anderson et al., 2011).

Study findings revealed that a lower consumption of vegetables, fruits, fiber, and whole grains was associated with having pancreatic cancer (Anderson et al., 2011). This case-controlled study was a good representation of the ethnically diverse population, as it included men, women, various ethnicities including Asian, American Indian, Black, Caucasian, and Alaskan Native, variable ages, smokers, non-smokers, consumers of alcohol and non-consumers of alcohol, and diabetics (Anderson et al., 2011). In addition, the rapid ascertainment protocol of this study had participants complete the questionnaire at the time of recruitment, which was close to the time they were diagnosed with adenocarcinoma decreasing the chance for recall bias (Anderson et al., 2011).

Limitations of the study design included recall of past behavior and events. When utilizing a food frequency questionnaire the participants must recall previous events and behavior which may not be reported accurately. The researchers reported misclassification of dietary patterns in control participants (e.g. possibly underreporting consumption of foods rich in fat, since it is widely known to be unhealthy and a risk factor for certain diseases such as heart disease). The demise of late-stage disease participants also decreased eligible cases of self-completed questionnaires.
Ankerberg-Nobis, Barnard, Berkow, and Saxe (2007) reviewed eight observational studies and 17 laboratory trials or intervention on the outcomes and progression of prostate cancer. The plant-based diets including a high fiber, phytonutrient-rich, low-fat dietary option positively influenced the health outcomes by slowing progression of prostate cancer, lowering levels of cholesterol, free androgen, total testosterone, and prostate specific antigen (Ankerberg-Nobis et al., 2007).

Allen et al. (2008) concluded in their European Prospective Investigation into Cancer and Nutrition (EPIC) study that there was a positive association between calcium intake or high intake of protein from dairy products and increased risk for prostate cancer. This prospective study of 142,251 men in Greece, Germany, Italy, Norway, France, Netherlands, Spain, Sweden, Denmark, and the United Kingdom had an average follow-up of 8.7 years. The participants were consented and then recorded their lifestyle, medical history, and diet on questionnaires. The results of the study by Allen et al. (2008) supported their hypothesis that men may be at increased risk for prostate cancer with increased consumption of dairy protein and calcium. If lowering consumption of calcium and protein from dairy products could possibly be helpful in decreasing risk for prostate cancer, could there be any benefits to decreasing or eliminating dairy products on preventing recurrence of breast cancer?

The strengths of the EPIC study included the wide range of animal food intakes, the large number of cases with prostate cancer, and the prospective design of the study (Allen et al., 2008). The limitations as seen in larger studies include the simple food questionnaires that may present with some error of measurement. Even so, the EPIC study calibrated dietary intakes from a 24-hour dietary recall method to help decrease error (Allen et al., 2008). With conducting a study that is in 10 different European countries there is a question of validity of results.
Barancokova et al. (2004) conducted a study of 48 individuals to identify if a vegetarian diet influenced genomic stability. The conclusions of that study weakly supported the hypothesis that a vegetarian diet does in fact decrease lymphocytic, oxidative stress (Barancokova et al., 2004). In contrast however, Barancokova et al. (2004) reported that if certain micronutrients are missing from the diet, specifically B vitamins, then genetic damage can take place as the micronutrients are important for DNA stability and metabolism. A vegetarian diet or variation which includes increased micronutrients and vitamins provides antioxidative effects and can minimally protect against genetic damage (Barancokova, et al., 2004). This study was small and did not discuss the strengths and limitations or the type of study that was conducted. If there is some validity to a vegan diet preventing oxidative stress this could potentially be an area worth further study to see the effects on the HER2 genes, as well as the BRCA 1 and BRCA 2 genes in the prevention of breast cancer recurrence.

Craig (2009) in his review of health effects of a vegan diet reported that individuals embracing a vegan diet were thinner (lower BMI), had lower serum cholesterol, reduced blood pressures, decreased risk for cardiovascular disease, and increased protective elements that fight cancer and many other chronic diseases. Additionally, a randomized design study by Barnard et al. (2009) reported that low-fat vegetarian and vegan diets were associated with an improvement of plasma lipid concentrations and glycemia in type-2 diabetic individuals. Diverticular disease, pancreatic cancer, prostate cancer, cardiovascular disease, and type-2 diabetes in relation to a vegan diet, are all diseases that have been studied with positive results and health benefits to the consumer. If a vegan diet can provide all of these health benefits and protection against various cancers, adoption of a vegan diet may be beneficial in preventing recurrence of breast cancer.
These are all very compelling reasons to consider joining the 1.4% of the American population (Craig, 2009) that currently consider themselves vegan.

Practitioners have the responsibility to provide exceptional primary care and patient education to women at risk for breast cancer and cancer survivors. Incorporating evidence-based research is a significant necessity in all aspects of practice and especially in relation to cancer. Although there are numerous studies that have been done on breast cancer and diet, there is still a very high incidence of breast cancer with few scientifically proven preventive measures being offered to women with regards to diet. A thorough literature review of current breast cancer research yields no studies related to breast cancer and the vegan diet. The purpose of this paper is to review the evidence related to the ability of a vegan diet to reduce or prevent breast cancer events and to suggest dietary approaches that could potentially improve prognosis and survival from breast cancer. Specifically, the paper examines dietary fiber for decreasing circulating estrogen, soy an isoflavone and its estrogenic effects, and finally dietary fat, IGF-1 levels, and obesity in relationship to breast cancer risk. The population of interest is women breast cancer survivors of all ages, all ethnicities, who are currently cancer-free, that followed a vegan diet for any period of time following their diagnosis and treatment of breast cancer.

Theoretical Framework

Women have much to be concerned with when they face a diagnosis of breast cancer. Their choices include surgery, chemotherapy, radiation, and alternative medicine. For the purposes of this paper Mary Kohnke’s (1982) advocacy theory is appropriate in forming the framework for the study. Kohnke (1982) believed that providing patients with information about their health care could help them better understand their circumstances to be able to make an
informed decision. This patient advocacy model has pervaded health care in all settings. Bu and Jezewski (2006) reported that National nursing organizations have even adopted patient advocacy in their professional conduct codes. The provider’s responsibility is to lend support to the patient through the decision-making process, after they have ensured that adequate information has been provided to them.

Bu and Jezewski (2006) recently developed a mid-range theory of patient advocacy through concept analysis. The three core attributes include 1) championing social justice in the rendering of health care, 2) acting on behalf of the patient, and 3) safeguarding the patient’s autonomy. They view patient advocacy as a “strategy consisting of specific actions for representing, preserving, and/or safeguarding” the values, interests, and the rights of patient’s in the healthcare system (Bu & Jezewski, 2006).

Advocacy theory discusses championing social justice in providing healthcare to patients. Not only does this include acting on behalf of patients at a legislative and policy level, but also striving for change on behalf of society, communities, and most importantly individuals (Bu & Jezewski, 2006). Practitioners need to become social activists by getting involved in issues dealing with health, education, and welfare (Bu & Jezewski, 2006). In the context of breast cancer recurrence prevention, this includes not only educating the patient on dietary options and how to make lifestyle modifications, but also becoming a consumer of knowledge in this area of health as a nurse practitioner to accurately inform the patient, the family, and the community.

Most individuals think of patient advocacy as acting on behalf of the patient. Bu and Jezewski (2006) describe this further as “defending patients against medical interventions that violate the patient’s best interest or wishes.” Practitioners are perfectly positioned to advocate
for the patient in this manner. When patients make informed decisions and choose to forego conventional options of treating breast cancer such as surgery, chemotherapy, and radiation the practitioner’s responsibility is to advocate for the patient when dealing with other health care providers, family, and friends that may disagree with the patient’s wishes.

The last attribute of the patient advocacy theory is safeguarding patient’s autonomy. Assisting patients to verbalize their values, preferences, and their life goals and supporting them with these choices regardless of the practitioner’s personal beliefs (Bu & Jezewski, 2006) is the true essence of patient advocacy. Once again, in the context of breast cancer recurrence prevention, it is the practitioner’s responsibility to provide appropriate and adequate information to the patient so informed decisions can be made. When it comes to these decisions, the patient not only has the right, but also the responsibility to make their own decisions about their health care (Bu & Jezewski, 2006).

Search Strategies

The literature search was initiated using the key words “breast cancer” and “vegan diet.” The library link to PubMed and CINAHL, were utilized for the literature search. For the literature search a broader search included the following key words “prevention,” “vegetarian,” “diet,” “cancer,” “recurrence,” “IGF-1,” “pancreatic,” “diabetes,” and “prostate.” In addition, a combination of these words was included in the search to identify other cancer studies that could contribute information to this literature review. Several research articles and literature reviews on diet and cancer were reviewed and identified. Over 40 articles related to diet and cancer were reviewed with the search narrowed down to eleven contributing articles. Utilizing Kohnke’s (1982) advocacy theory and a mid-range theory of patient advocacy by Bu and Jezewski (2006)

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the literature was organized in the context of preventing breast cancer recurrence through diet. The dietary components that contribute to lowering the risk for breast cancer events were identified under the following categories: dietary fiber and circulating estrogen (2 articles), soy and its estrogenic effects (3 articles), and dietary fat, IGF-1, and obesity (6 articles) in relation to breast cancer risk.

**Review of Literature**

**Dietary fiber and circulating estrogen**

A prospective cohort study by Gaskins et al. (2009) called the BioCycle study, reported a significant decrease in the concentration of circulating hormones in a diet high in fiber. The focus of the BioCycle study of 250 young, healthy, regularly menstruating, premenopausal women between the ages of 18 and 44 was to determine if anovulation and hormone concentrations were associated with fiber intake (Gaskins et al., 2009). A positive association with anovulation risk was noted, as well as an inverse association with dietary fiber consumption and hormone concentrations of estradiol, progesterone, FSH, and LH (Gaskins et al., 2009). An increase risk for anovulatory cycle was noted with each 5-g/d increase in fiber intake. The strengths of this study included intensive monitoring over two menstrual cycles of this ethnically diverse group (Gaskins et al., 2009). Significant improvements from previous studies included the use of fertility monitors at the clinic sites, individual cycle assessments on ovulation, and utilization of exclusion criteria at baseline which reduced bias (Gaskins et al., 2009). The limitations included the size of the study group participants consuming “at or above the Dietary Reference Intake (DRI>22g dietary fiber/d; n=41 cycles), and the small number of anovulatory cycles (n=42) limiting the power of the findings” and resulting in wide confidence intervals.
(Gaskins et al., 2009). This study differed from a previous study conducted on primarily older, post-menopausal women (Butler et al., 2010).

Butler et al. (2010) identified from their previous population-based cohort study of Singapore Chinese in 1993-1998 that 629 of the 34,028 women had been diagnosed with breast cancer. This was a statistically significant dose-dependent trend reported in lowering postmenopausal breast cancer risk by consuming a vegetable-fruit-soy dietary pattern (Butler et al., 2010). In the vegetable-fruit-soy pattern, Butler et al. (2010) noted a 30% decrease in risk for the fourth compared to the first quartile. The strengths of this study included the use of a FFQ (food frequency questionnaire) created specifically for the study population and was validated within the study group. Additionally, daily energy and major nutrient intake was compared with the FFQ and multiple 24-hour recalls showed to be within 10% of each other (Butler et al., 2010). The limitation of this study by Butler et al., (2010) was the study method used called, a posteriori, which means the researchers gained knowledge based on their personal experience and not experiential evidence.

The results of the study by Butler et al. (2010) were similar to the BioCycle study by Gaskins et al. (2009) in showing that increased dietary fiber can lower the risk of breast cancer. However, the BioCycle study also measured hormone levels including lutenizing hormone and follicle stimulating hormone independent of estradiol. Gaskins et al. (2009) reported a decrease in circulating hormones with increased fiber intake. Since we know that increased levels of estrogen put women at risk for developing breast cancer and recurrence, it is encouraging to know that increasing dietary fiber could potentially be a very effective preventive measure for breast cancer survivors.
Soy and its estrogenic effects

Soy foods are rich in isoflavones or phytoestrogens as they are sometimes referred to. According to Devine and Warren (2010), a phytoestrogen is an estrogen-like chemical found in plants. As phytoestrogens are similar to mammalian estrogen, 17B-estradiol, they compete at the estrogen binding sites in humans possibly exerting antiestrogenic affects in environments high in estrogen (Cai et al., 2009).

In 2009, Cai et al. published the results of a large population-based, longitudinal cohort study conducted in Shanghai. The Shanghai Breast Cancer Survival Study of 5,042 participants found that soy intake is not only safe for breast cancer survivors, but it lowers the mortality and recurrence of breast cancer (Cai et al., 2009). The associations of soy isoflavone/protein intake with recurrence and mortality followed a dose-response pattern in linear form until soy intake arrived at 11 grams per day at which time it leveled off and no additional benefits were seen (Cai et al., 2009).

Interestingly, the average American woman only consumes 1-6 mg of soy per day compared to her counterpart in China consuming 47 grams of soy per day (Cai et al., 2009). The inverse association did not vary with menopausal status and was evident for women with both estrogen-receptor negative and estrogen-receptor positive cancer and early and late stage cancers (Cai et al., 2009). The strength of this study was the large population-based study design. The limitations included the shorter follow-up period of 3.9 years compared to other longitudinal studies. In a vegan diet, one of the primary sources of protein is derived from soy products. Therefore, incorporating more soy into the diet assists to lessen the circulating estrogen, thereby decreasing the possibility of breast cancer recurrence.
Caan et al. (2009) reported from their study Life After Cancer Epidemiology (LACE) study found a possible association with a decreased risk for breast cancer recurrence with an increased consumption of soy isoflavones. This was one of the first prospective studies to examine the relationship between breast cancer and soy intake. The 1,954 female breast cancer survivors were followed for 6.31 years with a result of 282 recurrences of breast cancers in this group (Caan et al., 2009). With increasing intakes of glycetin and daidzein (components of soy), there was a non-significant decrease in risk for recurrence. With tamoxifen use, the risk for breast cancer recurrence was significantly decreased with the increased use of glycetin (Caan et al., 2009). Overall, the researchers found the participants in the highest daidzen (another soy component) intake group, had the lowest rate of recurrence compared to those in the lowest intake category.

The strengths of this study by Caan et al. (2009) included the large sample size of 1,954 participants, the prospective design as this helps to reduce errors in dietary recall, and the use of a supplemental and comprehensive Food Frequency Questionnaire (FFQ) specifically targeting soy products. In addition, having access to the treatment data assisted the researchers to identify different factors that affect estrogen levels in women. One of the limitations of this study was that the group was not ethnically diverse, but was largely comprised of Caucasian females. The researchers reported a possible reduction in risk for breast cancer recurrence in women that consumed soy products while taking tamoxifen, concurrently (Caan et al., 2009). Increasing soy intake, especially for women currently taking tamoxifen therapy could greatly increase the chances for a good prognosis.

**Dietary fat, IGF-1, and obesity**
A large, longitudinal, prospective health study of 188,736 postmenopausal women called the National Institute of Health-AARP Diet and Health Study (2007), reported a direct association between dietary fat and invasive breast cancer (Chang et al., 2007). The follow-up period of 4.4 years, yielded 3,501 invasive breast cancer cases. Within this group, 11% of the women with higher incidence of invasive breast cancer were within the highest quintile of percent from energy from total fat (Chang et al., 2007). This study examined subtypes of fat, as well as total fat consumption and found a positive association with breast cancer. An interaction was found between fat intake and concurrent use of HRT (hormone replacement therapy) as statistically significant in relation to the risk of invasive breast cancer (Chang et al., 2007). As evidenced here in this study, dietary fat is a known risk factor for breast cancer. Adopting a dietary pattern that is low in fat could be beneficial in decreasing the chance of getting breast cancer. Furthermore, incorporating a plant-based diet rich in fiber and low in fat could potentially, significantly drop the risk of a recurrence or primary diagnosis of breast cancer.

Insulin-like growth factor-1 is known to modulate cell growth and survival and may participate in the development of tumors (Egger et al., 2004). With higher levels of IGF-1 which can assist in tumorigenesis, including differentiation, proliferation, and apoptosis (Blackburn & Wang, 2007) one could conclude the risk for a breast cancer event is heightened. Egger et al., (2004) reported an association with colorectal cancer, prostate cancer, and premenopausal breast cancer with higher concentrations of IGF-1. Key (2010), reported that women with somewhat higher intake of protein from dairy sources have an increased level of IGF-1. Again, the vegan diet with its low-fat, no dairy pattern could offer a level of protection from breast cancer events.

Obesity has been associated with breast hyperplasia, cancer, and increased production of local estrogen as reviewed by Brooks, Bulun, Chen, Moy, and Zhao (2012). In a randomized,
controlled trial by Barnard et al. (2009), persons with type-2 diabetes were randomly assigned to either a diet following the 2003 American Diabetic Association guidelines or to a low-fat vegan diet. The study screened 1049 individuals with 99 participants meeting the criteria. The strengths of this randomized design included participants that were free-living individuals (outside the research environment) as well as those with long-standing diabetes which differed from other similar studies. Additionally, the researchers analyzed dependent measures independent of dietary compliance variations, included statistical methods to reduce changes in medication effects, and lengthened the study by one year as compared to other studies (Barnard et al., 2009). Weight loss was significant with the vegan diet group losing -4.4 kg and the conventional group losing -3.0 kg over the 74-week trial. The hemaglobin A1c changes of -0.40 for the vegan group and 0.01 for the conventional group prior to medication adjustments was somewhat significant as Hb A1c levels change slowly over time (Barnard et al., 2009). Farmer, Gaitskell, Oke, and Stevens (2012) found more true-positives with 12-month Hb A1c testing than with 6-month testing so the 74-week clinical trial was probably more accurate than the other, shorter 6-month research studies. When total-cholesterol was analyzed prior to modifications to lipid-lowering medications the levels decreased by 20.4 mg/dL in the vegan dietary group and 6.8 mg/dL in the conventional group. Additionally, LDL cholesterol in the vegan group decreased by 13.5 mg/dL and in the conventional group it was decreased by 3.4 mg/dL (Barnard et al., 2009). The results supported that a vegan diet that excluded fat from animal sources was more effective in lowering plasma lipid concentrations and had better control of glycemia compared to the ADA dietary pattern (Barnard et al., 2009). Both study groups benefited from long-term weight reduction with the vegan dietary group losing 9.7 lbs and the
conventional dietary group losing 6.6 lbs (Barnard et al., 2009). Weight loss for breast health and prevention can be adequately achieved by utilizing a vegan dietary pattern.

Discussion

Implications for nurse practitioner practice

The prevalence of breast cancer can be significantly reduced by modifying one of the common risk factors, diet. Several of the studies reviewed certain aspects of vegetarian diets, including increased micronutrients from vegetables, fruits, and whole-grains, as possibly being protective against breast cancer or recurrence. Multiple studies have found a negative correlation between breast cancer and plant-based vegetarian diets, while several other studies have suggested a positive relationship between breast cancer and vegetarian diets. The studies that showed a negative correlation increased the vegetable and fruit consumption of the study participants, but did not remove meat or meat products from the diet. The widely variable research findings promote confusion for breast cancer survivors. To add to the confusion, there are different types of vegetarian diets, as previously described. Important implications for breast cancer survivors mortality and morbidity relates to their behaviors, as they respond to an increase in vulnerability (Blank, Edmondson, Fenster, & Park, 2008). Nurse practitioners have a responsibility to provide the most accurate information regarding health promotion so patients can make informed decisions about their healthcare.

Meraviglia and Stuifbergen (2011) suggested in a small qualitative study, that various behaviors that promoted health in low-income cancer survivors were behaviors that they engaged in prior to their diagnosis in addition to adopting new behaviors following diagnosis. Dietary changes were one of the areas the participants modified after diagnosis. The strengths of this
study were the use of ethnically diverse subjects and the use of transcripts and content analysis by two coders to maintain consistency in participant’s comments. The main limitation was the small sample size of 13 people (Meraviglia & Stuitbergen, 2011). The authors concluded that engaging in behaviors, such as healthy diets and exercise improves the quality of health prior to, and after diagnosis of breast cancer (Meraviglia & Stuitbergen, 2011). This is important to embrace as nurse practitioners so that we can encourage health promoting behaviors in our patients to prevent and reduce further disease processes.

Nurse practitioners should be educating women on the health benefits of a vegan diet as it relates to breast health and preventing cancer recurrence. In the study by Barnard et al. (2009) not only did it show to be beneficial for lowering LDL cholesterol, promoting weight loss, and controlling glycemia, but as an added benefit of decreasing BMI (body mass index) one could conclude that production of local estrogen would diminish, decreasing the risk of breast cancer recurrence. Egger et al., (2004) reported that IGF-1 (insulin-like growth factor-1) may play a part in tumorigenesis, as it modulates cell growth. Additionally, Key (2010) stated that women who get their protein from dairy sources have increased levels of IGF-1. So, a vegan diet that excludes dairy will not only assist in weight loss and glycemic control, but will also lower IGF-1 levels which could prevent breast cancer tumor growth either primary or secondary in nature.

It is recommended that nurse practitioners as patient advocates should discuss with their patients, whether they are breast cancer survivors or have a positive family history, about a vegan dietary option that could potentially prevent breast cancer occurrence or recurrence. The United States Department of Agriculture recently designed a new food pyramid called “myplate (2010).” The concept of the plate relates that half of an individual’s plate should include fruits and vegetables, one quarter should be protein, and the last quarter should be whole grains. In the
face of an obesity epidemic that is fraught with health problems including increased risk for cancers and more specifically breast cancer, it is crucial to recommend at the very least, a healthy vegetarian diet. Women who are at an increased risk for breast cancer should be advised to adopt a vegan diet for better health and potential to ward off breast cancer recurrence.

Additionally, making dietary modifications towards a more plant-based diet is inexpensive and it’s a preventive measure that everyone can incorporate into their lives. With various other positive outcomes related to cancer and vegan diets, it is paramount that providers act as patient advocates by informing patients of healthy options. The final responsibility of the nurse practitioner as a patient advocate is to encourage further research studies to be conducted in which breast cancer and a vegan dietary pattern are evaluated in preventing breast cancer recurrence.

**Recommendations for Future Research**

Recommendations for future research include breast cancer survivors and those newly diagnosed with breast cancer that will include a vegan diet that excludes animal proteins for an extended period of time. Further, there is a need that is common in much of the literature for studies to be conducted on how to educate women for the prevention of breast cancer. Until the research is more definitive and not so controversial there is limited information to disseminate to woman regarding the prevention of breast cancer.
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