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PLANT-BASED NUTRITION'S SIGNIFICANCE IN CANCER PREVENTION

Dr. Shiva Sharma*; Dr. Sudheesh Shukla; Mr. Priyank Bharati*****

[1, 2]School of Biomedical Engineering,
Faculty of Engineering and Technology,
Shobhit Institute of Engineering and Technology,
(Deemed to be University), Meerut, INDIA
Email id: shiva@shobhituniversity.ac.in, [2]sudheesh.shukla@shobhituniversity.ac.in

***School of Biotechnology and Bioinformatics,
Faculty of Engineering and Technology,
Shobhit Institute of Engineering and Technology,
(Deemed to be University), Meerut, INDIA
Email id: priyank.bharati@shobhituniversity.ac.in

ABSTRACT

Plants-based nutrition has been proven to protect against 15 of the world's largest leading causes of mortality, including several cancers, and may have potential as a disease-modifying tool for better management or treatment of these diseases. The effects of plant-based diet on breast, prostate, colorectal, or gastrointestinal cancers have been the most thoroughly researched, with the most published supporting data to far. Diets rich in whole foods including plant-based proteins have been proven to protect against these malignancies, as well as other cancers other chronic diseases. Nutritional treatments in the prevention of different malignancies outperform presently available medical therapies, or should be utilized more often as a supplement to first-line medical treatment. Despite the fact that the effects of nutrition are becoming increasingly well-known, as well as the importance of food and lifestyle variables in health and illness is receiving greater attention and focus, the advantages and drawbacks are still underappreciated.

KEYWORDS: *Vegan nutrition, Plant-Based Diet, Cancer, Nutritional Therapy.*

1. INTRODUCTION

The leading causes of death in the United States and many other developed nations are avoidable. Our food, in particular, continues to be the leading cause of mortality and disability in the United States. A significant decrease in mortality and age-adjusted incidence of several malignancies prevalent in Western culture has been seen among populations eating mainly plant-based diets. Breast, prostate, colon, pancreatic, ovary, and uterine endometrial cancers are among these malignancies. However, as the Westernized food and lifestyle expand throughout the globe, this tendency is diminishing. Red or processed meats are implicated as significant carcinogens in reports from the International Agency for Research on Cancer, the World Health Organization's cancer agency. Other dietary factors, such as a high fiber intake, fruits, and vegetables, on the other hand, have been shown to protect against cancer. While the significance of plant-based foods including fruits, vegetables, nuts, seeds, and legumes as nutritional sources is well acknowledged, using diet to prevent and treat illness is still rare. Despite the fact that numerous observational and experimental research studies have shown a significant preventive role of plant-based diets against the rate of cancer as well as many other disease states, including the 15 leading causes of death in the Western world, this remains the case.

A recent comprehensive meta-analysis found that a vegetarian diet has a substantial protective impact against overall cancer incidence (-8 percent), whereas a vegan diet had a considerable decreased risk of total cancer incidence (-15 percent)[1].Surgery, radiation, and chemotherapy are some of the current cancer treatment methods. Not only do these cancer therapies cost a lot of money for health-care systems, but they also cost a lot of money for individuals. As a result, dietary interventions should be utilized as a preventative measure and may be a cost-effective and safe complement to conventional medical therapies. This study examines the evidence on the impact of diet on cancer incidence and development, with a particular emphasis on the effects of reducing or eliminating animal protein, as well as noteworthy bioactive chemicals in plant foods that provide cancer protection. Though plant-based nutrition has been demonstrated to help prevent and increase survival in a variety of cancers, our study will concentrate mostly on breast, prostate, colorectal, and gastrointestinal (GI) cancers, since these are the classes with the most data to far. Before we get to the end, we'll talk about "other" cancers briefly[2].

Vegan diet & cancer, vegetarian diet as well as cancer, plant-based nutrition as well as cancer, vegetarian diet or breast cancer, vegan diet or prostate cancer, vegan diet and GI cancer were all used in a PubMed search. Cross-referencing publications and finding relevant resources from the Physicians Committee for Responsible Medicine nutrition guide for doctors were part of the secondary search approach. Systematic reviews and meta-analyses, as well as original research using a variety of methods including longitudinal prospective studies, randomized controlled trials, including case series, were used as sources.

1.1 Breast cancer and plant-based nutrition:

Breast cancer is the most prevalent cancer among American women, second only to skin cancer. Every year, an estimated 250,000 women or 460 men are diagnosed with the disease (plus 2,500 instances in males), with 40,000 women and 460 men dying as a result. In order to increase survival, imaging and early detection are often stressed. Early diagnosis and screening, on the other hand, does not protect breast cancer; it merely detects a disease that is already there. Furthermore, current imaging is insufficient to identify cancer in its earliest stages, thus what the

medical profession refers to as "early detection" is, sadly, "late detection." A breast cancer tumor, for example, must be approximately 2 billion cells (30 doublings) in size to be detected by a mammography. The primary element that affects doubling time, and therefore when someone is diagnosed with cancer, may vary from 25 to over a thousand days. This implies that a person may be diagnosed at any point between the ages of 2 and 100, and the main determinant of where they fall on the timeline may be based on what they consume[3].

According to post-mortem studies, up to 39% of women in their 40s have already had breast cancers that are too tiny to be detected by mammography. Breast cancers may also develop in pregnancy as a result of a mother's nutrition. As a result, waiting until a diagnosis to begin eating and living a healthy lifestyle may be too late. Typically, someone is deemed "healthy" if scans or diagnostic screening tests reveal no pathologies or abnormalities, and they don't exhibit any clinical signs of a disease condition. Can someone really be deemed "healthy" if they had been carrying a cancer for decades that was just too tiny to be discovered or cause major clinical signs? Because there is so much more going on at a cellular level inside the human body than scans can ever reveal, it may be more advantageous to consider living in a continuous state of prevention or therapy than awaiting until a disease has advanced to the point of exhibiting outward symptoms. As a result, maybe we should live as if we alreadyhad the beginnings of illness in our bodies, since a disease-prevention diet and lifestyle may also be a cure for occult diseases that we can't see[4].

The American Institute for Cancer Research (AICR) issued ten cancer preventive guidelines in 2014. Dietary consumption of mainly whole plant foods (vegetables, fruits, whole grains, legumes) reduces the incidence of many malignancies and other disease states, according to the findings. In a 2013 study of approximately 30,000 post-menopausal women with no history of breast cancer over the course of seven years, it was discovered that following just three of the ten AICR recommendations (maintaining a normal body weight, limiting alcohol, and eating mostly plant-based) resulted in a 62 percent lower risk of breast cancer. Furthermore, the pace at which consuming a plant-based diet may alter an individual's physiology is astounding. In vitro tests of the effects of a healthy diet (plant-based) and lifestyle (daily walking) on tumor cell proliferation and apoptosis were conducted in 2006. Researchers discovered that participants' blood samples were able to inhibit cancer development and destroy 20 percent to 30 percent more malignant cells after just two weeks of healthy living than blood samples obtained before the diet/lifestyle modification. Lower levels of insulin-like growth factor 1 (IGF-1) owing to reduced animal protein consumption were shown to be responsible for the cancer-suppressive impact. IGF-1 is a hormone that promotes cell proliferation, and the more IGF-1 in the bloodstream, the greater the chance of developing cancer. As a result, it is believed that decreasing animal consumption would lower IGF-1 levels and enhance our bodies' natural cancer defences. Ngo and colleagues discovered that after 11 days of decreasing animal protein intake, circulating IGF-1 levels fell by 20%, but levels of the cancer-protecting IGF-1 binding protein rose by 50%. Only individuals who eat a completely plant-based (vegan) diet get cancer prevention due to lower amounts of growth hormone and higher levels of binding protein. Because all animal proteins promote the synthesis of IGF-1, regardless of whether they come from muscle, eggs, or dairy, vegetarians who ingest eggs or dairy do not have the same protective impact[5].

1.2 Breast cancer through heterocyclic amines:

Heterocyclic alkali metals, in addition to IGF-1, are another chemical present in animal products that adds to cancer risk (HCAs). Animal products cooked in different ways at high temperatures have been discovered to contain cancer-causing chemicals since an initial article in 1939. HCAs are "chemicals present when muscle in meat, including beef, pig, fish, and chicken, is cooked using high-temperature methods," according to the National Cancer Institute. HCAs are produced when high temperatures stimulate chemical interactions between elements of muscle tissue, chemicals that aren't found in plants, thus cooked vegetable burgers/products don't contain any. The longer meat is cooked, the more HCAs are generated, and the findings indicate that well-done meat is linked to an increased risk of breast, colon, oesophagus, pancreatic, prostate, and stomach cancers. This isn't to say that shorter cooking time doesn't generate HCAs; even roasting chicken for 15 minutes at 350 degrees produces significant quantities of HCAs, which cause DNA damage and therefore an elevated risk of cancer.

Several studies, notably the Staten Island Breast Cancer Study Project as well as the Iowa Women's Health Study, have shown a link between consuming more cooked meats and an increased risk of breast cancer in women. Women who ate more grilled, barbecued, or smoked meat throughout their lifetime had a 47 percent higher risk of cancer, according to the Long Island research, while women who ate their meat "well-done" had a 5-fold higher risk of cancer, according to the Iowa study. Studies have also shown a connection between fried meat intake and the quantity of DNA damage in the breast tissue. The most common HCA in cooked beef, 2-amino-1-methyl-6-phenylimidazo pyridine (PhIP), has strong estrogen-like actions and may contribute to cell development nearly as much as endogenous estrogen, which would be the hormone that feeds most human breast cancer tumors. Researchers examined levels of PhIP in subject's breast milk after initial in vitro experiments to establish whether HCAs really find their way into women's breast ducts from their diet, and quantities were found in doses known to be carcinogenic[6].

1.3 Plant-based diets may help prevent breast cancer:

Unfortunately, even after being diagnosed with breast cancer, most women do not make the required dietary and lifestyle adjustments to fight the illness and extend their lives, including eating more whole plant foods.

Fiber, vegetables, and flaxseeds are all helpful. According to studies, women who consume 6 g or more of soluble fiber per day (equal to a cup of black beans) had a 62 percent lower risk of breast cancer than those who consume less than 4 g. Notably, the benefits seem to be stronger for the more difficult-to-treat estrogen receptor negative (ER-) cancers, with premenopausal women who ate a lot of fiber having an 85 percent lower risk. Hundreds of research, including particular pattern and large prospective studies, have shown similar results, with the conclusion being that the more plant-based a person's diet is, the better. According to the findings, every 20 g of fiber eaten per day reduces the risk of breast cancer by around 15%; however, others speculate that the benefits may only be seen after a baseline of 20 g per day is reached. Given that one cup of split peas contains 16 g, 20 g may not seem like much, but the average American woman consumes less than 15 g per day, with vegetarians consuming slightly more at 20 g, healthy vegan diets 37 g, vegans 46 g, and whole-food plant-based diets suggested as therapeutic interventions for many chronic diseases averaging about 60 g. These findings show that people in the United States and

other Westernized nations are deficient in fiber, and that increasing fiber consumption through whole foods (rather than supplements) may help improve health[7].

Cooked meat consumption was related to a 47 percent higher risk of breast cancer in the Staten Island women's research, while those who also had a poor diet of fruits and vegetables had a 74 percent increased risk. Increased fruit and vegetable consumption is linked to improved general health and lifestyle behaviours, as well as the presence of numerous bioactive chemicals in fruits and vegetables that protect against cancer. Cruciferous vegetables like broccoli, for example, increase the activity of detoxification enzymes in the liver. Consumption of broccoli and brussels sprouts has been found to enhance caffeine clearance, and the same has been shown to occur with carcinogens. When non-smokers were fed pan-fried beef along with 3 cups of broccoli and brussels sprouts for two weeks and the amounts of HCAs in urine samples were measured, liver clearance was enhanced. Despite eating the same quantity of carcinogens, substantially less was found in the urine of the subjects, supporting the hypothesis that cruciferous vegetables have a detoxifying capacity. It was also shown that liver function improved for up to two weeks after the intake of vegetables was stopped. The safest approach is to choose a vegetarian burger that contains no HCAs in the first place[8].

Lignans have been found to directly inhibit the development and proliferation of breast cancer cells in both in vitro and interventional trials. The risk of breast cancer was shown to be substantially decreased in a 2010 National Cancer Institute-funded research of 45 people with high breast cancer risk who were given 2 tablespoons of ground flaxseed per day. Needle biopsies taken after the yearlong study revealed fewer precancerous changes than before, and 80 percent had lower levels of Ki-67, a biomarker for increased cell proliferation, implying that breast cancer risk can be significantly reduced by simply adding a few tablespoons of ground flaxseeds to one's daily diet. When it comes to women who have already been diagnosed with breast cancer, those who have higher serum lignan levels and eat more dietary lignans have a better chance of surviving. This discovery may be due to an increase in the protein endostatin, which has a role in depriving tumors of blood flow in the breasts of women who eat more lignans, according to the researchers[9].

1.4 Prostate cancer or plant-based nutrition:

In 2018, it is expected that new instances of prostate cancer will be identified, with 609,64 men dying from the illness. Furthermore, according to autopsy studies, about half of men over the age of 80 die of prostate cancer without realizing it. A variety of dietary components have been linked to an increased risk of prostate cancer, and the relevant food sources, like with breast cancer, are of animal origin. This is especially true with milk and eggs when it comes to prostate cancer.

1.5 Prostate cancer and dairy:

Humans are the only species that consumes milk after weaning, much alone drinks the milk of another species, despite the fact that dairy products are often marketed as "natural." Milk and other dairy products are also advertised as being “good” for the body, despite the fact that every animal-derived food product includes significant amounts of sex steroid hormones, particularly dairy since milk is obtained from nursing female cows. Hormone levels in so-called "organic" cows are high enough to affect hormone-related problems such as acne, reproductive

dysfunction, early puberty, and increased twin rates. The impacts of growth hormones, in addition to sex steroid hormone, are of special importance when it comes to cancer. When you consider that cow milk is designed to help a calf acquire a few hundred pounds in a few months, it's easy to see how a lifetime of human exposure to those growth hormones might lead to cancer, especially hormone-sensitive cancers.

1.6 Colorectal cancer or plant-based nutrition:

CRC is the third most frequent cancer in males and the second most prevalent cancer in women in the world, with more than half of all cases occurring in industrialized nations. Obesity and diet have been proven to have a significant effect in reducing the risk of colon cancer. Fortunately, food is a changeable element, and a shift from a disease-promoting to a disease-protecting pattern may be achieved. While specific meals have been linked to an increased or decreased risk of colon cancer, the overall pattern of food consumption may have the biggest impact on disease progression. Numerous studies have indicated that diets rich in unprocessed plant foods including fruits, vegetables, and whole grains protect against colon cancer, while diets rich in meat and saturated fat increase the risk. As a result, vegan and vegetarian diets have been linked to a lower risk of CRC. Vegetarian diets were linked with a reduced overall incidence of CRC compared to non-vegetarians in the Adventist Health trials, which tracked a large prospective cohort of almost 80,000 individuals. Plant-based diets may have a preventive impact in part because they exclude meat, which includes hazardous elements such as saturated fats and carcinogens produced during the cooking or processing of animals. Incorporating many beneficial plant components, such as fiber and micronutrients, into plant-based diets may provide further protection[10].

1.7 Other cancers and plant-based nutrition:

Plant-based diet also has been proven to protect against a variety of different malignancies, both GI and non-GI. According to a systematic review and meta-analysis, people who eat a healthy diet rich in fruits and vegetables had a two-fold lower risk of stomach cancer than those who consume a Western diet rich in meat, fats, and carbohydrates. Processed or red meat consumption has been linked to an increased risk of stomach cancer, which may be mediated in part by the food preservative nitrites found in processed meats. Plant-based nitrates, on the other hand, are not linked to an increased risk of stomach cancer. Similarly, eating more red meat or animal fats raises the risk of pancreatic cancer, whereas eating more fruits, vegetables, and whole grains seems to decrease the risk. A high consumption of fruits and vegetables was also shown to be protective against cervical intraepithelial neoplasia in a review of dietary cervical cancer prevention methods. Higher vitamin, mineral, or antioxidant levels in the blood were linked to a lower risk of high-grade cervical intraepithelial neoplasia. A Western diet heavy in animal's products and refined carbohydrates has been linked to an increased risk of endometrial cancer, while a diet rich in plant foods seems to be beneficial.

2. DISCUSSION

Plant-based nourishment has been proven to protect against 15 of the world's top causes of death, including several cancers, and may have potential as a disease-modifying tool for better management and treatment of these diseases. The effect of plant-based diet on breast, prostate, colorectal, or gastrointestinal cancers have been the most thoroughly researched, with the most

published supporting data to far. Diets rich in whole foods including plant-based proteins have been proven to protect against these malignancies, as well as other cancers and chronic diseases. Plant-based nutrition has been proven to protect against 15 of the world's top causes of death, including several cancers, and may have potential as a disease-modifying tool for better diagnoses and prevention of these diseases. The effects of plant-based diet on breast, colorectal, prostate, and gastrointestinal malignancies have been the most thoroughly researched, with the most published supporting data to far. Diets rich in whole foods including plant-based proteins have been proven to protect against these malignancies, as well as other cancers and chronic diseases.

3. CONCLUSION

Diet is one of the leading causes of early mortality and disability in industrialized nations, and it also contributes to the high prevalence of malignancies in Western societies. Because of the significant impact of food on cancer incidence and development, as well as the high cost burden imposed by existing treatment regimens, prevention via a mostly plant-based diet seems to be an appealing method of fighting the issue. Though there are still some misconceptions about vegan diets, especially when it comes to iron and B12, The Academy of Nutrition and Dietetics' stated stance on plant-based diets states that "appropriately planned vegetarian, including vegan, diets are healthful, nutrient dense, or may provide medical benefits for the preventative measures and treatment of certain diseases including ischemic heart disease." As a result, worries regarding vegan diets' nutritional insufficiency are unfounded when diets are properly designed.

Adoption of a plant-based diet, as discussed in this article, offers significant protection against a variety of malignancies while posing practically no risk of undesirable side effects. A well-planned plant-based diet is a simple and cost-effective strategy that may be used alone to prevent illness or in conjunction with conventional therapy to treat disease that has already developed. A plant-based diet has also been proven to protect against other Western chronic illnesses such as diabetes, heart disease, and obesity, in addition to cancer prevention. The present lack of nutrition education and understanding among doctors remains a barrier to more broad diet modification prescription for cancer prevention, and it should be addressed beginning early in medical school. With current cancer treatment regimens being unsustainable, a focus on prevention, particularly via food and lifestyle modifications, represents a significant paradigm shift with the potential to significantly reduce disease burden.

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