

Word Count: 1195

Cancer and Plant-Based Diets

Introduction

Cancer ranks as one of the world's leading causes of mortality. The hallmark of the disease is the uncontrolled expansion and proliferation of body cells with the risk of destroying normal body tissues (Ksouri). On average, 1.6 million new cancer cases are reported every year in the country, with almost 600,000 patients dying annually from the disease (CDC). The mortality rate remains high despite several kinds of cancers being preventable through excision of abnormal growths before they become cancerous and lifestyle changes. In addition, chemotherapy, the gold standard for cancer treatment, may not always work due to the natural resistance of some tumors to cancer drugs or the acquisition of such resistance during treatment (Król et al.). Among the leading risk factors is nutrition. Certain dietary components such as alcohol, antioxidants, acrylamide, and specific food additives have been linked to cancer incidence (National Cancer Institute [NCI]). Others, such as dietary fiber and fruit-derived polyphenols, are known anti-cancer agents (Ksouri). Hence, a healthy diet can play a significant role in preventing cancer incidence. This paper, therefore, examines whether plant-based diets can reduce cancer rates and improve the success of treatment.

Foods as Carcinogens

Numerous nutrition reports and clinical studies have highlighted how remarkably unhealthy the American diet is compared to other more indigenous cultures. One cross-sectional study that examined the diet of American adults between 1999 and 2012 found that 46% had poor diets containing an excess of processed meats, sugar-sweetened beverages, and salt and suboptimal amounts of fruits, vegetables, beans, nuts, whole grains, and fish (Rehm et al.). The trend is

worse among children and youth, with 56% having a poor diet (Liu et al.). Low-quality carbohydrates, mainly added sugar, potatoes, refined cereals and grains, saturated fat, and red meat dominate the American diet while healthful, high-quality carbohydrates, polyunsaturated fat, and plant protein remain suboptimal. Other than poor food quality, Americans also eat too much food. For instance, an individual consumes four 7-ounce servings of processed meat such as hot dogs, bacon, ham, and sausage each week (Mozaffarian). These foods contain additives with strong links to certain cancers. Carcinogenic elements in food include; (1) acrylamide found in potato chips, French fries, baked pastries, and breakfast cereals and (2) artificial sweeteners such as aspartame and saccharin (NCI).

Some cooking habits and heat treatment increase toxic substances in food. For instance, charring, burning, frying, or grilling muscle meat at high temperatures forms PAHs (polycyclic aromatic hydrocarbons) and HCAs (heterocyclic amines) – two known mutagens that induce the genetic changes that could increase cancer risk (NCI). Further, excessive intake of caloric foods, especially saturated fat and sugar, can cause obesity. This condition is associated with high inflammation in the adipose tissue that increases the risk of breast cancer. Other aspects of food linked to cancer include saturated fatty acids in dairy products, N-nitrosodimethylamine in salted fish, aflatoxin in nuts and cereals, plants exposed to pesticides like DDT, and intake of genetically modified organisms (Ksouri). Lastly, highly processed foods also increase cancer risk, especially breast cancer. This is because ultra-processed foods not only have poor nutritional quality (i.e., high fat, salt, and sugar content) but also contain a lot of additives (e.g., titanium dioxide linked to chronic intestinal inflammation) and contaminants from their plastic packaging (e.g., bisphenol A) (Fiolet et al.). Thus, the highly processed and vitamin- or

fiber-deficient Westernized diet has contributed immensely to the high incidence of cancer in the country.

Foods as Anticancer Agents: Role of Plant-Based Diet

A plant-based diet is a kind that is based on foods of plant origin with minimal (or zero) ingredients non-plant foods (Burke et al.). As such, a plant-based diet has more plants (e.g., fruits, whole grains, and vegetables) and very few (if any) animal foods (e.g., meat, dairy, and eggs). People tend to choose this kind of diet for a variety of reasons. Lately, however, evidence indicates that a plant-based diet can help reduce cancer incidence (Lanou and Svenson; Key et al.; Molina-Montes et al.). According to a 2021 report by AICR (American Institute for Cancer Research), vegan and plant-based diets are linked with the best long-term health for cancer. It can also help reduce the risk of various cancers, including breast, colorectal, and prostate. Drawing insights from a large US-based study that compared vegetarians to non-vegetarians, AICR found that men following a vegan diet were as much as 35% less likely to have or develop prostate cancer. Burke and colleagues echoed similar sentiments, but with regards to colorectal cancer. The authors established that consuming 6 oz of whole-grain foods daily may reduce this cancer by 21%.

Meanwhile, Molina-Montes et al. focused on a range of cancer-related outcomes, such as “cancer-specific mortality” and “cancer recurrence”. The aim was to synthesize and collate current “clinical evidence regarding the impact” (or lack thereof) of “plant-based dietary patterns” on the above outcomes. The study found that although the limited number of studies led to inconclusive outcomes, the few post-diagnostic studies examined showed that plant-based diets might have chemo-preventive potential. Findings were, however, near-unanimous in Key et al.’s analysis of the same. For oral (and pharyngeal) cancers in general, the study discovered that

consuming more vegetables, fruits, and other related plant-based micronutrients (e.g., folate and Vitamin C) may lower cancer risk. Similar findings were also observed regarding stomach, colorectal, prostate, and lung cancers. However, findings were inconclusive for breast and pancreatic cancers (Key et al.).

In sum, the studies examined herein have revealed that despite limited data and the possibility of the diet-cancer association being influenced by a host of residual confounding factors such as alcohol consumption and smoking, eating plant-based foods may have a protective effect. Earlier prospective observational studies, including Donaldson and Lanou and Svenson, showed that plant-based diets are modestly cancer-protective. This relationship has been linked by specific plant foods (e.g., fruits) and constituents like antioxidants, fiber, and several other kinds of phytochemicals, which collectively help in achieving and maintaining a healthy weight and cellular functioning, thus reducing the risk of cancer occurrence and recurrence (Lanou and Svenson). Specifically, Donaldson found the intake of flaxseed and abundant fruits and cruciferous vegetable portions with broccoli sprouts especially beneficial. Protective elements in such a dietary regime include folic acid, selenium, Vitamin B-12, ascorbic acid, and antioxidants (e.g., carotenoids). According to Collins, phytochemicals and antioxidants are powerful tumor-fighting dietary components that help in (1) hormonal regulation, (2) reducing various types of inflammation, (3) rebuilding health cells, and (4) fighting tumorigenesis and cancer replication.

Conclusion

Cancer is a progressively debilitating illness. Not only does cancer impose a high financial burden on patients, but the standard chemotherapy treatment may fail due to multidrug resistance. Therefore, the best approach is prevention, and this includes adopting healthy dietary

patterns and choices. In particular, appropriately constructed plant-based diets containing nutritionally adequate nutrients and calories can reduce cancer risk. The anti-cancer or cancer-protective benefits of such diets are attributed to their high antioxidant, fiber, and phytochemical levels. Therefore, American society would benefit greatly from curbing their craving for or addiction to highly processed foods. But such a change should be a gradual process of increasing the fruit and vegetable content in food servings until the recommended daily quota is attained.

Works Cited

- American Institute for Cancer Research (AICR). "Vegan diet: Highest in fiber and lowest in saturated fat." 13 Apr. 2021, www.aicr.org/cancer-prevention/food-facts/vegan-diet/.
- Burke, Nancy, et al. "Plant-based diets: Why all the hype?" *Rogel Cancer Center | University of Michigan Health*, 29 June 2018, www.rogelcancercenter.org/living-with-cancer/mind-body-side-effects/nutrition/plant-based-diets-why-all-hype.
- Centers for Disease Control and Prevention (CDC). "Cancer." 16 Dec. 2020, www.cdc.gov/chronicdisease/resources/publications/factsheets/cancer.htm.
- Collins, Karen. "Difference between antioxidants and phytochemicals?" *American Institute for Cancer Research (AICR)*, 16 Nov. 2015, www.aicr.org/resources/blog/healthtalk-whats-the-difference-between-an-antioxidant-and-a-phytochemical/.
- Donaldson, Michael S. "Nutrition and cancer: A review of the evidence for an anti-cancer diet." *Nutrition Journal*, vol. 3, no. 1, 2004, p. 19, doi: 10.1186/1475-2891-3-19.
- Fiolet, Thibault, et al. "Consumption of ultra-processed foods and cancer risk: Results from nutrinet-santé prospective cohort." *BMJ*, vol. 360, 2018, p. k322, doi: 10.1136/bmj.k322.
- Key, Timothy J., et al. "Diet, Nutrition, and Cancer Risk: What Do We Know and What Is the Way Forward?" *BMJ*, vol. 368, 2020, p. m996, doi: 10.1136/bmj.m996.
- Król, Magdalena, et al. "Why chemotherapy can fail?" *Polish Journal of Veterinary Sciences*, vol. 13, no. 2, 2010, pp. 399-406, doi: 10.2478/v10181-011-0133-5.

Ksouri, Rihab. "Food components and diet habits: Chief factors of cancer development."

Food Quality and Safety, vol. 3, no. 4, 2019, pp. 227-231, doi:

10.1093/fqsafe/fyz021.

Lanou, Amy J., and Barbara Svenson. "Reduced cancer risk in vegetarians: An analysis of recent reports." *Cancer Management and Research*, vol. 3, 2011, pp. 1-8, doi:

10.2147/cmar.s6910.

Liu, Junxiu, et al. "Trends in diet quality among youth in the United States, 1999-2016."

JAMA, vol. 323, no. 12, 2020, p. 1161, doi:10.1001/jama.2020.0878.

Molina-Montes, Esther, et al. "The impact of plant-based dietary patterns on cancer-related outcomes: A rapid review and meta-analysis." *Nutrients*, vol. 12, no. 7, 2020, p.

2010, doi: 10.3390/nu12072010.

Mozaffarian, Dariush. "A nutrition report card for Americans: Dark clouds, silver linings."

The Conversation, 12 Apr. 2021, <https://theconversation.com/a-nutrition-report-card-for-americans-dark-clouds-silver-linings-156200>.

National Cancer Institute (NCI). "Risk factors: Diet." 29 Apr. 2015, www.cancer.gov/about-cancer/causes-prevention/risk/diet.

Rehm, Colin D., et al. "Dietary intake among US adults, 1999-2012." *JAMA*, vol. 315, no.

23, 2016, p. 2542, doi:10.1001/jama.2016.7491.