Nutrition and Cancer Prevention

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Abstract

This study examines demographics and variations of opinions of cancer patents in terms of whether or not they believe healthy nutrition can prevent cancer or cancer reoccurrence. Sex had the greatest influence on whether or not the respondents took vitamin and/or mineral supplements weekly. The results showed that women took a higher number of supplements a week compared to men. Other opinions studied included whether or not the respondents thought that genetic history played a part in their particular cancer and whether they believed in alternative treatments (healing themselves without medication, chemotherapy, or radiation). The majority did not agree that their genetic history played a part in their particular cancer. Nearly every one of the cancer patients surveyed would try alternative treatments if they were asked to.

Introduction

Millions of people each year die from various forms of cancer. There have been many debates over the years about possible cancer prevention methods and whether or not they are substantial enough to be tested. First, evidence suggests that some cancers can be prevented by healthy nutrition, meaning lots of fruits and vegetables. This, by far, is the most disputed topic since some who have cancer claim that they generally ate healthy before they were diagnosed. However, studies have shown that the benefits of eating healthy far outweigh the negatives (Forman, Hursting, Umar, & Barrett, 2004). Second, the use of vitamin and/or mineral supplementation has a similar beneficial effect on the immune system, particularly with tumor reoccurrence. Studies have also suggested that vitamin and mineral supplementation may also be a possible cancer preventative method in conjunction with a healthy diet (Forman *et al*, 2004; Greenwald, 2004). Studies are also being done on how nutrition interacts with specific genes and if this can somehow prevent cancer in the future. There is no doubt that there are mutated genes located on DNA strands in some individuals who are predisposed to cancer. Interestingly, there is a low rate of these mutations actually being activated and forming cancer cells. There is also speculation about nutrition affecting our genes and causing the manipulation of DNA (Go, Wong, Wang, Butrum, Norman, & Wilkerson, 2004; Mathers, 2003).

Review of Literature

Dietary Choices

Evidence has suggested that eating fruits and vegetables have lowered the risk for cancers of the mouth and pharynx, esophagus, stomach, and colorectal area. They may also reduce the risk of bladder, ovarian, and breast cancers (Go, Wong, Wang, Butrum, Norman, & Wilkerson, 2004). Breast cancer, especially, has been found to be directly linked to nutrition as well as genetic predisposition (Go *et al*, 2004; Greenwald, 2004; Novak & Chapman, 2001). Cruciferous vegetables (broccoli, cauliflower, cabbage, and kale), which contain sulfur components, are said to reduce estrogen levels. This prevents DNA damage and genetic mutations that cause cancer. Other food components, such a soy isoflavones, the bioactive components in grapefruit, and green tea also are shown to inhibit estradiol (Greenwald, 2004). In addition to cancer prevention, nutrition is also very important to people who currently have cancer or have had it in the past. Since cancer patients usually have had to undergo chemotherapy or radiation, malnutrition is very common (Isenring, Bauer, & Capra, 2004). Many cancer patients suffer from appetite loss, nausea, and nutrient deficiency (Hartmuller & Desmond, 2004; Isenring *et al*, 2004). It is important for cancer patients to maintain healthy diet for their strength and possibly to overcome their disease (Hartmuller & Desmond, 2004). Recommended foods include organic fruits and vegetables (raw, steamed, or juiced), whole grains, and green tea. Foods that should be avoided are processed foods, animal fats, milk and most dairy, alcohol, excess amounts of sugar, and caffeine (Novak & Chapman, 2001).

Vitamin/Mineral Supplements

Many cancers are preventable and many have had encouraging results when treated with certain vitamins and minerals. The study of retinoids has been a hot topic for years. The first

component studied was β-carotene in 1981 which was given to lung cancer patients. There were four different trials and all of them either led to an adverse effect or had no effect on the lung cancer. Even though there were inconsistencies found in the experiment, β-carotene is an antioxidant thus, making it able to either increase or decrease tumor progression only in lung cancer. In contrast, it can help decrease growth of skin cancers (Forman, Hursting, Umar, & Barrett, 2004). Vitamin A, from which β-carotene comes, was also studied. However, since Vitamin A is fat soluble, it cannot be eliminated from the body, therefore, it can be toxic (Forman *et al*, 2004; Greenwald, 2004). Another carotenoid, lycopene, was studied in ferrets that were also exposed to lung cancer. Lycopene was found to reduce and inhibit the growth of lung tumors thus making it a possible cancer preventative supplement (Forman *et al*, 2004; Greenwald, 2004). Lycopene was also shown to reduce the rate of tumor growth in prostate cancer. Vitamin E and selenium were also shown to have encouraging results. In studies for prostate cancer, Vitamin E was shown to act as an antioxidant, strengthen the immune system, and lower prostate cancer mortality rate by 41%. Selenium, which can also act as an antioxidant and is used in the production of testosterone, reduced the risk of prostate cancer occurrence by 63% (Greenwald, 2004). Calcium, combined with a healthy diet of fruits and vegetables, also demonstrated a reduction in tumor growth in mice and humans with colon cancer (Forman *et al*, 2004).

Nutrition and Gene-Interactions

Tumor growth begins with DNA damage resulting from genetic mutations usually caused by carcinogenic agents (Forman *et al*, 2004). It is becoming more apparent that there is a direct relationship between genotype and diet that increases the risk of cancer. Cancer is a genetic disease and not much is known about what happens at the molecular level to set off replication

of the cells. Recent developments in molecular and cell biology have identified many of the genes and proteins that cause the mutations (Mathers, 2003). Genetic testing has also become a helpful way to examine those who may be at risk for certain cancers (Go *et al*, 2004). New technologies are being developed to manually silence the genes during DNA imprinting of an embryo. Imprinting, also called gene silencing, is similar to what happens during ageing and cancer development. This presents an even greater need for research on how nutrition could prevent tumor progression. During gene silencing, DNA from the egg and the sperm are "methylated" and these methyl groups actually come from nutrients such as folate (Mathers, 2003). There has been evidence that the use of folate and other nutrients that are important to our health can be used to manipulate DNA (Go *et al*, 2004; Mathers, 2003). However, the majority of cancer occurrences are sporadic, meaning they are caused by damage to DNA and not the genes themselves. Greater control studies on certain diets for certain genotypes need to be administered before we have definitive answers (Mathers, 2003). The same goes for risk profiles and recommendations on how to reduce those risks (Go *et al*, 2004).

A Framework

The Human Ecological Theory is a useful framework for the study of nutrition and cancer. This theory looks at the systems that individuals operate within, such as the microsystems or close daily environments, the mesosystem or interaction of the various microsystems, and the macrosystem or societal wide influences. Cancer can be caused by choices people make in their daily lives such as what to eat. These choices are influenced by those in the individual's microsystem. Parents modeling affects food choices in the home and the choices available at school cafeterias as well as peer influences affect food choices at school. Even if parents urge good food choices peers may have more pull when making those choices

outside of the home, thus a mesosystem interaction. The mass media (macrosystem) by way of television commercials, ads, and billboards influence choices as well. These choices may lead to increased incidences of cancer.

Summary

In conclusion, studies and trials are being performed on the combination of nutrition, vitamin and mineral supplementation, and gene-interactions. Although there is not yet a cure for cancer, these studies can help us better understand possible preventative measures.

Methods

Elizabeth Eaton's Study on Cancer Prevention

This study will investigate the opinions of cancer patients on the causes of cancer and cancer prevention methods.

Operationalization of Variables

The variables in this study that will be looked at are the amount of vitamin and mineral supplements taken weekly, the participants' opinions on genetic history as a possible cause of cancer, and their opinions on a healthy diet being a cancer prevention method. Age, gender, and ethnicity are demographic questions. I think it is important to ask the participant's ethnicity because some ethnicities have higher incidences of certain cancers than others. The participants will also be asked to explain how they feel about alternative treatments (healthy eating, vitamin and mineral supplementation, or other health remedies) being a possible cancer prevention method. One quantitative question will ask how many vitamin and/or mineral supplements they take weekly. I will also ask how likely they feel their genetic history played a role in their cancer and whether or not they agree that a healthy diet can prevent cancer.

Sample Selection

A convenience sample will be used. I will administer this survey to cancer support message boards online and/or relatives and friends who have cancer and ask if the cancer patients will be willing to participate in the study.

Analyses

Qualitative and quantitative analysis will be used.

Elizabeth Eaton's Study of Opinions on Cancer Prevention

This is an anonymous and confidential survey designed to examine opinions on the causes of cancer and cancer prevention.

Please mark or fill in the appropriate response

1. Age_____

2. Sex
( ) male ( ) female

3. Ethnic Background
( ) African-American ( ) Latino/Hispanic ( ) Caucasian ( ) Asian or Pacific Islander
( ) Indian ( ) Jewish ( ) Other: specify_____

4. How many times a week do you take vitamin and/or mineral supplements? _____

5. How likely do you feel your genetic history caused the development of your particular cancer?

( ) Very Likely
( ) Likely
( ) Somewhat Likely
( ) Not Likely

6. How much do you agree with the theory that a healthy diet may prevent cancer or cancer reoccurrence?

( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

7. In as much detail as possible, what are your feelings on the concept that alternative treatments (healthy eating, vitamin/mineral supplements, other health remedies, etc) can play a role in cancer prevention?

_____
_____
_____
_____
_____

Thank you for your time in completing this survey.

Results

Univariate Demographic Analyses

This sample had slightly more females (56.2%) than males (43.8%) (see Table 1). All of the respondents were former or current cancer patients with a mean age of 52.75 years. Most of the respondents were Caucasian (68.8%), with the rest being Latino/Hispanic (12.5%), Jewish (12.5%), or Asian (6.2%).

Table 1. Univariate Analysis of Demographic Variables, N=16.

	N	%
Sex		
Male	7	43.8
Female	9	56.2
Age (mean in years)		52.75
Ethnicity		
Latino/Hispanic	2	12.5
Caucasian	11	68.8
Asian	1	6.2
Jewish	2	12.5

Univariate Research Analyses

This study looked at the number of vitamin and mineral supplements the respondents take per week. The mean number of supplements taken was 3.5 (see Table 2). The respondents generally disagree that their genetic history caused the development of their cancer, with a mean score of 2.2 on a four-point scale, with 1=not likely and 4=very likely. However, the

respondents generally agree with the theory that a healthy diet may prevent cancer or cancer reoccurrence. The mean score was 2.8 with 1=strongly disagree and 4=strongly agree.

Table 2. Univariate Analysis of Research Variables, N=16.

	Mean
Number of Vitamin or Mineral Supplements Taken Weekly	3.5
Agree That Nutrition Can Prevent Cancer or Cancer Reoccurrence	2.8
Likely That Genetic History Caused Particular Cancer	2.2

Alternative Table 2 if your RV3 is nominal.

Table 2. Univariate Analysis of Research Variables, N=16.

	N	%
Mean Number of Vitamin or Mineral Supplements Taken Weekly		3.5
Mean Agreement That Nutrition Can Prevent Cancer or Cancer Reoccurrence		2.2
Do You Think That Genetic History Can Cause Particular Cancers		
Yes	11	68.8
No	5	31.2

Bivariate Analyses

A crosstabulation of sex and agreement that nutrition can prevent cancer showed that 78% of females and 57% of males agreed that nutrition does play a role in cancer prevention.

A Chi square calculation of ethnicity by sex was completed with a result of 2.89. The critical value was 7.815 at three degrees of freedom (df), therefore the results were not significant. This concludes that the distribution of ethnicity and sex was found by chance and there is no relationship between them.

A t-test calculation of the number of vitamin/mineral supplements taken weekly by sex was completed. The t-value obtained was -2.366, which, at fourteen degrees of freedom (df) with an alpha level of <.05, was above the critical value of 2.145, and consequently was significant. Therefore, female cancer patients take significantly more vitamin and/or mineral supplements a week than male cancer patients.

A correlation of the number of vitamin/mineral supplements taken weekly by age was completed. The result was 0.139, which, at fourteen degrees of freedom (df) and a critical value of 0.497, signifies that there was no significance. Therefore, there is no relationship between the number of vitamin/mineral supplements taken weekly and age.

Another correlation was completed using the number of vitamin and mineral supplements taken weekly by whether or not the respondents agree that nutrition can prevent cancer or cancer reoccurrence. The result was 0.423 which, at fourteen degrees of freedom (df), did not meet the critical value of 0.497. As can be seen in figure 1, there is no relationship between the respondent's opinions on nutrition preventing cancer and the number of vitamins and minerals they take in a week.

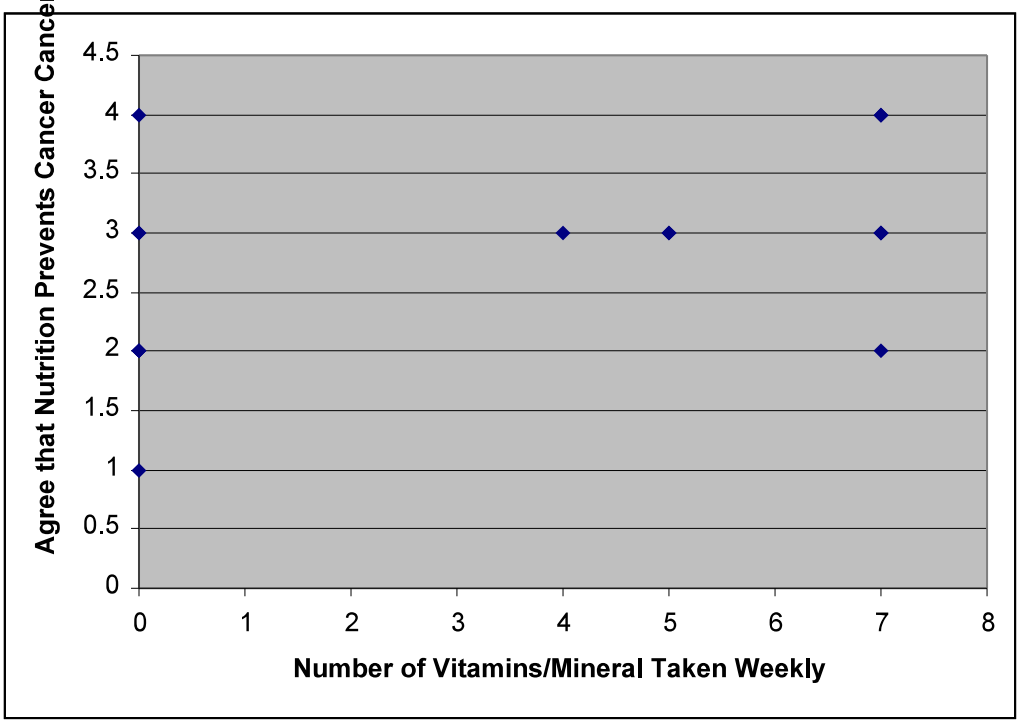

Figure 1. Correlation of Vitamins and Minerals Taken Weekly by Agreeing that Nutrition Prevents Cancer, N=16.

Qualitative Analysis

The respondents were asked a qualitative question about whether or not they believed alternative treatments (healthy eating, vitamin and mineral supplements, other health remedies, etc.) can play a role in cancer prevention. The respondent's opinions were mixed. Most surveyed simply did not know but did think we should try everything we could to find a possible cure. Some have even tried to volunteer themselves in studies pertaining to this. A few definitely thought that alternative treatments were the answer to finding a cure. Only one person thought that alternative treatments did not work and we are wasting our time trying.

Conclusions

My research did not support my theory that people think healthy nutrition (eating right and taking vitamin and mineral supplements) can prevent cancer or cancer reoccurrence. Overall, the respondents generally agreed that nutrition may help prevent cancer but many of them have known someone or had practiced healthy diets themselves and still were diagnosed. This suggests that good nutrition alone cannot prevent cancer and that there must be other factors affecting our population.

The results from the crosstabulation indicate that women are more likely to believe that nutrition can prevent cancer as compared to males. I believe this is because women, since they contain more body fat and tend to gain weight at a faster rate than men, are more apt to believe theories on nutrition. Most of the women I have come across in my lifetime seem to be more in tune with how and what we should eat and the benefits and consequences of it. Women also, in my experience, seem to be quicker to try fad diets. So, it makes sense to me that more women would agree more than men. However, the majority of men surveyed agreed as well. I believe this is because, for the past several years, healthy eating and exercise possibly preventing illness and allowing people to live longer has been a hot topic. I trust that this will continue as well.

My t-test calculation on how many vitamin and mineral supplements cancer patients take weekly by sex showed that women cancer patients take more supplements than male cancer patients. This also correlates with my crosstabulation that women are more willing to agree that good nutrition can prevent cancer. Therefore, it is not surprising that women would take more vitamin and mineral supplements than men. It appears that men, while they generally agree that good nutrition can prevent cancer, they are more reluctant to actively participate in taking vitamins and minerals that could improve their nutritional status. Only 29% of men surveyed

took any kind of supplements at all. This could be because men might not make the direct connection between supplements and eating healthy.

I did two correlation tests. The first was of vitamin and mineral supplements taken weekly by age which resulted in no significance. The fact that there was no correlation could possibly be because most of the respondents were around the same age. In future studies, I may want to administer this survey to younger and older cancer patients so that I can get more accurate research on the topic. The second correlation was of vitamin and mineral supplements taken weekly and whether or not the respondents agree that good nutrition can prevent cancer. The result was not significant; however, I believe that if I had surveyed more people on this subject, the result would have been significant. For this research study, I will have to accept that there is no direct correlation.

The respondents seemed to go back and forth on whether or not alternative treatments were a possible answer to the prevention of cancer. Most did not know whether alternative treatments could help but would be willing to try anything for the sake of finding out. None surveyed had ever tried any. This indicates that more research studies have to be conducted before we can make an actual assumption.

Based on my research, I conclude that there is simply not enough information to draw an absolute conclusion on whether or not being healthy can prevent cancer. It could be that in some people, it does help. For others, it might be genetic history and no amount of healthy eating and/or supplementation can change that. My basic conclusion is that every person's body is different and, since we do not know the specifics on what causes cancer or prevents it, we are all at risk. In future studies, I would want to consider administering separate studies using these variables. Such as the effect ethnicity has on a certain type of cancer(s) or whether certain types

of cancer(s) are more prevalent in males or females.

References

Forman, M.R., Hursting, S.D., Umar, A., & Barrett, J.C. (2004). Nutrition and cancer prevention: A multidisciplinary perspective on human trials. *Annual Review of Nutrition, 24,* 223-254.

Go, V.L.W., Wong, D.A., Wang, Y., Butrum, R.R., Norman, H.A., & Wilkerson, L. (2004). Diet and cancer prevention: Evidence-based medicine to genomic medicine. *The Journal of Nutrition, 134*(12), 3513S-3516S.

Greenwald, P. (2004). Clinical trials in cancer prevention: Current results and perspectives for the future. *The Journal of Nutrition, 134*(12), 3507S-3512S.

Hartmuller, V.W., & Desmond, S.M. (2004). Professional and patient perspectives on nutritional needs of patients with cancer. *Oncology Nursing Forum, 31*(5), 989-996.

Isenring, E., Bauer, J., & Capra, S. (2004). The effect of intensive dietetic intervention on the nutritional status of hospitalized patients on chemotherapy. *Nutrition and Dietetics, 61*(1), 46-49.

Mathers, J.C. (2003). Nutrition and cancer prevention: Diet-gene interactions. *Proceedings of the Nutrition Society, 62*(3), 605-610.

Novak, K.L., & Chapman, G.E. (2001). Oncologists' and naturopaths' nutrition beliefs and practices. *Cancer practice: A Multidisciplinary Journal of Cancer Care, 9*(3), 141-146.