Vitamin E and Various Effects on Prostate Cancer

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Abstract

According to the American Cancer Society, one in every eight men will be diagnosed with prostate cancer in their lifetime, and one in every 41 men will die of the disease in the future. Such alarming rates of prostate cancer diagnosis and death raise concern and call for solutions to lower cases of the disease. In many ways, diet, supplements, and vitamins have all been correlated to improving health metrics and preventing diseases, including prostate cancer. Vitamin E acts as an antioxidant, thus theoretically helping reduce the contraction of diseases, including cancer. However, studies conducted throughout the past half a century have produced a wide range of results with respect to vitamins and supplements, specifically that of supplemental Vitamin E and the formation of prostate cancer. Three separate studies examined the use of Vitamin E and its effects on the formation of prostate cancer. The study conducted by Klein et al.1 examined if vitamin E is more effective in lowering the number of prostate cancer cases in men above the age of 50 when compared to selenium, vitamin E and selenium, and a placebo. Similarly, the study by Kirsh et al.2 looked at whether doses greater than 30 IU/day of supplemental vitamin E, B-carotene, and vitamin C are more effective than taking less than 30 IU/day in lowering the number of prostate cancer cases in 29,361 adult male smokers and nonsmokers. Finally, the study completed by Chan et al.3 examined if vitamin E is more effective in lowering prostate cancer cases in nonsmoking, healthy U.S. male health professionals than the vitamin is in lowering prostate cancer cases in smoking individuals and those who quit more than 10 years ago. Despite variations in the study populations, the methods of each study, and a range of other metrics, each study primarily focuses on vitamin E and its correlation to the formation of prostate cancer. The differences and varying methods are addressed in detail in the proceeding paper. Based on the unique methods, results, and conclusions from these three studies, it is difficult to conclude the effects of Vitamin E on the number of prostate cancer cases as it has been shown to increase the risk of prostate cancer, have no association with it at all, and also decrease the risk of prostate cancer.

Introduction

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Vitamin E & an Increase in the Risk of Prostate Cancer

Vitamin E, consumed either as supplements or through general foods, acts as an antioxidant and works to decrease the risk for diseases that include cancer. However, healthy men with an average risk of prostate cancer who took a common dose and formulation of vitamin E (400 IU/d) had a significantly increased risk of prostate cancer (Klein et al.). Klein et al. highlight how seemingly innocuous yet biologically active substances such as vitamins cause harm within the body and thus lead to an increase in prostate cancer cases. The study focuses primarily on individuals above the age of 55 and ultimately totaled 35,533 men who were randomly assigned to one of four groups and then tracked for a total of seven to twelve years.

Throughout the study, the rate of prostate cancer detection was greater in each treatment group when compared with the placebo. However, the results were only statistically significant in the vitamin E alone group (Klein et al.). Ultimately, a difference began to appear approximately three years after randomization, with the risk of prostate cancer at 7 years of median follow-up increasing by 17% in men randomized to supplementation with Vitamin E alone (*Figure 1*).

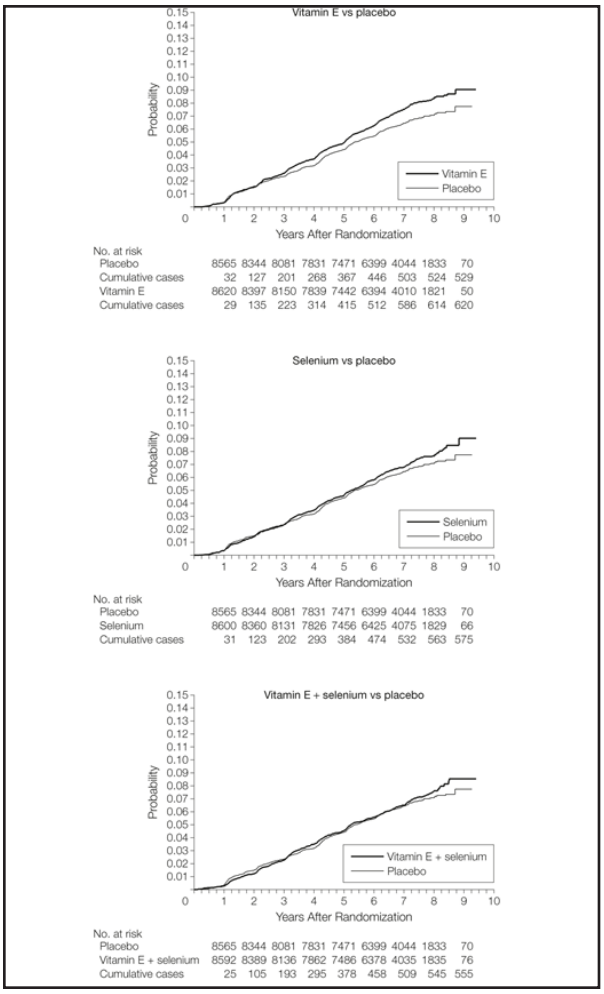

Figure 1. This graph shows the three separate treatment groups and the association between the probability of being diagnosed with prostate cancer and the number of years following the beginning of the study. The Vitamin E vs. Placebo graph illustrates a statistically significant difference in Vitamin E supplementation and the risk of prostate cancer that supports the Klein et al. study.

Across the course of the study, the total number of prostate cancer cases diagnosed in the placebo, vitamin E alone, selenium alone, and vitamin E and selenium groups were 529, 620, 575, and 555 respectively (*Figure 2*).

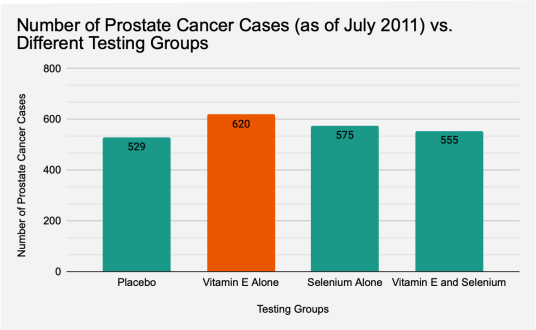

Figure 2. This graph demonstrates the number of prostate cancer cases across different testing groups. The orange highlights a statistically significant difference between the group which took Vitamin E supplements alone as compared to other groups.

The p-values associated with the aforementioned data highlight a statistically significant distinction between the group receiving Vitamin E by itself and the other groups (*Table 1*).

Table 1. Risk of Prostate Cancer P Values for Testing Groups

Testing Group	P value
Placebo	N/A
Vitamin E Alone	0.008*
Selenium Alone	0.18
Vitamin E and Selenium	0.46

* = significant value

The present study utilized an interventional methodology by dividing participants into four groups and regulating the use of supplemental vitamin E and selenium. This varies from the other two studies in the thesis and thus may contribute to the varying results and conclusions. Ultimately, Klein et al. argue for an association between Vitamin E and an increase in the number of prostate cancer cases, yet the results conflict with the preceding studies and thus make it difficult to come to a comfortable conclusion.

Vitamin E & No Association with the Risk of Prostate Cancer

Vitamin E has also been concluded to have no association with prostate cancer risk in healthy, nonsmoking adult men (Chan et al.). This study utilized an observational approach that involved participants filling out a food questionnaire. The population consisted of middle-aged male medical professionals. This population and the methods used in the study are very similar to that of the study by Kirsh et al. Therefore, similarities between the results and conclusions of each study make sense. The study ultimately determined that for nonsmoking individuals, vitamin E had no significant association with the development of prostate cancer, yet this was only consistent with individuals who had no previous history of smoking (*Table 2*). Smoking individuals or those who recently quit actually saw a decrease in metastatic prostate cancer risk when taking vitamin E supplementation (*Table 2*).

Table 2. Prostate Cancer Cases compared across multiple populations

	Nonsmokers	Smokers	Quit Smoking (>10 years ago)
Total Prostate Cancer Cases	819 (RR: 1.000)	369 (RR: 1.156)819 (RR: 1.000)	708 (RR: 1.026)
Extraprostatic Prostate Cancer Cases	213 (RR: 1.227)	110 (RR: 0.826)	193 (RR: 1.353*)
Metastatic/Fatal Prostate Cancer Cases	97 (RR: 1.207)	55 (RR: 0.576*)	78 (RR: 1.75*)

* = significant value

However, this variation in results could be based on the lifestyle choices of the populations and thus affect the validity of vitamin E correlating to prostate cancer incidence. Although Chan et al. concluded that Vitamin E has no association with the development of prostate cancer in nonsmoking men, the variety of results from different population groups calls for more research on the topic.

Vitamin E & a Decreased Risk of Prostate Cancer

The study by Kirsh et al. determined that although there was no association between Vitamin E and prostate cancer incidence for nonsmokers, there was a decrease in the risk of advanced prostate cancer among current and recent smokers. Kirsh et al. analyzed the use of three different dietary supplements: vitamin E, B-carotene, and vitamin C. Both Kirsh et al. and Chan et al. utilized observational methodology, issued a food questionnaire, and had similar populations. Thus, similarities in results are expected. This study is consistent with the study conducted by Chan et al. in determining no correlation between Vitamin E and prostate cancer for nonsmokers. Additionally, recent and current smokers saw similar results. The study ultimately determined that among current and

recent smokers, high-dose (>400 IU/day) and long-duration (>10 years) vitamin E supplementation was related to decreased risk of advanced prostate cancer and increased risk for non-advanced disease (*Table 3*).

Table 3. Relative Risks of Total, Advanced, and Non-Advanced Cases of Prostate Cancer by Different Supplemental Vitamin E Intakes and Smoking History

Case Type	0	>0-30	>30-400	>400	P Trend
All Cases	1.00 1.00 1.00	1.09 1.13 0.90	0.92 0.97 0.93	1.05 0.78 0.93	.99 .98 .61
Advanced Cases	1.00 1.00 1.00	1.34 0.67 0.63	1.16 0.72 1.03	1.29 0.29* 0.95	.44 .01* .96
Non-Advanced Cases	1.00 1.00 1.00	0.96 1.67 1.05	0.92 1.46 0.89	1.09 1.47* 0.90	.70 .03* .42

Never Smokers

Current Smokers/Quit within past 10 years

Quit >10 years ago

* = significant value

Smoking greatly influences the results, and variations in lifestyles can greatly influence prostate cancer incidence. Thus, the association between vitamin E and the development of prostate cancer is unclear and requires further research.

Comparison of Methods

In both our Kirsh et al.[2] and Chan et al.[3] studies, the methods involved in gathering data were merely observational, as both participants were required to fill out a food frequency questionnaire, from which information on vitamin E intake was synthesized. However, the Klein et al.[1] study, which concluded that vitamin E supplementation significantly increases the risk of prostate cancer, involved an interventional study with four groups using different substances of a daily supplement. These studies were similar in that the sample consisted of at least approximately 30,000 participants or greater. Additionally, a majority of participants in each sample had come from the United States. The Klein et al.[1] and Kirsh et al.[2] studies differ from the Chan et al.[3] study as these two studies compared vitamin E against the effects of another vitamin. In our first study, vitamin E was compared to selenium and a vitamin E and selenium combination, and in our second study, vitamin E was compared to B-carotene and vitamin C. Given the important differences in the methods of these studies, it is likely that the different findings had to do with the methods conducted.

Conclusion

Given the key differences in results of each study (increase in risk, no association, and decrease in risk), from vitamin E increasing the risk of prostate cancer by 17%,[1] to it actually being helpful in decreasing the risk of prostate cancer for nonsmokers (Kirsh et al., 2006), it is difficult to conclude the effects that vitamin E has on prostate cancer. These studies' results make it difficult to conclude vitamin E's true effects, and therefore, we believe that more research is required. In the future, it would be important to limit confounding variables such as a family history of cancer, age, race, and obesity, as these all can have an important impact on one's risk of prostate cancer. An examination of one's intake of calcium would also be very important to isolate as a variable in this experiment, as it has been said this can often lead to more aggressive forms of prostate cancer. All in all, this topic is one that requires significantly more research before we can reach any sort of decisive conclusion about the effects of vitamin E supplementation on the risk of prostate cancer.

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