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# Does A Diet That Consists of High Fiber Prevent the Recurrence of Colorectal Adenomas in Patients Who Have Previously Had At Least One Adenoma Detected Via Colonoscopy?

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**Does a diet that consists of high fiber prevent the recurrence of colorectal adenomas in patients who have previously had a least one adenoma detected via colonoscopy?**

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## ABSTRACT

**OBJECTIVE:** To determine whether ingesting a diet high in fiber will decrease the incidence of colorectal adenoma recurrence in a person who has previously had colorectal adenomas.

**STUDY DESIGN:** Review of three English language primary studies published in 2002, 2007, 2009.

**DATA SOURCES:** Randomized, double-blinded, controlled trials comparing high fiber diets to low fiber diets were found using OVID and PubMed.

**OUTCOME MEASURED:** The prevalence of colorectal adenoma recurrences was totaled throughout each study. Each trial had a colonoscopy at the end of its study; two of the three had a “clearing” colonoscopy prior to the trials commencement to determine each individual’s baseline. In each study, each participant was also asked to divulge any medical records and pathology reports pertaining to any surgical resections or colonoscopies done during the study time-frame, which had been completed by practitioners outside of the study, in order to account for those results.

**RESULTS:** Two of the three randomized controlled trials showed that high fiber diets did not yield a statistically significant reduction in the recurrence of colorectal adenomas. However, a very compliant subset of the third trial showed that a high fiber diet can significantly reduce the risk of colorectal adenoma recurrence. High fiber diets showed no harmful effects during the study.

**CONCLUSIONS:** Two of the three trials demonstrated that high fiber diets do not reduce the recurrence of colorectal adenomas. However, the third trial demonstrated that a very compliant, high fiber diet consuming, sub-population of their study showed a significant reduction in colorectal adenoma recurrence. These ‘super-compliers’ were not only compliant to the chief study intervention; a high-fiber diet, but they were also compliant with two other dietary goals and guidelines that the study suggested. Therefore, another study may help to define whether it was indeed the high fiber diet alone or in combination with the other dietary goals which actually produced the reduction in colorectal adenoma recurrence. Also this study could determine whether it was the other dietary goals, and not the fiber, which actually caused the colorectal adenoma reduction.

**KEY WORDS:** Adenoma, Colorectal Neoplasm, High fiber, Diet, Fiber, Colorectal adenoma

## INTRODUCTION

Colorectal adenomas are benign, pre-malignant, or malignant cancer lesions that grow in the distal aspect of the large intestines, also called the colon. These growths are common, with 50% of people in westernized countries having at least one adenoma by the age of 70. Unfortunately, 10% of adenomas will become malignant. These malignancies have a drastic effect on each patient's morbidity and mortality since colorectal cancer is the second leading cause of cancer death worldwide.<sup>1</sup>

It has already been suggested that smoking, obesity, and alcohol use are modifiable risk factors for the development of colon cancer. Medical practitioners also commonly believe that eating a high fiber diet can reduce the risk of colon cancer. This belief comes from the fact that most African populations eat a diet high in fiber and their incidence of bowel diseases including colon cancer is very low.<sup>2</sup> While many practitioners believe in this correlation, it has yet to be proven in randomized controlled trials. Therefore, the aim of the studies used in this EBM review, and the EBM review itself, is to determine convincingly whether high fiber diets do in fact reduce the risk of colorectal adenomas. Researchers used colorectal adenomas as an indicator of future colorectal cancer risk because colorectal adenomas are believed to be the precursor to most colorectal cancer lesions.<sup>3</sup>

The importance of determining the validity of this correlation is two-fold in its motivation: financial and to promote medical beneficence. It was estimated in 2008 that total U.S. Healthcare expenditures due to cancer was \$93.2 billion dollars,<sup>4</sup> with colon cancer being the second most common diagnosed, and fatal cause of cancer.<sup>5</sup> Therefore, if a high fiber diet could be proven as a lifestyle modification that reduces the risk of colorectal adenomas and

colon cancer it would give practitioners another way to prevent cancer deaths and save healthcare spending.

It is estimated that 50% of colon cancer deaths are preventable given the current detection and screening techniques.<sup>6</sup> These measures include flexible sigmoidoscopies every 5 years starting at age 50, in both men and women, and colonoscopies every 10 years. Also, annual fecal occult blood tests and digital rectal exams starting at age 40, for both men and women, are part of the current screening protocols.<sup>7</sup>

The signs of colon cancer include hematochezia and bowel consistency changes. Also, constitutional symptoms such as weight loss, fever, and fatigue are always suspicious for an underlying malignancy. It is thought that right sided lesions are more likely to cause melena or be asymptomatic while left sided lesions are more likely to cause hematochezia.<sup>6</sup>

While colon cancer is a treatable type of cancer via colorectal resection with or without radiation and chemotherapy<sup>8</sup>, a move in US healthcare policy towards preventive care and fiscal responsibility leads medicine to search for modifiable risk factors and screening tools used to both detect and treat cancers earlier, thus preventing their development. These more fiscal treatment methods in respect to colon cancer and adenomas include preventative adenoma biopsy by way of a colonoscopy or sigmoidoscopy, which can be curative if lesions are found to be pre-malignant or locally invasive malignancies. In order to achieve better patient outcomes and more fiscally responsible medicine within colorectal cancer it is imperative to learn the validity of a high fiber diet as it relates to colorectal cancer recurrences. This modifiable risk factor could give health care providers one more tool with which to educate their patients. Providing this education would ideally lead to the prevention of the initial development of many colorectal cancers and adenomas.

**OBJECTIVE**

The objective of this systematic review is to determine whether, “A diet that consists of high fiber prevents the recurrence of colorectal adenomas in patients who have previously had a least one adenoma detected via colonoscopy.” No randomized controlled trials have definitely demonstrated a correlation between high fiber diets and a reduced risk of colorectal adenomas. However, many practitioners believe this correlation to be true; therefore, it is important to determine the validity of the believed correlation between high fiber diets and colorectal adenomas.

**METHODS**

A detailed search was completed by the author of this study. The author searched databases OVID and PubMed. Three randomized, double-blind, controlled trials, written in English, published from 2002-2009 were found comparing high fiber and low fiber diets and the recurrence of colorectal adenomas. The population used in the review included people with a history of colorectal adenomas without invasive cancer that were ages 35-80 years old. The demographics and inclusion/exclusion criteria each study is detailed in Table 1. The key words used to find these articles included, “adenoma”, “colorectal neoplasm”, “high fiber”, “diet”, “fiber”, and “colorectal adenoma.” The studies reported the prevalence of colorectal adenoma recurrences and used P-values of  $< 0.05$  and 95% confidence intervals to determine whether the prevalence of colorectal adenoma recurrences were significant based on the high fiber diets as compared to those that ate lower dietary fiber quantities. The inclusion criteria in selecting the articles for this review were articles that were RCT’s published in 2002 or later and had a study outcome that was a POEM (Patient Oriented Evidence that Matter). Also each RCT could not have been used in another review in the Cochrane database. The topic used for this review could

not have had a recent review published in the Cochrane database with more recent articles than the RCT's used in the author's study. Each of the three articles selected were published.

**Table 1- Demographics of Studies Used in Analysis of High fiber Diets on Colorectal Adenomas**

Study	Type	# Patients	Age years	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Jacobs, 2002 (1) USA	RTC	1304	40-80	Patients that were 40 or older with at least one colonoscopy in the previous 3 months positive of colorectal adenoma who completed 75% of the study.	People that were generally unhealthy, diagnosed with invasive cancer, history of colon resection, had a genetic predisposition, and ate > 30 g of fiber/day.	204	1 group of patients was given 13.5 g of fiber in addition to their daily diet. Group 2 was given only 2.0 grams of fiber in addition to their diet every day.
Lanza, 2007 (2)	RTC	1,192	35-89	Patients that were 35 or older with at least one colonoscopy in the previous 6 months positive for colorectal adenoma.	People that had a history of invasive colon cancer, bowel resection, genetic predisposition, IBD, and could not meet the requirements of the study.	391	1 group was given 18 grams of dietary fiber everyday in addition to their normal diet and went through diet counseling. Group 2 was given a brochure on healthy eating.
Sansbury, 2009 (3) USA	RCT retrospective analysis	2,079	35-89	Patients that were 35 or older with at least one colonoscopy in the previous 6 months positive for colorectal adenoma	People that had a history of invasive colon cancer, bowel resection, genetic predisposition, IBD, and could not meet the requirements of the study.	1,905	1 group was given 18 grams of dietary fiber everyday in addition to their normal diet and went through diet counseling. Group 2 was given a brochure on healthy eating.

Each study then intervened by splitting the participants into two groups. Study one (Jacobs) gave one-half of the participants 13.5 grams of fiber per day, the other half was given 2.0 grams of fiber per day; fiber was given via a wheat bran supplement. The average fiber consumed per person per day, including the fiber given to them during the trial, was determined based on self-reporting. Jacobs then grouped the participants based on their average fiber intake into four groups, with the high fiber group consuming approximately 27.7 grams of fiber per day and the low fiber group eating approximately 10.1 grams of fiber per day. Study two (Lanza) gave its high fiber group intensive dietary counseling and suggested they consume 18 grams of dietary fiber per 1,000 kcal's eaten along with two other dietary goals including eating less than 20% of their total caloric intake through fat and eating 3.5 servings of fruits and vegetables per 1,000 kcal's. The control group was given a brochure on eating healthy. Study three (Sansbury) asked its participants to consume 18 grams of dietary fiber per 1,000 kcal's, 3.5 servings of fruits and vegetables per 1,000 kcal's, and eat less than 20% of their daily energy supply through fat. From there Sansbury split the participants into 2 groups based on their compliance in the study, the 'super-compliers' and the 'inconsistent/poor compliers.' In each study the researchers compared the prevalence of adenoma recurrences, via colonoscopies, between the control and intervention groups at the end of the studies.

## **OUTCOMES MEASURED**

While each individual study had multiple outcomes that they measured, solely the prevalence of adenoma recurrences was measured for this EBM review. Jacob's study, which split groups in terms of 13.5 versus 2.0 grams of fiber per day measured the prevalence, location (distal, proximal, or distal and proximal), and size (cm) of adenomas as well as many different patient demographics. This trial lasted three years; a colonoscopy was done at the end of the



three years to assess the presence or absence of adenoma recurrences. Lanza's study, which split groups into intense dietary counseling versus a simple brochure, measured the prevalence of adenoma recurrence, location (proximal, distal), severity of recurrence (high risk, advance), personal demographics of the participants, adherence to the dietary recommendations, and the number and time between colonoscopies in the trial. This study lasted four years; each participant had at least two colonoscopies, a clearing colonoscopy one year into the trial and a final colonoscopy at the four year completion of the study. Sansbury's study expanded on Lanza's study which split participants into super-compliers versus inconsistent/poor compliers. Sansbury measured the prevalence of adenoma recurrence, adherence to dietary goals, demographics of each participant, size of adenoma (<1cm, >1cm), severity of recurrence (villous/mix, advanced, high-grade), and time between colonoscopies. This study lasted four years with a clearing colonoscopy after one year and a final colonoscopy after four years. In each study, each participant was also asked to divulge any medical records and pathology reports pertaining to any surgical resections or colonoscopies done during the study time-frame, which had been completed by practitioners outside the study, in order to account for those results.

## **RESULTS**

Three randomized, double-blinded, controlled trials were analyzed based on the prevalence of adenoma recurrences over the length of the study periods. The control and intervention groups were compared to determine if the amount of fiber ingested significantly reduced the number of adenoma recurrences.

In Jacob's study there were two comparison groups, the high fiber group ate 13.5 grams of additional fiber; the fiber was supplemented to their normal dietary habits. The low-fiber group ate 2.0 grams of additional fiber; the fiber was supplemented to their normal dietary

habits. The data resulted in four subgroups. Jacobs took the participants and averaged their daily dietary fiber intake in four different groups based on average dietary fiber consumed over the three year study; these averages were based on self-reporting of dietary fiber intake including the supplemented wheat bran. The first quartile ate 10.1 grams per day, the second quartile ate 15.3 grams per day, the third quartile ate 20.0 grams per day, and the fourth quartile ate 27.7 grams per day. For this EBM review the highest and lowest quartiles were studied to determine the efficacy of the high versus low fiber intake, see Table 2. This data shows that despite a large range in dietary fiber intake that there was no significant correlation between a high fiber diet and a reduced prevalence of adenoma recurrences; P-value of 0.31. While this study may not have been successful there were no reported harmful effects from the high fiber or low fiber diets listed in Jacob's report. The relative risk reduction ratio is negative meaning that the diet only narrowly reduces the risk of recurrence, but is not a statistically significant figure. Since the confidence interval crosses 1.0 there is no evidence of an effect of the high versus low fiber diet. The NNT is negative meaning that for every 19 participants on a high fiber diet 1 fewer person would have a recurrence of an adenoma compared to those on a non-high fiber diet. Finally, the absolute risk reduction is negative meaning there is no risk of eating a low fiber diet versus a high fiber diet.

**Table 2- Jacob's Study: Results, Efficacy, Safety**

Median Daily Fiber Intake (g/day)	No. of Participants with Recurrence of Adenomas	No. of Participants with no Recurrence of Adenomas	CER and EER	Adjusted OR (95% CI)	P-Trend	RRR	ARR	NNT
10.1	175	151	53.7%	1.00				
27.7	156	170	47.9%	(0.57 to 1.19)	.31	-10.8%	-0.058%	-18

In Lanza's study participants were placed into two groups, one group received dietary counseling focused on three specific goals, daily dietary fiber intake of at least 18 grams per 1,000 kcal's, fat intake of less than 20% of calories, and a daily fruit/vegetable serving goal of 3.5 per 1,000 kcal's. The second group was given a brochure on healthy eating. After following these groups for four years Lanza found no significance difference in the number of adenoma recurrences between groups based on a one year clearing colonoscopy and a final four year colonoscopy. 57.1% of the control group had recurrent adenomas while 56.3% of the intervention group had recurrent adenomas producing a relative risk reduction and absolute risk reduction that is negative. She also discovered a large, negative 125 numbers needed to treat, meaning it would take 126 people eating a high fiber diet in this study design to prevent one person from a colorectal adenoma recurrence. This study finally ended with a confidence interval crossing one and a P-value of 0.21 which both proved to be insignificant, meaning that in this study a high fiber diets did not decrease the risk of adenoma recurrences, See table 3. In this study there were no harmful effects reported based on the dietary changes and study intervention.

**Table 3- Lanza's Study: Results, Efficacy, Safety**

	No. of Participants with Recurrence of Adenomas	No. of Participants with no Recurrence of Adenomas	CER and EER	Adjusted OR (95% CI)	P-Value	RRR	ARR	NNT
18 g fiber/day + dietary counseling	228	177	56.3%					
Brochure	226	170	57.1%	(0.98-1.09)	0.21	-1.4%	-0.008%	-125

Finally, Sansbury's extension and re-analysis of Lanza's study proved to be the most significant. Sansbury split Lanza's dietary intervention group into three, and did not analyze Lanza's control group. The intervention group was made up of a group of super-compliers,

meaning they met 9-12 of a possible 12 dietary goals throughout the trial. The control group was made of inconsistent compliers, that met 4-8 of their dietary goals, and poor compliers, that met 0-3 of their dietary goals. Sansbury chose to include both the inconsistent and poor compliers in the control group because the difference in their outcomes was insignificant. Sansbury noticed demographic trends between the super-compliers and the control group. Super-compliers were more likely to have an initial (pre-study) lower intake of fat and a higher initial intake of red meats, fiber, and fruits/vegetables. Nearly 40% of the control group had recurrent adenomas whereas only 31% of the super-compliers had recurrent adenomas. Throughout the whole trial, both intervention and control groups, were most compliant with the recommendation of a decreased fat intake. The CI was reported to be 0.47-0.98 demonstrating a statistical significance in the prevalence of super-compliers recurrence in adenomas as compared to the prevalence of the control group recurrences. The relative risk reduction was 27.4% and the absolute risk reduction was 0.085%. The numbers needed to treat was 12. This data shows a mild correlation between excellent compliance to a high fiber diet and a reduction in adenoma recurrences, see Table 4. This trial represented no risk in the high fiber intervention to the studies participants.

**Table 4- Sansbury's Study: Results, Efficacy, Safety**

	No. of Participants with Recurrence of Adenomas	No. of Participants with no Recurrence of Adenomas	CER and EER	Adjusted OR (95% CI)	RRR	ARR	NNT
18 g fiber/day + dietary counseling	65	145	31.0%				
Brochure	374	573	39.5%	0.47-0.98	27.4%	0.085%	12

## DISCUSSION

The three randomized controlled trials researched for this EBM review demonstrated differing efficacy in determining whether a diet high in fiber reduced the risk of colorectal adenoma recurrence. While the studies showed varying results, the consumption of a high fiber diet proved to be safe with all the study participants. Two of the three studies did not establish significance between a high fiber diet and a decrease in colorectal adenoma recurrence. Sansbury's study revealed that a group of super-complying participants, who did not only comply with dietary high fiber intake but also reduced fat and increased fruit/vegetable recommendations, did significantly reduce their risk for colorectal adenoma recurrence by 27%. While the length of a study and sample sizes are always a limiting factor in research there are a couple other aspects of these studies which limited the results. First, these studies assume that the reduction in risk of colorectal adenomas conversely reduces the risk of colon carcinoma. While colorectal adenomas are thought to be the precursor to colon cancer,<sup>3</sup> it is important to remember that all colorectal adenomas do not form into malignancies, only 10% do.<sup>1</sup> Also there is no justification for the amount of dietary fiber used in the control groups versus the interventional groups. Numbers such as 18 grams, 2 grams, and 13 grams of additional dietary fiber have no scientific significance; there is no proof that more fiber would not have produced better results. Another flaw to all three of these studies is that the dietary intake of all foods including fiber was self-reported by the study participants which could lead to flawed estimations of each participant's true daily dietary fiber intake. Finally, the demographics of the studies were very limited. Most of the participants were Caucasian, well-educated, married, and greater than 50 years old; a more diverse population may have produced different outcomes.

## CONCLUSION

The research displayed does not prove nor disprove whether increased dietary fiber decreases the prevalence of colorectal adenoma recurrence in patients with a previous adenoma. The answer to this question is more complicated than one aspect of a person's diet; the correlation between dietary factors and health prevention is multi-factorial. However, Sansbury's study gives practitioners one more tool in their arsenal of preventative medicine. It is important to realize that none of RCT's studies showed that high fiber diets are harmful. Therefore, practitioners can explain the efficacy of this liability-free risk factor to their patients in hopes that they will become super-complaint and reduce their risk of colorectal adenoma recurrence; and since colorectal adenomas are thought to be the precursor to colorectal carcinoma<sup>3</sup> one can therefore infer that a high fiber diet may reduce colorectal adenomas and also colorectal carcinoma. Further studies need to be run in order to determine whether it was indeed the dietary fiber that was responsible for the decrease in adenomas or whether it may have been the low fat or high fruit/vegetable portions of the diet, or a combination of any of the three that was responsible for the results. Future studies aimed at determining a scientifically derived amount of dietary fiber needed to reduce adenoma recurrence would be beneficial. Designing a study that starts the habits of increased dietary fiber in younger populations may be helpful since most disease processes take a lifetime of cumulative physiological insults in order to develop; solely eating a high fiber diet later in life may not be enough to prevent adenomas. This EBM review, at the very least, shows that there is no risk involved in at least suggesting a high fiber diet to patients asking about the prevention of colorectal adenomas. It also provides us with some evidence that colorectal adenomas and colorectal cancers can be prevented by eating a high fiber diet.

## REFERENCES

- <sup>1</sup> Shalkow J, Wexler LH. Colorectal Tumors. <http://emedicine.medscape.com/article/993370-overview>. Updated Oct 1, 2009. Accessed December 3, 2010.
- <sup>2</sup> Jacobs E, Giuliano A, Roe D, et al. Baseline Dietary Fiber Intake and Colorectal Adenoma Recurrence in the Wheat Bran Fiber Randomized Trial. *Journal of the National Cancer Institute*. 2002; 94(21): 1620-1625.
- <sup>3</sup> Lanza E, Yu B, Murphy G, et al. The Polyp Prevention Trial—Continued Follow-up Study: No effect of a Low-Fat, High-Fiber, High-Fruit, and Vegetable Diet on Adenoma Recurrence Eight Years after Randomization. *Cancer Epidemiol Biomarkers Prev*. 2007; 16(9): 1745-1752.
- <sup>4</sup> American Cancer Society. Economic Impact of Cancer. <http://www.cancer.org/Cancer/CancerBasics/economic-impact-of-cancer>. Updated May 20, 2009, Accessed December 3, 2010.
- <sup>5</sup> Sansbury L, Wanke K, Albert P, et al. The Effect of Strict Adherence to a High-Fiber, High-Fruit, and –Vegetable, and Low-Fat Eating Pattern on Adenoma Recurrence. *Am J Epidemiol*. 2009; 170(5): 576-584.
- <sup>6</sup> Tomislav D. Colon Cancer, Adenocarcinoma. <http://emedicine.medscape.com/article/277496-overview>. Updated Sept 28, 2010. Accessed December 3, 2010.
- <sup>7</sup> American Cancer Society. Colorectal Cancer Early Detection. <http://www.cancer.org/Cancer/ColonandRectumCancer/MoreInformation/ColonandRectumCancerEarlyDetection/colorectal-cancer-early-detection-screening-tests-used>. Updated February 22, 2010. Accessed December 3, 2010.
- <sup>8</sup> Dragovich T, Tsikitis V. Colon Cancer, Adenocarcinoma. Accessed on Oct. 1, 2010. <http://emedicine.medscape.com/article/277496-treatment>, last updated Sep. 28, 2010.