

# Low or High Fiber Diet for Diverticular Disease

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# Introduction

- Diverticulosis of the colon: an acquired condition from herniation of the mucosa through defects in the muscle layer of the bowel wall
- Approximately 60% of individuals over age 60 will develop colonic diverticula
- Asymptomatic with 10% to 25% developing symptoms

# Pathophysiology

- Decreased dietary fiber intake results in decreased intestinal contents and smaller size of the colonic lumen
- Results in transmission of muscular contraction pressure to the wall of the colon rather than to the contents of the lumen
- Result increased pressure on the wall leads to formation of diverticula at the weakest point in the wall, the sites of penetration by blood vessels

# Spectrum of Disease

- Diverticulosis is asymptomatic colonic diverticula
- Symptomatic diverticular disease is associated with mild symptoms, abdominal pain and/or change in bowel habit
- Diverticulitis is complicated diverticular disease with severe clinical symptoms and evidence of inflammation
- Complicated diverticulitis is perforation, abscess, fistula, bleeding or stricture/obstruction

# Objective

- The hypothesis that a low-fiber diet may result in diverticulosis and a high-fiber diet will prevent symptoms or complications of diverticular disease is widely accepted
- To assess the role of dietary fiber in the prevention and management of diverticular disease

# Evidences on Fibers and Diverticulosis

- Study of 264 patients from the general population compared with 56 vegetarians
- Vegetarians were less likely than the non-vegetarians to have radiologically confirmed diverticulosis (12% v 33%  $p < 0.01$ )

Gear JSS, et al. Symptomless diverticular disease and intake of dietary fibre. Lancet 1979;313:511-4.

# Evidences on Fibers and Diverticulosis

- 848 patients undergoing colonoscopy in Korea
- 103 (12%) were found to have diverticulosis (85% were located in the right colon)
- Dietary fiber scores in individuals with (score 7.0) and without diverticulosis (score 7.1)

# A High-Fiber Diet Does Not Protect Against Asymptomatic Diverticulosis

- The Diet and Health Studies (DHS), a cross sectional study of 2104, 30-80 years old, undergoing an outpatient colonoscopy at University of North Carolina Hospitals.
- DHS III was conducted between 1998 and 2000, DHS IV between 2001 and 2002, and DHS V between 2009 and 2010.
- Diet and physical activity were assessed in interviews using validated instruments.



# A High-Fiber Diet Does Not Protect Against Asymptomatic Diverticulosis

- 878 cases of diverticulosis and 1226 controls noted in the colonoscopy reports
- 246 (28%) had many (>3)
- 354 (40%) had few (1-3)
- 278 (32%) did not have the diverticula quantified

# Adjusted Prevalence Ratios for Diverticulosis by Diet

	Quartile			
	2	3	4	<i>P</i> for trend
Total fiber	1.03 (0.89–1.19)	1.14 (1.00–1.31)	1.30 (1.13–1.50)	.004
Fiber from beans	0.94 (0.82–1.09)	1.10 (0.96–1.26)	1.10 (0.95–1.27)	.31
Fiber from grains	1.01 (0.88–1.17)	1.16 (1.01–1.33)	1.25 (1.09–1.45)	.011
Fiber from fruits and vegetables	0.87 (0.76–1.01)	1.12 (0.98–1.28)	1.06 (0.92–1.22)	.431

Adjusted for age, race, and body mass index.

# Adjusted Prevalence Ratios for Diverticulosis by Diet

	Quartile				<i>P</i> for trend
	2	3	4		
Insoluble fiber	0.92 (0.79-1.06)	1.05 (0.92-1.22)	1.24 (1.08-1.42)		.07
Soluble fiber	0.92 (0.83-1.10)	1.12 (0.98-1.28)	1.24 (1.07-1.42)		.038
Total fat	0.96 (0.83-1.10)	0.91 (0.79-1.05)	0.97 (0.84-1.12)		.445
Red meat	0.95 (0.83-1.10)	1.00 (0.87-1.15)	1.04 (0.90-1.19)		.862

Adjusted for age, race, and body mass index.

# Adjusted Prevalence Ratios for Number of Diverticula by Diet

	All cases n=878	Few diverticula n=354	Many diverticula n=246
Total fiber	1.30 (1.13–1.50)	1.17 (0.89–1.54)	1.81 (1.30–2.52)
Fiber from beans	1.10 (0.95–1.27)	0.97 (0.74–1.26)	1.34 (0.95–1.88)
Fiber from grains	1.25 (1.09–1.45)	1.31 (0.99–1.72)	1.49 (1.09–2.04)
Fiber from fruits/ vegetables	1.06 (0.92–1.22)	1.07 (0.81–1.43)	1.06 (0.77–1.46)
Insoluble fiber	1.24 (1.08–1.42)	1.15 (0.88–1.50)	1.64 (1.18–2.28)
Soluble fiber	1.24 (1.07–1.42)	1.06 (0.81–1.40)	1.74 (1.24–2.45)
Total fat	0.97 (0.84–1.12)	0.99 (0.76–1.30)	1.02 (0.75–1.38)
Red meat	1.04 (0.90–1.19)	1.04 (0.80–1.36)	1.07 (0.78–1.47)

Adjusted for age, race, and body mass index. Peery, AF. Gastroenterology 2012; 142:266-272.

# A High-Fiber Diet Does Not Protect Against Asymptomatic Diverticulosis

- High-fiber diet was associated with an increased rather than a decreased prevalence of diverticulosis
- Data demonstrated no association between fat, red meat, and diverticulosis
- Previous hypotheses regarding diverticulosis risk factors and diet recommendations to patients should be reconsidered

# Dietary Fiber and Asymptomatic Diverticulosis

Study first author, yr	Design	Total number (cases)	Intervention	Findings
Painter, 1971	ecological	NA	compared prevalence of diverticular disease across regions and time periods	higher prevalence of diverticulosis in western countries vs. Asia and Africa
Gear, 1979	case-control	320	56 vegetarians compared to 264 non-vegetarians	diverticulosis on barium study more prevalent in non-vegetarians; fiber intake also lower

# Dietary Fiber and Asymptomatic Diverticulosis

Study first author, yr	Design	Total number (cases)	Intervention	Findings
Song, 2010	cross-sectional	848 (103)	studied factors associated with diverticulosis	dietary fiber intake not associated with diverticulosis on colonoscopy
Peery, 2011	cross-sectional	2,104 (878)	studied factors associated with diverticulosis	dietary fiber intake positively associated with diverticulosis on colonoscopy

# Evidences on Fibers and Symptomatic Diverticulosis

- Compared 'high fiber diet', bulk laxative plus an antispasmodic to bran supplementation of 18 g per day in 20 patients
- Bran was significantly more effective in relieving symptoms, increasing stool weight and decreasing stool transit time



# Evidences on Fibers and Symptomatic Diverticulosis

- Randomized 18 patients to 7 g of bran per day or placebo for 3 months
- Fiber improved global symptom scores

Brodribb AJ: Treatment of symptomatic diverticular disease with a high-fibre diet. *Lancet* 1977;1:664–666.

# Evidences on Fibers and Symptomatic Diverticulosis

- 58 patients randomized to bran (7 g fiber/day), ispaghula husk (9 g fiber/day) or placebo (2.3 g fiber/day) each for 4 months in a cross-over design
- Fiber improved constipation but not other gastrointestinal symptoms

# Dietary Fiber and Symptomatic Diverticulosis

Study first author, yr	Design	Total number (cases)	Intervention	Findings
Taylor, 1976	RCT	20	'high fiber diet' vs. bulk laxative and antispasmodic vs. bran supplement (18 g/day)	bran most effective in relieving symptoms, increasing stool weight, decreasing stool transit
Brodribb, 1977	RCT	18	bran supplement (7 g/day) vs. placebo	fiber improved global symptom score

# Dietary Fiber and Symptomatic Diverticulosis

Study first author, yr	Design	Total number (cases)	Intervention	Findings
Ornstein, 1981	RCT	58	bran (7 g/day), ispagula husk (9 g/day), placebo	fiber improved constipation but not other symptoms
Hodgson, 1977	RCT	30	methylcellulose 1 g/day vs. placebo	mean improvement in symptom score greater in methylcellulose group
Smits, 1990	RCT	43	lactulose 15 ml/day vs. 30–40 g/day fiber diet	bowel habits and pain improved in both groups

# Evidences on Fibers and Symptomatic Diverticular Disease

- Compared 100 hospitalized patients with abdominal symptoms and diverticulosis on barium enema to 110 hospitalized controls
- More frequent consumption (at least twice a week vs. once a week) of cucumbers, lettuce, and spinach, as well as brown bread (daily vs. never) was significantly associated with a decreased risk of symptomatic diverticulosis

# Evidences on Fibers and Symptomatic Diverticular Disease

- 48,000 men enrolled in the Health Professionals Follow-up Study (HPFS) from 1988 to 1992 via detailed medical and dietary questionnaires
- 385 cases of symptomatic diverticular disease
- Men in the highest quintile of fiber intake had a relative risk of 0.58 (95% CI 0.41–0.83) for symptomatic diverticular disease

Aldoori WH, et al. A prospective study of diet and the risk of symptomatic diverticular disease in men. *Am J Clin Nutr* 1994;60:757–764.

# Evidences on Fibers and Symptomatic Diverticular Disease

- Cohort study of American healthcare professionals
- Insoluble component of fiber was associated with a decreased risk (relative risk 0.63, 95% confidence interval 0.36 to 0.75) of diverticular disease

Aldoori WH, et al. A prospective study of dietary fiber types and symptomatic diverticular disease in men. *J Nutr* 1998;128:714-9.

# Evidences on Fibers and Symptomatic Diverticular Disease

- Vegetarians had 31% lower risk of hospital admission or death from DD compared with meat eaters (0.69, 0.55 to 0.86)
- Cumulative probability of hospital admission or death caused by DD in 50-70 year olds of 4.4% for meat eaters and 3.0% for vegetarians
- Those in the highest fifth of fiber intake having a 41% lower risk (0.59, 0.46 to 0.78) of DD compared with those in the lowest fifth



# Dietary Fiber and Symptomatic Diverticular Disease

Study first author, yr	Design	Total number (cases)	Intervention	Findings
Manousos, 1985	case-control	210 (100)	hospitalized patients with diverticulosis on barium enema vs. hospitalized controls	fruit, vegetable and brown bread intake associated with decreased risk of diverticular disease
Aldoori, 1994/1998	prospective cohort	47,888 (385)	studied factors associated with symptomatic diverticular disease	fiber intake, particularly insoluble, fruit/vegetable fiber decreased risk
Crowe, 2011	prospective cohort	47,033 (812)	studied factors associated with hospitalization	fiber intake is associated with decreased risk

# Evidences on Fibers and Diverticular Complications

- 56 patients admitted with symptomatic uncomplicated diverticulosis were later questioned regarding fiber intake
- Those who consumed  $> 25$  g per day of fiber were significantly less likely to have had symptoms (19 vs. 44%), or a diverticular complication (6.5 vs. 32%)

# Evidences on Fibers and Diverticular Complications

- 307 patients with symptomatic uncomplicated diverticular disease were randomized to a high fiber diet (20 g/day) versus a high fiber diet plus rifaximin 400 mg twice daily for 7 days per month
- After 2 years of follow-up, the rifaximin group was less likely to have had diverticular complications ( $p = 0.03$ )

# Dietary Fiber and Diverticulitis

Study first author, yr	Design	Total number (cases)	Intervention	Findings
Leahy, 1985	retrospective cohort	56	patients with symptomatic uncomplicated disease questioned regarding past fiber intake	patients with >25 g/day of fiber less likely to have diverticulitis or surgery
Colecchia, 2007	RCT	307	patients with symptomatic uncomplicated disease randomized to fiber $\geq 20$ g/day =/4 cyclical rifaximin	rifaximin group less likely to have diverticular complications

# Systematic Review on High Fiber Diet Therapy in Diverticular Disease

- The aim of this review is to assess whether a high-fiber diet can improve symptoms and/or prevent complications of diverticular disease of the sigmoid colon and/or prevent recurrent diverticulitis after a primary episode

# Systematic Review on High Fiber Diet Therapy in Diverticular Disease

- The first search resulted in a combined total of 195 articles
- After reviewing the abstracts, 13 studies addressed the use of high-fiber diet specifically in colonic diverticular disease
- 3 met the inclusion criteria

# Systematic Review on High Fiber Diet Therapy in Diverticular Disease

- Dietary fiber to prevent recurrence of diverticulitis
- No dietary fiber study met the inclusion criteria of this systematic review question

# Systematic Review on High Fiber Diet Therapy in Diverticular Disease

- Dietary fiber for symptomatic diverticular disease
- One RCT found a significant reduction in pain and improvement of overall symptoms [Brodribb 1977]
- A second RCT found no effect on pain and large bowel symptoms, except for reduction of constipation [Ornstein 1981]
- The third trial showed a significant treatment effect of methylcellulose on symptoms [Hodgson 1977]



# Systematic Review on High Fiber Diet Therapy in Diverticular Disease

- Dietary fiber for symptomatic diverticular disease
- RCTs have subjective symptom outcomes
- Sample size is too small to demonstrate a difference in objective outcomes such as the incidence of acute diverticulitis or other complications of diverticular disease

# Systematic Review on High Fiber Diet Therapy in Diverticular Disease

- High-quality evidence for a high-fiber diet in the treatment of diverticular disease is lacking
- Most recommendations are based on level 2 evidence
- Nevertheless, high-fiber diet is still recommended in several guidelines

# Summary of Guidelines

Organisation	Year	Fibers recommended preventing diverticular disease	Original research cited
American College of Gastroenterology	1999	Yes	Aldoori et al.
European Association for Endoscopic Surgery	1999	Yes	Brodribb and Humphreys; Gear et al.
American Society of Colon and Rectal Surgeons	2006	Not mentioned	
World Gastroenterology Organization	2007	Yes	Painter and Burkitt; Talbot

# Summary of Guidelines

Organisation	Year	Fibers recommended in treatment of symptomatic DD	Original research cited
American College of Gastroenterology	1999	Yes	Brodribb; Ornstein et al.
European Association for Endoscopic Surgery	1999	Yes	Brodribb
American Society of Colon and Rectal Surgeons	2006	Not mentioned	
World Gastroenterology Organization	2007	Yes	Nair and Mayberry; Aldoori et al.

# Summary of Guidelines

Organisation	Year	Fibers recommended in preventing recurrence of diverticulitis	Original research cited
American College of Gastroenterology	1999	Not mentioned	
European Association for Endoscopic Surgery	1999	Yes	None
American Society of Colon and Rectal Surgeons	2006	Yes	Larson et al.; Painter
World Gastroenterology Organization	2007	Not mentioned	

# Summary

- The data on fiber as a cause of diverticulosis are limited and conflicting, but suggest that dietary fiber may play a beneficial role in diverticular symptoms and complications.

Thank you