

## Stopping or reducing dietary fiber intake reduces constipation and its associated symptoms

Kok-Sun Ho, Charmaine You Mei Tan, Muhd Ashik Mohd Daud, Francis Seow-Choen

Kok-Sun Ho, Charmaine You Mei Tan, Muhd Ashik Mohd Daud, Francis Seow-Choen, Seow-Choen Colorectal Surgery PLC, Singapore 238859, Singapore

Author contributions: Seow-Choen F designed the research; Tan CYM and Muhd Daud MA were responsible for data collection and analysis; Ho KS and Seow-Choen F wrote the paper. Correspondence to: Francis Seow-Choen, MBBS, FRCSEd, FAMS, Seow-Choen Colorectal Surgery PLC, 290 Orchard Road, The Paragon No. 06-06, Singapore 238859, Singapore. [seowchoen@colorectalcentre.com](mailto:seowchoen@colorectalcentre.com)

Telephone: +65-67386887 Fax: +65-67383448

Received: January 4, 2012 Revised: April 18, 2012

Accepted: April 22, 2012

Published online: September 7, 2012

### Abstract

**AIM:** To investigate the effect of reducing dietary fiber on patients with idiopathic constipation.

**METHODS:** Sixty-three cases of idiopathic constipation presenting between May 2008 and May 2010 were enrolled into the study after colonoscopy excluded an organic cause of the constipation. Patients with previous colon surgery or a medical cause of their constipation were excluded. All patients were given an explanation on the role of fiber in the gastrointestinal tract. They were then asked to go on a no fiber diet for 2 wk. Thereafter, they were asked to reduce the amount of dietary fiber intake to a level that they found acceptable. Dietary fiber intake, symptoms of constipation, difficulty in evacuation of stools, anal bleeding, abdominal bloating or abdominal pain were recorded at 1 and 6 mo.

**RESULTS:** The median age of the patients (16 male, 47 female) was 47 years (range, 20-80 years). At 6 mo, 41 patients remained on a no fiber diet, 16 on a reduced fiber diet, and 6 resumed their high fiber diet for religious or personal reasons. Patients who stopped or reduced dietary fiber had significant improvement in their symp-

toms while those who continued on a high fiber diet had no change. Of those who stopped fiber completely, the bowel frequency increased from one motion in 3.75 d ( $\pm 1.59$  d) to one motion in 1.0 d ( $\pm 0.0$  d) ( $P < 0.001$ ); those with reduced fiber intake had increased bowel frequency from a mean of one motion per 4.19 d ( $\pm 2.09$  d) to one motion per 1.9 d ( $\pm 1.21$  d) on a reduced fiber diet ( $P < 0.001$ ); those who remained on a high fiber diet continued to have a mean of one motion per 6.83 d ( $\pm 1.03$  d) before and after consultation. For no fiber, reduced fiber and high fiber groups, respectively, symptoms of bloating were present in 0%, 31.3% and 100% ( $P < 0.001$ ) and straining to pass stools occurred in 0%, 43.8% and 100% ( $P < 0.001$ ).

**CONCLUSION:** Idiopathic constipation and its associated symptoms can be effectively reduced by stopping or even lowering the intake of dietary fiber.

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**Key words:** Dietary fiber; Constipation; Chronic idiopathic constipation; Abdominal bloating

**Peer reviewers:** Dr. Jit Fong Lim, Gleneagles Hospital Singapore, 6 Napier Road, No. 09-09, Gleneagles Medical Centre, Singapore 258499, Singapore; Poh-Koon Koh, Professor, Capstone Colorectal Surgery Centre, Mt Elizabeth Hospital, 3 Mount Elizabeth, No.07-08, Singapore 238499, Singapore

Ho KS, Tan CYM, Muhd Daud MA, Seow-Choen F. Stopping or reducing dietary fiber intake reduces constipation and its associated symptoms. *World J Gastroenterol* 2012; 18(33): 4593-4596 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v18/i33/4593.htm> DOI: <http://dx.doi.org/10.3748/wjg.v18.i33.4593>

### INTRODUCTION

Lack of fiber in the diet was first postulated in 1971

as the cause of diseases such as diverticulosis, hemorrhoids and colorectal cancer<sup>[1]</sup>. Since then, partly due to widespread media publicity, it is now widely accepted that dietary fiber is a necessary component of a healthy diet and is required for normal bowel movement<sup>[2-5]</sup>. It is popularly used in the management of constipation by the public and by many doctors. Insoluble fiber is known to increase stool weight and decrease colonic transit time<sup>[6,7]</sup>. Fiber is said to aid in water retention in the colon and results in stools that are less dry and easier to evacuate. However, the reality is that stool moisture content remains at 70%-75% regardless of the amount of fiber and water consumed<sup>[7,8]</sup>.

There is recent evidence that low fiber intake does not equate to constipation<sup>[9]</sup>. Patients with chronic constipation also have similar fiber intake to controls<sup>[10-13]</sup>. Patients with chronic constipation may also have worsening symptoms when dietary fiber intake is increased<sup>[14]</sup>. Another study found that lactulose was more effective in easing constipation when compared with fiber<sup>[15]</sup>.

It has also been our experience that many patients with constipation are already consuming a large amount of fiber before they seek medical attention.

We therefore carried out a prospective longitudinal case study to investigate the effect of decreasing dietary fiber in patients with idiopathic constipation.

## MATERIALS AND METHODS

Constipation was defined clinically in patients who presented either with symptoms of straining to expel bulky large stools or a bowel frequency of less than one motion per 3 d over a period of at least 3 mo. Patients who presented to the clinic with symptoms of constipation, abdominal distension, pain or bloating, difficulty in evacuation with or without symptoms of rectal bleeding were considered for the study. For the purpose of this study, we did not distinguish between slow colonic transit type or obstructed defecation type of constipation nor did we attempt to classify the patients according to irritable bowel syndrome subtypes. All the patients underwent colonoscopy to exclude colonic lesions. Patients who had colorectal cancer, previous colonic surgery, melanosis coli or thyroid disorders were excluded. Patients with anal conditions such as severe prolapsed hemorrhoids, chronic anal fissure or any other condition that required surgery were also excluded.

Sixty-three consecutive patients after normal colonoscopy were enrolled into the study from May 2008 to May 2010. Each patient was to act as their own control. The physiology of the gastrointestinal tract and the bulking effects of dietary fiber were explained to the patients<sup>[16,17]</sup>. Patients were then instructed to completely stop their intake of dietary fiber, including vegetables, cereals, fruits, wholemeal bread and brown rice for 2 wk. Those who were vegetarians were asked to eat white rice instead of unpolished rice, white bread instead of whole meal bread, and to take processed bean products for protein. They were to continue their normal quantities of carbohydrates

and proteins. Sieved fruit juices and clear vegetable soups were allowed. Patients were instructed not to take any laxatives during these 2 wk. After 2 wk, patients were asked to continue on with as little fiber in their diet as they were comfortable with for the long term. Patients were followed up at 1 mo and 6 mo intervals and final results were analyzed at 6 mo.

Data collected included age, sex, general dietary fiber intake, symptoms of constipation, difficulty in evacuation of stools, anal bleeding, abdominal bloating or abdominal pain. Constipation was recorded as the interval in days between bowel movements. Difficulty in evacuation was a subjective measure and patients were asked to choose from one of 3 degrees (no straining, occasional or moderate straining and severe straining or straining most of the time).

## Statistical analysis

All data was entered into a secured database, and accessed only by the authors. The paired samples *t* test was performed using SPSS for Windows (SPSS Inc., Chicago, United States), version 17.0 on an IBM personal computer. Results are expressed as mean  $\pm$  SD.

## RESULTS

There were 16 males (25.6%) and 47 (74.4%) females, median age 47 years (range, 20-80 years) included in the study. At the commencement of the study, all patients were already on a high fiber diet or taking fiber supplements. After 2 wk of a no fiber diet, patients were asked to continue on as little fiber in the diet as they were able to follow if this were to give them relief from their symptoms.

At 6 mo, 41 patients continued on a no fiber diet and 16 were on a reduced fiber diet. The remaining 6 patients continued on a high fiber diet for various reasons including being vegetarians or inability to stop consuming dietary fiber for religious or personal reasons.

The median age of patients who stayed on a no fiber diet was 46 years (range, 21-80 years), on a reduced fiber diet was 45 years (range, 20-65 years) and on a high fiber diet was 59 years (range, 28-75 years). There was no statistical significant difference in age between the 3 groups. There was also no statistical difference in sex between the 3 groups (Table 1).

At 6 mo follow-up, the interval between bowel movements decreased with the reduction in fiber intake ( $P < 0.001$ ). Forty one patients who completely stopped fiber intake had their bowel frequency increased from one motion in 3.75 d ( $\pm 1.59$  d) to one motion in 1.0 d ( $\pm 0.00$  d) ( $P < 0.001$ ). Of 16 patients who reduced their dietary fiber intake, 12 patients had daily bowel movement, 3 had one bowel movement every 2 to 3 d and one had a bowel movement every 4 to 6 d, giving one motion per 1.9 d ( $\pm 1.21$  d) on a reduced fiber diet compared with 1 motion per 4.19 d ( $\pm 2.09$  d) on a high fiber diet ( $P < 0.001$ ). There was no change in the frequency of bowel movement for patients who continued with high dietary fiber intake, with one motion per 6.83 d ( $\pm 1.03$  d) before and after consultation ( $P = 1.00$ ).

Table 1 Age and sex of all patients, segregated by post-consultation dietary fiber intake

Variable	General (n = 63)	No fiber (n = 41)	P value	Reduced fiber (n = 16)	P value	High fiber (n = 6)	P value
Age (yr), mean (range)	47 (20-80)	46 (21-80)	0.864	45 (20-65)	0.459	59 (28-75)	0.052
Sex <sup>1</sup> n (%)	16 (25.4)	15 (36.6)	0.258	1 (6.25)	0.034	0 (0)	< 0.01

<sup>1</sup>Numbers of male in each group. Corresponding P values for the age and sex of each category to the overall mean are provided.

Table 2 Symptoms at presentation and at 6 mo following change in dietary fiber intake

Symptom	Symptoms at presentation (n = 63)	High dietary fiber (n = 6)	P value	Reduced dietary fiber (n = 16)	P value	No dietary fiber (n = 41)	P value
Anal bleeding	31	4	1	4	0.216	0	< 0.001
Constipation	63	6	1	12	0.041	0	< 0.001
Bloatedness	33	6	1	5	0.041	0	< 0.001
Strain in bowel opening	63	6	1	9	0.004	0	< 0.001
Abdominal pain	13	3	1	2	0.164	0	0.012

There was also a difference between the groups in the proportion of patients with associated symptoms. For symptoms of bloating, all of those on a high fiber diet continued to be symptomatic, while only 31.3% in the reduced fiber group and none of the no fiber group had symptoms (0%,  $P < 0.001$ ) (Table 2).

With regards to straining, all those on a no fiber no longer had to strain to pass stools. Of those who reduced dietary fiber, 7 of 16 showed improvement while the symptoms remain unchanged in those who remained on a high fiber diet ( $P < 0.001$  between groups).

Symptoms of abdominal pain only improved in patients who stopped fiber completely while those who continued on a high fiber diet or reduced fiber diet did not show any improvement (Table 2). In addition, those on a no dietary fiber diet no longer had symptoms of anal bleeding.

## DISCUSSION

This study has confirmed that the previous strongly-held belief that the application of dietary fiber to help constipation is but a myth. Our study shows a very strong correlation between improving constipation and its associated symptoms after stopping dietary fiber intake. However whilst there was no significant difference between the mean age of the 3 groups with different post-consultation dietary fiber intake, older patients seemed less likely to stop dietary fiber, although this did not reach significance. We did not survey the actual reasons for resuming dietary fiber. The clinical impression during consultation however was that some of these patients were vegetarians, some felt uneasy not eating any fiber, whilst others could not completely discontinue fiber due to constant media and peer pressure to increase dietary fiber.

Constipation is often mistaken by the layman as the state of not passing stool, with the subsequent false notion that making more feces will allow easier defecation. In truth, constipation refers to the difficulty in evacuating a rectum packed with feces, and easier defecation

cannot possibly be affected by increasing dietary fiber which increases bulky feces. In this paper, we looked at constipation both as the number of days before each motion as well as the ease of defecation.

It is well known that increasing dietary fiber increases fecal bulk and volume. Therefore in patients where there is already difficulty in expelling large fecal boluses through the anal sphincter, it is illogical to actually expect that bigger or more feces will ameliorate this problem. More and bulkier fecal matter can only aggravate the difficulty by making the stools even bigger and bulkier. Several reviews and a meta-analysis had already shown that dietary fiber does not improve constipation in patients with irritable bowel diseases<sup>[18-21]</sup>.

The role of dietary fiber in constipation is analogous to cars in traffic congestion. The only way to alleviate slow traffic would be to decrease the number of cars and to evacuate the remaining cars quickly. Should we add more cars, the congestion would only be worsened. Similarly, in patients with idiopathic constipation and a colon packed with feces, reduction in dietary fiber would reduce fecal bulk and volume and make evacuation of the smaller and thinner feces easier. Adding dietary fiber would only add to the bulk and volume and thus make evacuation even more difficult.

Whilst it is often stated in physiology textbooks that bulking agents improve peristalsis, there is no proof of this in practice nor experimentally. Regardless of the food ingested, small intestinal and right mid colonic contents are fluid and all ingestible dietary fiber is suspended therein. Dietary fiber, therefore, cannot act as solid boluses for the initiation of peristalsis. In fact, dietary fiber had been shown to retard peristalsis and hold up gaseous expulsion in human experiments<sup>[22]</sup>.

Dietary fiber is also associated with increased bloatedness and abdominal discomfort<sup>[22]</sup>. Insoluble fiber was reported to worsen the clinical outcome of abdominal pain and constipation<sup>[18-20]</sup>. In our recent study, patients who followed a diet with no or less dietary fiber intake showed a significant improvement, not just in their constipation,

but also in their bloatedness. Patients who completely stopped consuming dietary fiber no longer suffered from abdominal bloatedness and pain. These symptoms are caused by the fermentation of dietary fiber by colonic bacteria, which produces hydrogen, carbon dioxide and methane<sup>[23]</sup>. Gases that are trapped by peristaltic colon exert pressure on the walls, causing the abdominal pain experienced by patients. This was previously observed in a prior study on younger patients, when dietary fiber had been shown not to be effective in the management of children with recurrent abdominal pain or bloating<sup>[21]</sup>.

Stools only become well-formed in the sigmoid colon and rectum and by this time, especially in constipated subjects, more stools result in more evacuation problems. It is not logical to increase both the volume and size of stool in patients with idiopathic constipation and indeed for anybody with difficulty in passing stools, e.g., due to anismus or anal spasm from anal stricture, fissure or pelvic outlet disorders. We have shown that decreasing the bulk and volume of feces immediately enables the easier evacuation of smaller and thinner stools through the anal sphincter mechanism. This eliminates the need to strain in passing stools, and prevents the tearing of the anal sphincter and bleeding due to large and bulky fecal loads. None of our patients experienced anal bleeding or straining following complete abstinence from dietary fiber.

The results of this study should lead us to reexamine popular beliefs in benefits of dietary fiber and more studies should be undertaken to confirm or repudiate these results.

In conclusion, contrary to popularly held beliefs, reducing or stopping dietary fiber intake improves constipation and its associated symptoms.

## COMMENTS

### Background

It is a widely accepted view that dietary fiber is essential for gut health and to promote bowel movements. However, most patients with chronic constipation seen by the authors were already taking high fiber diet with no improvement in their symptoms.

### Research frontiers

The role of dietary fiber in patients with chronic constipation is reevaluated.

### Innovations and breakthroughs

The authors showed that reducing dietary fiber intake may actually improve symptoms of chronic constipation.

### Applications

This could bring relief to millions of people suffering from chronic constipation in that reducing their dietary fiber intake may relieve their symptoms and suffering.

### Peer review

This paper is a preliminary study looking at the effects of dietary fiber on the symptoms of constipation on a small cohort of cases. The discussion provided an overview of the evidence available in the literature on this topic and gave a fresh perspective on the benefits or harm of excessive dietary fiber. All in all, this is an interesting preliminary study that warrants publication and further research.

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