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Fiber (Glucomannan) Is Beneficial in the Treatment of Childhood Constipation

Vera Loening-Baucke, MD*; Erasmo Miele, MD†; and Annamaria Staiano, MD‡

ABSTRACT. *Objective.* Constipation and encopresis are common problems in children. Still today, the role of fiber in the treatment of chronic constipation in childhood is controversial. The aim of our study was to evaluate whether fiber supplementation is beneficial in the treatment of children with functional constipation with or without encopresis. We used glucomannan as the fiber supplement.

Methods. We evaluated the effect of fiber (glucomannan, a fiber gel polysaccharide from the tubers of the Japanese Konjac plant) and placebo in children with chronic functional constipation with and without encopresis in a double-blind, randomized, crossover study. After the initial evaluation, the patients were disimpacted with 1 or 2 phosphate enemas if a rectal impaction was felt during rectal examination. Patients continued with their preevaluation laxative. No enemas were given during each treatment period. Fiber and placebo were given as 100 mg/kg body weight daily (maximal 5 g/day) with 50 mL fluid/500 mg for 4 weeks each. Parents were asked to have children sit on the toilet 4 times daily after meals and to keep a stool diary. Age, frequency of bowel movements into the toilet and into the undergarment, presence of abdominal pain, dietary fiber intake, medications, and the presence of an abdominal and/or a rectal fecal mass were recorded on a structured form at the time of recruitment and 4 weeks and 8 weeks later. Children were rated by the physician as successfully treated when they had ≥ 3 bowel movements/wk and ≤ 1 soiling/3 weeks with no abdominal pain in the last 3 weeks of each 4-week treatment period. Parents made a global assessment to whether they believed that the child was better during the first or second treatment period.

Results. Forty-six chronically constipated children were recruited into the study, but only 31 children completed the study. These 31 children (16 boys and 15 girls) were 4.5 to 11.7 years of age (mean: 7 ± 2 years). All children had functional constipation; in addition, 18 had encopresis when recruited for the study. No significant side effects were reported during each 4-week treatment period. Significantly fewer children complained of abdominal pain and more children were successfully treated while on fiber (45%) as compared with placebo treatment (13%). Parents rated significantly more children (68%) as being better on fiber versus 13% as being better on placebo. The initial fiber intake was low in 22 (71%) children. There was no difference in the percentage of children with low fiber intake living in the United

States (70%) and Italy (71%). Successful treatment (physician rating) and improvement (parent rating) were independent of low or acceptable initial fiber intake. The duration of chronic constipation ranged from 0.6 to 10 years (mean: 4.0 ± 2.5 years). Duration of constipation did not predict response to fiber treatment. Children with constipation only were significantly more likely to be treated successfully with fiber (69%) than those with constipation and encopresis (28%).

Conclusion. We found glucomannan to be beneficial in the treatment of constipation with and without encopresis in children. Symptomatic children who were already on laxatives still benefited from the addition of fiber. Therefore, we suggest that we continue with the recommendation to increase the fiber in the diet of constipated children with and without encopresis. *Pediatrics* 2004;113:e259–e264. URL: <http://www.pediatrics.org/cgi/content/full/113/3/e259>; fiber, glucomannan, constipation, encopresis, children.

ABBREVIATION. BM, bowel movement.

Constipation and encopresis are common problems in children. Constipation is a symptom and not a disease. As a symptom, constipation can be caused by many different disorders. In children, constipation is mostly attributable to functional constipation, which is constipation not attributable to organic and anatomic causes or intake of medication. Often constipation is combined with encopresis. Encopresis is the involuntary loss of formed, semi-formed, or liquid stool into the child's underwear in the presence of functional constipation after the child has reached the age of 4 years.¹

The common clinical history of children with chronic constipation and encopresis includes a prolonged period, often of many years' duration, of infrequent and abnormal stools. The frequency of encopresis can range from several times a week to >10 times a day. Encopresis is, in most children, a complication of long-standing constipation. A prevalence rate of 34% for constipation has been reported from Great Britain.² Most often constipation is short-lived and of little consequence; however, chronic constipation most often follows an inadequately managed acute problem. Five percent of the otherwise healthy 4- to 11-year-old school children in Great Britain had chronic constipation lasting for >6 months.² At the time of diagnosis, most children present with a very large amount of stool in a dilated rectal ampulla. Approximately half of the patients have an abdominal fecal mass present, a physical

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finding that indicates a more severe form of stool retention.

In the early 1970s, Burkitt et al³ had observed a relationship between stool volume and fiber ingestion in Africans. Burkitt speculated that the frequent occurrence of constipation among Western societies was the result of reduced dietary fiber intake.³ Therefore, treatment programs for the majority of children with chronic constipation with or without encopresis have included increase in dietary fiber, in addition to scheduled toilet sittings and daily laxatives.⁴⁻¹⁰ Usual advice for dietary changes has been reduction in milk intake and increase in dietary fiber intake. Dietary fiber treatments have ranged from raw foods such as fruits and vegetables, to synthetic preparations such as guar gum and pectin fiber. However, to be effective, these fiber agents have to be ingested in large quantities, which most children find unacceptable. Recent reports have shown that glucomannan, a fiber gel polysaccharide (composed of β -1,4-linked D-glucose and D-mannose) prepared from the tubers of the Japanese Konjac plant, is a soluble fiber, can be taken in much smaller quantities than guar gum or pectin, and has no unpleasant smell or taste.^{11,12} Dry glucomannan powder is hygroscopic and forms a pectin-like gel in contact with water.

The aim of our study was to evaluate whether fiber supplementation is beneficial in the treatment of children with functional constipation. We used glucomannan as the fiber supplement.

METHODS

Subjects

Children who had chronic functional constipation for ≥ 6 months with or without encopresis and were >4 years of age were recruited from the Pediatric Clinics at the University of Iowa (Iowa City, IA) and the Pediatric Clinics at the University of Naples, Federico II (Naples, Italy) for a double-blind, randomized, crossover study comparing the fiber supplement glucomannan with placebo. Constipation was defined as a delay or difficulty in defecation, present for >2 weeks, and sufficient to cause significant distress to the child.⁶ All children had functional constipation, which is constipation not attributable to organic and anatomic causes or intake of medication. Patients had to be well except for problems related to constipation. Children with Hirschsprung's disease, hypothyroidism, mental deficiency, chronic debilitating diseases, or neurologic abnormalities or children who had previous surgery of the colon or anus were not recruited.

The experimental protocol was approved by the institutional review boards of both universities. Written informed consent was obtained from all parents, and assent was obtained from children ≥ 7 years of age. It had been previously calculated that at $\alpha = .05$; 26 subjects will allow a power of approximately .95 to detect a difference of .7 versus .2 in achieving normal bowel patterns in this crossover design.

Study Design

First Clinic Visit

Patients had a history and physical examination, including a rectal examination, performed. Age, gender, weight, duration of constipation, duration of encopresis (calculated using 4 years as the time when a child should be bowel trained), presence of stool withholding, frequency and size of bowel movements (BMs) into the toilet and of those evacuated into the undergarment, presence of abdominal pain, presence of urinary incontinence during the day and/or night, and medications at the time of the evaluation were recorded on a structured intake form. Fiber intake was rated as low or acceptable. Even though most parents and children had been previously advised to increase dietary fiber, few had been

able to accomplish this. Stool consistency was assessed rating the stool consistency as hard like rocks, pellets = 0, firm = 1, soft like banana = 2, loose like milkshake = 3, and watery = 4.

Treatment

After the initial evaluation, the patients were disimpacted with 1 or 2 phosphate enemas if a rectal impaction was felt during rectal examination. Patients continued with their preevaluation laxative. After informed consent was signed, patients were randomized by envelope into 1 of 2 treatment arms for the double-blind, randomized, crossover study. Blinding was done by having the medication labeled glucomannan A and glucomannan B with the code kept by the company until the study was completed and analyzed. Glucomannan A was a capsule containing maltodextrins as placebo. Glucomannan B was a capsule containing glucomannan, a polysaccharide of D-glucose and D-mannose, equal to 450 mg of alimentary fiber. Group 1 received placebo first for 4 weeks and then glucomannan for 4 weeks. Group 2 received glucomannan first and then placebo. Placebo and glucomannan (DicoFarm, Rome, Italy) were given as 100 mg/kg body weight daily (maximal 5 g/day), rounded to the nearest 500 mg, because each capsule contained 500 mg. Each capsule was either opened and sprinkled on food given with 50 mL of fluid per capsule; given as a solution, whereby the content of each 500-mg capsule was mixed with 50 mL of fluid of the child's choice; or swallowed as a capsule with 50 mL of fluid for each capsule. In addition, parents were instructed to have the child sit on the toilet 4 times daily after meals and to keep a stool diary.

The patients and their parents kept diary sheets during the 8 weeks of study. They recorded daily each BM, soiling episode, abdominal pain episode, and medication used and reported at the end of each treatment period the associated subjective symptoms such as stool consistency, new occurrence of abdominal pain, bloating, abdominal distention, excessive gas, or diarrhea. No enemas were given during each treatment period.

Follow-up Visits

At the 4-week and 8-week visits, the interim history was assessed; stool diaries were collected and evaluated; and a physical examination, including a rectal examination, was performed. Enema treatment was given when a rectal impaction was felt during the rectal examination. The overall tolerance and palatability of the study medication was assessed. At the 4-week visit, the crossover in medication occurred.

Outcome

The safety of the fiber supplement glucomannan was evaluated through reports by parents and children on side effects, such as new onset of abdominal pain, bloating, abdominal distention, excessive gas, or diarrhea. The efficacy of fiber and placebo was compared on the basis of changes in frequency of BMs, soiling frequency, and disappearance of abdominal pain in the last 3 weeks of each 4-week treatment period using the diary plus reports by the child and parents. Successful treatment was rated by the physician and was defined as ≥ 3 BMs per week and ≤ 1 soiling episode in the last 3 weeks with no abdominal pain. Parents made a global assessment as to whether they believed that the child was better during the first or second treatment period.

Analysis

Fisher exact test and Wilcoxon rank sum test were used to analyze differences between the initial data and the placebo and the fiber treatment periods. Wilcoxon signed rank test was used for comparison between group 1 and group 2. $P < .05$ was considered to be statistically significant.

RESULTS

We recruited 46 children with chronic constipation. Thirteen children did not show for the 4-week follow-up: 7 children who were randomized to receive placebo first and 6 children who were randomized to receive fiber first. Two constipated girls completed the first 4 weeks of the study only: 1 received

placebo and 1 received fiber; both recovered from chronic constipation and abdominal pain during the first 4 weeks of treatment and did not return for the 8-week visit. Data from the 13 children who entered the study and were randomized but did not come for follow-up and the 2 children who did not complete the study were excluded from the analysis. The initial data of these 15 children were not significantly different from the data of the 31 children who completed the study, except soiling frequency per week was significantly less (4.0 ± 1.4 ; $P < .001$).

The data analysis includes 31 children with functional constipation with or without encopresis. These 31 constipated children (16 boys and 15 girls) were 4.5 to 11.7 years of age (mean: 7.1 ± 2.0 years). All children experienced chronic constipation for 6 months to 10 years (mean: 4.0 ± 2.5 years), and 18 had, in addition, encopresis with ≥ 1 soiling episodes/wk for 6 months to 5 years (mean: 1.8 ± 1.3 years). Fifty-eight percent of the children were on laxatives when recruited but were still symptomatic. They stayed on their laxative throughout the study. Thirteen children were taking lactilol, 3 were taking polyethylene glycol, 1 was taking milk of magnesia, and 1 was taking senna.

Safety

No significant side effects such as new onset of abdominal pain, bloating, abdominal distention, excessive gas, diarrhea, or anaphylactic symptoms were reported during the 4-week placebo and 4-week fiber treatment periods.

Outcome for All Children

The data comparing children who received placebo and fiber in the first 4-week trial are shown in Table 1. No significant difference was found between children who received placebo first and those who received fiber first ($P > .2$). Eleven children received

TABLE 1. Comparison of Children Who Received Placebo and Those Who Received Fiber in the First 4-Week Trial

	Placebo (n = 11)	Fiber (n = 20)	P
Age, y	6.6 ± 1.4	7.4 ± 2.3	.363
Boys	45%	55%	.716
Frequency of BMs/wk	3.2 ± 2.0	3.3 ± 2.2	.930
Children with <3 BMs/wk	45%	50%	1.0
Stool consistency	0.23 ± 0.5	0.35 ± 1	.878
Duration of constipation	3.7 ± 2.2	4.1 ± 2.7	.224
Presence of abdominal pain	55%	45%	.716
Children on laxatives	45%	65%	.449
Children with encopresis	55%	60%	1.0
Frequency of soiling episodes/wk	8.7 ± 6.0	10.5 ± 14.7	.512
Duration of encopresis	1.6 ± 1.1	1.9 ± 4.1	.256
Daytime wetting	36%	20%	.405
Nighttime wetting	18%	20%	1.0
Successful treatment during placebo*	18%	10%	.601
Successful treatment during fiber*	36%	50%	.707
Improved (parent rating)	73%	65%	1.0

* Successful treatment was rated by the physician and was defined as ≥ 3 BMs/wk and ≤ 1 soiling episode/3 wk with no abdominal pain.

TABLE 2. Outcome Data in All 31 Children With Chronic Functional Constipation

	Initial (n = 31)	Placebo (n = 31)	Fiber (n = 31)
Frequency of BMs/wk	3.3 ± 2.1	3.8 ± 2.2	4.5 ± 2.3 †
Children with <3 BMs	45%	52%	19%‡
Stool consistency	0.3 ± 0.9	1.2 ± 0.9 †	1.5 ± 0.9 †
Presence of abdominal pain	48%	42%	10%†‡
Children on laxatives	58%	58%	58%
Children with encopresis	58%	48%	42%
Frequency of soiling episodes/wk (n = 18)	9.9 ± 12.3	4.2 ± 4.8 †	4.0 ± 6.3 †
Successful treatment*	0%	13%	45%†‡
Improved (parent rating)	0%	13%	68%†‡

* Successful treatment was rated by the physician and was defined as ≥ 3 BMs/wk and ≤ 1 soiling episode/3 wk with no abdominal pain.

† $P < .05$ as compared with initial data.

‡ $P < .05$ as compared with placebo treatment.

enema treatment before the placebo treatment period and 14 before the fiber treatment period ($P > .5$).

Comparison of the Initial Data and the Placebo Treatment Period

Stool consistency and frequency of soiling episodes per week improved significantly during the placebo treatment period as compared with the initial evaluation ($P < .04$; Table 2). There was no significant change in frequency of BMs per week, percentage of children with <3 BMs/wk, encopresis, or abdominal pain ($P > .2$). Daytime wetting (26%) and nighttime wetting (19%) remained the same. Only 4 (13%) children were treated successfully.

Comparison of the Initial Data and the Fiber Treatment Period

During the fiber treatment period, the frequency of BMs and soiling episodes and stool consistency improved significantly as compared with the initial evaluation, as did the percentage of children with abdominal pain ($P < .03$; Table 2). Daytime wetting and nighttime wetting remained the same ($P = 1$), as did the percentage of children with <3 BMs/wk and with encopresis ($P > .5$). Fourteen (45%) children were treated successfully.

Comparison of the Fiber Treatment Period With the Placebo Treatment Period

Significantly fewer patients had <3 BMs/wk and complaint of abdominal pain ($P < .02$; Table 2) during the fiber treatment period as compared with the placebo treatment period. Significantly more children were treated successfully while on fiber (45% vs 13%; $P < .02$). Parents made a global assessments as to whether their child was improved during the first or second treatment period. Parents rated that significantly more children had improved while on fiber (68%) as compared with placebo treatment (13%; $P < .001$).

Comparison of Children on Low and Acceptable Fiber Intake

The fiber intake was low in 22 (71%) children. There was no difference in the percentage of children

with low fiber intake living in the United States (70%) and Italy (71%). Successful treatment (physician rating) and improvement (parent rating) were independent of low or acceptable fiber intake ($P > .6$).

Comparison of Children on Laxatives With Those Who Did Not Take Laxatives

Eighteen children were taking daily laxatives when initially evaluated but were still symptomatic. The laxative dose was not changed during the 2 study periods, even though the dosage may have been inadequate. Thirteen children were not receiving laxatives. Comparison of these 2 groups of children revealed more children with encopresis in the laxative group (78% vs 31%; $P < .02$), and significantly more children in the laxative group were treated successfully with fiber than with placebo ($P < .01$).

Analysis by Duration of Constipation

The duration of chronic constipation ranged from 0.6 to 10 years (mean: 4.0 ± 2.5 years; median: 4 years). Fifteen children with constipation <4 years were compared with 16 children with constipation for ≥ 4 years. There was no significant difference in the parameters evaluated. In particular, duration of constipation did not predict response to fiber treatment.

Outcome in the 13 Children With Constipation Only

Thirteen children had constipation only for 1 to 10 years. The mean duration of constipation was 3.7 ± 2.9 years. The data of these 13 children with constipation and no encopresis are shown in Table 3. During the placebo treatment period, a significant improvement in stool consistency was reported by the parents and children, and 23% of the constipated children were treated successfully and rated as improved by the parent. During the fiber treatment period, stool consistency improved significantly as compared with the initial period: 69% were treated successfully, and 62% were rated as improved by the parent.

Significantly more children (69%) were treated successfully during the fiber treatment period as

TABLE 3. Outcome Data in 13 Children With Functional Constipation Only

	Initial (n = 13)	Placebo (n = 13)	Fiber (n = 13)
Frequency of BMs/wk	4.1 ± 2.6	4.4 ± 2.8	4.8 ± 3.4
Children with <3 BMs/wk	38%	46%	31%
Stool consistency	0.2 ± 0.4	$1.0 \pm 0.8^\dagger$	$1.5 \pm 1.1^\ddagger$
Presence of abdominal pain	46%	54%	8% [†]
Children on laxatives	31%	31%	31%
Daytime wetting	38%	38%	38%
Nighttime wetting	8%	8%	8%
Successful treatment*	0%	23%	69% ^{††}
Improved (parents' rating)	0%	23%	62% [†]

* Successful treatment was rated by the physician and was defined as ≥ 3 BMs/wk and ≤ 1 soiling episode/3 wk with no abdominal pain.

[†] $P < .05$ as compared with initial data.

^{††} $P < .05$ as compared with placebo treatment.

TABLE 4. Outcome Data in 18 Children With Functional Constipation and Encopresis

	Initial (n = 18)	Placebo (n = 18)	Fiber (n = 18)
Frequency of BMs/wk	2.7 ± 1.4	3.5 ± 1.6	$4.3 \pm 1.2^\ddagger$
Children with <3 BMs/wk	56%	44%	11% [†]
Stool consistency	0.4 ± 1.1	$1.4 \pm 0.9^\dagger$	$1.4 \pm 0.8^\ddagger$
Presence of abdominal pain	50%	33%	11% [†]
Children on laxatives	78%	78%	78%
Children with encopresis	100%	83%	72% [†]
Frequency of soiling episodes/wk	9.9 ± 12.3	$4.2 \pm 4.8^\dagger$	$4.0 \pm 6.3^\ddagger$
Daytime wetting	17%	17%	17%
Nighttime wetting	28%	28%	28%
Successful treatment*	0%	6%	28% [†]
Improved (parents' rating)	0%	6%	78% ^{††}

* Successful treatment was rated by the physician and was defined as ≥ 3 BMs/wk and ≤ 1 soiling episode/3 wk with no abdominal pain.

[†] $P < .05$ as compared with initial data.

^{††} $P < .05$ as compared with placebo treatment.

compared with 23% during the placebo period ($P < .05$). Parents rated 8 (62%) children as doing better during the fiber treatment period as compared with 3 (23%) during the placebo treatment period ($P > .1$).

Outcome in the 18 Children With Constipation and Encopresis

Eighteen children had constipation with encopresis. They had constipation for 4.2 ± 2.3 years and encopresis for 1.8 ± 1.3 years. The data of these 18 children with constipation and encopresis are shown in Table 4. During the placebo treatment period, significant improvements were reported in stool consistency and frequency of soiling episodes per week. Only 1 child was treated successfully. One parent reported improvement during the placebo period.

During the fiber treatment period, the frequency of BMs per week, stool consistency, soiling frequency, and number of children with abdominal pain and soiling improved significantly ($P < .05$). Five (28%) children were treated successfully. Fourteen (78%) parents reported that their child improved during the fiber treatment period. Frequency of BMs per week and parent rating of improvement was significantly higher during fiber treatment as compared with placebo treatment ($P < .05$).

Outcome in 13 Children With Constipation Versus 18 Children With Constipation and Encopresis

Children with constipation only were significantly more likely to be treated successfully with fiber (69%) than those with constipation and encopresis (28%; $P < .04$).

DISCUSSION

In this double-blind, randomized, placebo-controlled study, we found that fiber was beneficial in children with constipation with or without encopresis. Significantly fewer patients had <3 BMs/wk and complaint of abdominal pain ($P < .02$) while on fiber, significantly more children were treated successfully while on fiber (45% vs 13%; $P < .02$), and parents rated that significantly more children had improved

while on fiber (68% vs 13%; $P < .001$). Significantly fewer children with constipation only complained of abdominal pain, and more children were treated successfully with fiber as compared with placebo ($P < .05$). Frequency of BMs per week and parent rating of improvement were significantly higher during fiber treatment as compared with placebo treatment in the 18 children with constipation and encopresis ($P < .05$). Children with constipation only were significantly more likely to be treated successfully with fiber (69%) than those with constipation and encopresis (28%; $P < .04$).

The number of children with encopresis decreased significantly during the fiber treatment period ($P < .05$). In addition, the number of encopresis episodes per week decreased significantly during the fiber as well as during the placebo treatment. Therefore, the improvement in encopresis may be attributable in part to the behavior management, which included frequent toilet sitting.

Fiber is arbitrarily divided into those that are water soluble and those that are water insoluble. Most common foods have a mixture of soluble and insoluble fiber, with approximately 25% to 35% of the total fiber being soluble.¹³ Many of the physiologic effects are linked to the water-soluble form. Others reported that there is no advantage to either soluble or insoluble fiber.¹⁴ Glucomannan is a water-soluble fiber. Connected with the solubility of a fiber is its fermentability.¹⁵ Increases in microbial mass from fiber fermentation contribute directly to stool bulk, which is a large part of the stool weight.¹⁵ Bacterial degradation of these soluble forms and the bacteria themselves may increase the fecal mass.^{16,17} The increase in water content and the bacterial proliferation are 2 of the more prominent mechanisms by which fiber affects gastrointestinal transit time and BMs, which may be softer and more frequent.^{18–20} The effect of fiber on the gastrointestinal tract varies, and even the same type of fiber may have varied effect dependent on the type of fiber and the way it is processed.^{16,21} Most fiber studies conducted in adults have evaluated the effect of fiber supplementation on total and colonic gastrointestinal transit time. Significant reduction in transit time was reported when the diet of adults without constipation were supplemented with fiber.^{18–20} Badiali et al²² found that wheat bran was more effective than placebo in improving bowel frequency and total colonic transit time in constipated adults, but neither the occurrence nor the severity of the most frequent accompanying symptoms of chronic constipation differed significantly between placebo and bran treatment. Ashraf et al²³ reported that psyllium increased stool weight and stool frequency but did not change the colonic transit time in constipated adults. Metcalf et al²⁴ and Chaussade et al²⁵ observed no significant effect of fiber on gastrointestinal transit time in adults.

Despite the helpful influence that dietary fiber can have on reducing the risk of chronic disease, the intake remains low in many populations worldwide, in particular in the United States. The dietary recommendation for children older than 2 years is to consume a minimal amount of dietary fiber equivalent

to age in years plus 5 g/day.²⁶ The dietary fiber preferably should come from food rather than from supplements. Most children, healthy as well as constipated children, do not eat an adequate amount of fiber. McClung et al²⁷ found that even in health-conscious families, approximately half of the children did not receive the recommended daily grams of fiber. We used 100 mg/kg body weight of glucomannan, a similar dose as used by Staiano et al¹² but a lower dose than the new dietary recommendation.²⁶ Staiano et al¹² had treated 10 neurologically impaired constipated children with glucomannan, 100 mg/kg body weight. They found that glucomannan improved the stool frequency but had no effect on total and segmental transit times.

Roma et al²⁸ found that low dietary fiber intake correlated with chronic constipation in Greek children and was independent of other nutrients. This correlation was found in all age groups (ages 2–14 years). Only cellulose and pentose of the main fiber fractions were independently correlated with chronic constipation. They suggested that low fiber intake may not be a causative factor for the onset of constipation in all cases, but it is an important factor for the maintenance of constipation.²⁸ Similarly, Morais et al²⁹ found that low dietary fiber intake was a risk factor for chronic constipation in children in Brazil. They found a large overlap between control and constipated children, indicating that other factors also contributed to the pathophysiology in constipated children. Zaslavsky et al³⁰ did not detect significant differences in daily fiber intake between healthy and constipated adolescents in Brazil.

Olness and Tobin³¹ reported that constipation resolved in 60 constipated children within an average of 4.3 weeks when given bran and a very restricted diet, excluding all milk products. Seven (39%) of 18 children continued with encopresis. The addition of bran alone was not adequate to control the constipation.

In a study to evaluate the safety of supplemental fiber in the treatment of childhood constipation, a group of 16 constipated children (2–12 years of age) were studied. They received 0.25 g of fiber/kg body weight/day for 6 months. It was found that increased fiber intake can be used safely in children >2 years of age without concerns for deleterious effects on growth rate or trace mineral or fat-soluble vitamin status.³² Anaphylactic symptoms after eating a psyllium-containing cereal had been reported previously.³³ No potential serious reactions were reported in our children during the 4-week trial.

In summary, we found glucomannan to be beneficial in the treatment of constipation with and without encopresis in children. Symptomatic children already on laxatives still benefited from the addition of fiber. Therefore, we suggest that we continue with the recommendation to increase the fiber in the diet of constipated children.

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