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The Tip of the Iceberg: The Prevalence of Functional Gastrointestinal Diseases in Children

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The understanding of abdominal pain, irritable bowel syndrome, and other functional gastrointestinal diseases (FGIDs) in children remains in its infancy, but significant progress has been made recently.¹ The concept of functional abdominal pain has evolved from a diagnosis of exclusion in patients with no organic disease to a positive diagnosis defined by symptom-based diagnostic criteria.² Functional abdominal pain and other FGIDs follow the paradigm offered by the biopsychosocial model, in which biological, psychological, and social factors play significant roles in human functioning in the context of disease or illness.³

Abdominal pain and other FGIDs have a significant impact in clinical practice, accounting for more than 50% of the consultations in pediatric gastroenterology and 2% to 4% of all general pediatric office visits.^{1,4} There is an apparent association between childhood functional abdominal pain and short-term and long-term comorbidities including depression, anxiety, lifetime psychiatric disorders, social phobia, and somatic complaints.^{5,6} It also has been suggested that children with chronic abdominal pain miss more school than healthy children, and absenteeism has been identified as a precursor to undesirable outcomes in adolescents, including diminished academic performance, school dropout, substance abuse, and violence.^{5,7} Functional abdominal pain can have long-lasting health consequences; quality-of-life measures are poorer in patients with FGID compared with the general population and patients with many other chronic conditions, including asthma and migraine.⁸ Children affected with abdominal pain also reported more abdominal and other somatic pain, functional impairment, and psychiatric symptoms than controls at 5-year follow-up.⁹ Long-term studies have found persistence of abdominal pain into adulthood in 1/3 to 1/2 of affected children.⁵

Despite the significant impact of functional abdominal pain, little information exists on its prevalence in a nonselected population of children. Most information is based on small studies that had many methodological limitations. It also is known that adults who consult a physician for FGIDs represent merely the tip of the iceberg—only a fraction of those affected seek medical attention.^{10,11} No similar information from well-designed studies is available in children, however.

It is within this framework that this issue of *The Journal* presents 2 important studies related to functional abdominal pain and other FGIDs in children. Saps et al¹² report on the prevalence of abdominal pain and other somatic complaints in school-age children, and Teitelbaum et al¹³ report that children with high body mass index (BMI) have a higher prevalence of FGIDs compared with normal control populations.

Saps et al completed a landmark study to establish the prevalence of abdominal pain in a nonselected population of school-age children (third to eighth grade). In this prospective cohort study, participants completed validated age-appropriate weekly questionnaires that addressed gastrointestinal and other symptoms. Other factors analyzed included school absenteeism, medical care utilization, anxiety, depression, functional disability, quality of life, somatization, and coping. One particularly interesting aspect is that the authors captured the children's perceptions of their parents' responses.

The study design is unique, providing an accurate, nonbiased picture of the prevalence of abdominal pain over time.¹² Furthermore, the use of weekly questionnaires limits the effect of recall bias. Somatic complaints and abdominal pain were very common. The weekly prevalence of pain was 38%, and 90% of the children reported at least 1 pain episode. Pain persisted for 4 weeks in 52% of the respondents, for 8 weeks in 24%, and for 12 weeks in 18%. Abdominal pain was associated with poorer quality of life; increased psychological comorbidities, school absenteeism, and parental work absences; and high cost. Interestingly, only 4 children sought medical attention, corroborating the findings of adult studies that only a minority of affected persons seek medical attention.

The prevalence reported by Saps et al is higher than reported previously. In a large population-based cohort study of unselected children age 2 to 6 years, the prevalence of abdominal pain was 11.8%, but prevalence was lowest in those age 2 years (3.8%) and 3 years (6.9%).¹⁴ Another study found prevalences of 8% in middle school children and 17% in adolescents.¹⁵ In the Add Health Study, a recent prospective, cross-sectional study of approximately 20 000 adolescents, 3.2% reported daily pain, 15% reported pain occurring more than twice a week, and 14% reported abdominal pain as moderate in frequency.⁵ That study also found that the children with daily pain also were more likely to miss school and have associated depression. One possible explanation for the differences between these findings and those of Saps et al could be related to the fact that only 50% of available students responded in the study of Saps et al. Given that we are not given any details about the symptoms or other characteristics of the nonresponders, we cannot exclude the possibility of a selection bias favoring those families in which abdominal pain was more prevalent.

The impact of abdominal pain on children is dependent not only on the child's internal makeup and coping characteristics,¹⁶ but also on environmental factors, and is influenced by parental perceptions, interactions, and expectations.¹⁷ Parents' ill health and anxiety have been identified as possible crucial risk factors for the onset of abdominal pain in children and also may have a significant affect on the course of the disorder. There may be differences in the ways in which parents respond to children with abdominal pain when ill, leading to the suggestion that reinforcement of symptoms may play a role, along with modeling of illness behavior. Both of these effects may be more likely in parents who are anxious or have increased concerns about their own health as well as their children's health. Parents in this situation may have increased sensitivity to their children's symptomatic complaints; in some studies, maternal anxiety was the most consistent predictor of subsequent adverse outcomes for these children.¹⁸ Another limitation of the present study is that it does not provide any information about the parents or the environment, preventing us from drawing any conclusions about the influence of those factors on the prevalence and reaction to abdominal pain in the children whom participated.

It is interesting to note that in the study by Saps et al, only a small percentage of children with abdominal pain were brought for medical attention. The factors that motivate parents to seek medical consultation for their children are not known. In adults, it has been shown that the decision is influenced by the severity of the pain, the presence of distressing

psychological symptoms, and exposure to stressful life events.¹⁹ There is limited information in children, but recent studies have suggested that the decision to take the child to the doctor is best predicted by maternal psychological distress and children's perceived pain severity.¹⁹ Mothers' psychological distress does not seem to correlate with pain severity in their children.

The next question that needs to be addressed is how to prevent abdominal pain from becoming a chronic condition and thus decrease its overall impact. Can we identify children and families at risk? Given that parental psychological factors also influence care utilization in their children, reducing parental anxiety and stress may be beneficial. One opportunity to intervene rests on the well-child pediatric visit, during which children's and parents' traits associated with worsening and perpetuation of abdominal pain may be identified. There also may be opportunities to intervene at school, with the help of school nurses. It has been shown that nurses' perceptions have a major influence on what happens to children who present with abdominal pain at school. Thus, educating and working closely with school nurses may decrease school absenteeism.²⁰

Also in this issue of *The Journal*, Teitelbaum et al measured BMI in new patients age 2 to 20 years referred to a pediatric gastroenterologist and compared the prevalence of FGIDs in these patients (ascertained by Rome II criteria) and healthy patients from a pediatric practice that were age- and sex-matched, as well as another control group from the 2005 New Jersey Student Health Survey of Middle and High School Students.¹³ They found a greater percentage of FGIDs, including constipation, gastroesophageal reflux disease (GERD), irritable bowel syndrome, fecal soiling, and functional abdominal pain, in obese patients compared with control populations. The implications of these findings are evident given the rising prevalence of obesity in the pediatric population. The exact relationship between obesity and functional bowel disease has not yet been well established. Given that both conditions are highly prevalent, establishing whether a true association exists may be difficult, and in the present study there also may be a potential selection bias.

In adults, the association between obesity and GERD appears to be strong, but the literature reports inconsistent findings for other functional bowel diseases.²¹ Very limited information on this is available in children, although constipation appears to be more prevalent in obese children.^{22,23} An increased prevalence of FGIDs in obese children also may have a major impact, possibly exacerbating the psychological issues. The medical consequences can be even greater, however, because the presence of FGIDs may not only increase medical utilization and decrease quality of life, but also have important effects on patients' long-term health, particularly those with GERD. Adult data demonstrate a correlation between increased incidence of Barrett's esophagus and the obesity epidemic.²⁴ To date, no pediatric studies have found an increased prevalence of Barrett's esophagus in overweight children, but more children may develop this complication as the obesity epidemic expands and reflux severity increases. Given that Barrett's esophagus has a premalignant potential, this may have a profound impact on the long-term care of overweight children.

The epidemiologic evidence suggests possibly more than a coincidental association between obesity and FGIDs. The next question that arises is the possibility that both may share an underlying mechanism.²¹ Given the established association with GERD, it has been suggested that obese patients are more likely to receive proton pump inhibitors, which in turn may lead to bacterial overgrowth by eliminating gastric acid, resulting in bloating, dyspepsia, constipation, and abdominal pain.²⁵ Other possible associated mechanisms include altered gastric function²¹ and alterations in neuropeptide function. Lower ghrelin levels have been found in obese individuals compared with normal-weight controls.²⁶ Given that ghrelin has been found to potentiate phase III-like gastric contractions, increase gastric

acid secretions, increase gastric emptying, and regulate energy homeostasis, altered ghrelin levels possibly may lead to both obesity and gastrointestinal dysfunction.²⁷

Another important question when trying to establish an association between obesity and FGIDs is whether the functional symptoms improve once the obesity is controlled. No available pediatric studies address this question. In adults, the only improvement that has been clearly shown is in those with GERD;²¹ the improvement of other FGIDs after weight loss has been inconsistent. Data from studies of patients after bariatric surgery seem to suggest a greater improvement in FGIDs after surgery, although whether the improvement is related to psychological factors is not clear.²⁸

Studies like those of Saps et al and Teitelbaum et al are important additions to the growing body of literature on FGIDs in children, and they should help open the eyes of the pediatric community about these disorders' wide prevalence and their major impact on children's health. A major emphasis on understanding the pathophysiology of FGIDs is needed to improve their prevention and treatment.

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Glossary

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| BMI | Body mass index |
| FGID | Functional gastrointestinal disease |
| GERD | Gastroesophageal reflux disease |