The role of food intolerance in functional gastrointestinal disorders in children

Background
Functional gastrointestinal disorder (FGID) is a common, benign, chronic diagnosis that has a significant negative impact on quality of life. FGIDs that develop in childhood can persist into adulthood. Currently, there is no cure and few treatment options are available.

Objective
This article provides an outline of current research supporting the role of food intolerance in children with FGIDs.

Discussion
Food intolerances have long been reported by patients with FGIDs; however, randomised controlled trials are lacking in this area. Food intolerances that have been investigated include intolerance to food chemicals, lactose, fructose and, more recently, fermentable carbohydrates, termed FODMAPs. The low-FODMAP diet eliminates poorly absorbed short-chain carbohydrates and has a clearly defined mechanism of action. Emerging evidence suggests it alleviates symptoms in adults with irritable bowel syndrome and, potentially, also in children. However, more evidence is required for the efficacy of the diet in children and in other subgroups of FGID. Any dietary restriction in growing children should be undertaken with clinical supervision by a dietitian.

Scope of the problem
A functional gastrointestinal disorder (FGID) is defined by the Rome III criteria as a variable combination of chronic or recurrent gastrointestinal symptoms, such as diarrhoea, constipation and abdominal pain, which are not explained by structural or biochemical abnormalities. Prior to the 2006 Rome III criteria, most paediatric studies considered the broader definition of recurrent abdominal pain (RAP) and these studies found RAP was prevalent in 8–25% of school-aged children. More recent studies found that RAP accounts for about 5% of childhood consultations in general practice and only approximately 50% of these are attributable to a FGID. The true epidemiology of FGIDs is unknown as only 10–46% of affected individuals seek medical attention.

Although a benign diagnosis, FGIDs have a significant effect on a child’s quality of life, with data showing the quality of life of children with a FGID is similar to those with active inflammatory bowel disease. FGIDs have a negative impact on a child’s school performance, sports and social activities. This translates to considerable health costs, including increased medical consultations, sick leave and work/school absenteeism. Given that FGIDs are chronic and the burden lifelong, childhood cases are likely to persist into adulthood, thereby affecting quality of life in the long term.

Diagnosis
All FGIDs are diagnosed using validated symptom-based clinical criteria (namely, the Rome III criteria). Simple laboratory and endoscopic tests are used to eliminate organic bowel diseases, including coeliac disease, inflammatory bowel disease, food allergy, eosinophilic oesophagitis, colorectal cancer and gastroenteritis, symptoms of which are similar to FGIDs. It is important to note that the diagnosis of FGID remains a diagnosis of exclusion. This review is concerned with FGID with associated abdominal pain, which includes functional dyspepsia, irritable bowel syndrome (IBS), abdominal migraine and childhood functional abdominal pain.
Despite FGIDs being chronic and debilitating, few treatment options are available and those options have a low and variable success rate. FGIDs present a significant therapeutic challenge because of their wide range of symptomatology, poorly understood aetiology and, hence, a lack of pharmacological targets. However, IBS, the most common FGID,\(^1\) has garnered the most attention with respect to the role of food intolerances in symptom generation, albeit limited attention with respect to controlled trials in children.

**Food intolerance**

The term food intolerance can be defined as a non-immunologically mediated adverse reaction to food, which can be resolved following dietary elimination of the suspected food and reproduced by the food challenge.\(^10\) There are no known biological markers that confirm food intolerance.\(^10,11\) Food intolerances are not life-threatening and most individuals with food intolerances can tolerate small amounts of the ‘trigger’ food in their diet without ill effect. The elimination of a suspect food or foods from an individual’s diet is not a cure but, rather, a means to providing symptom relief.

Two out of every three adults with IBS report that eating certain foods triggers symptoms.\(^12\) Furthermore, the greater the severity of IBS symptoms, the more foods in the suspect patients identify as being responsible for the symptoms.\(^13\) Similarly, children have reported that certain foods exacerbate symptoms.\(^12\) Furthermore, the greater the severity of IBS symptoms over the 3-hour period following the fructose load. Further, the 11 patients with a positive breath test were asked to follow a restricted fructose diet and 81% reported immediate symptom improvement. In particular, abdominal pain and bloating continued to be significantly reduced 2 months after the initial breath test. Similarly, in a larger study Escobar et al\(^20\) recruited 121 children with functional abdominal pain and a positive hydrogen breath test for fructose intolerance, instructed them on a low-fructose diet and found 77% reported resolution of symptoms.

In 2005, a therapeutic diet emerged that aimed to minimise poorly absorbed short chain carbohydrates, denoted by the acronym FODMAPs (fermentable oligo-, di-, monosaccharides and polyols).\(^21\) Table 1 shows the five FODMAP groups, their malabsorption rates and examples of food sources. Interestingly, fructose and lactose are two of the five FODMAP groups highlighted for restriction in this diet. It is important to note, however, that the low-FODMAP diet involves investigation as to which groups prove to be problematic in any individual and therefore restriction is only recommended for carbohydrate groups that elicit symptoms, rather than across all FODMAP groups. This ensures a diet that can be liberalised over time, with challenges to determine an individual’s threshold for tolerance.

A low-FODMAP diet alleviates gastrointestinal symptoms by reducing the amount of undigested carbohydrate that presents to colonic bacteria. Less fermentation results in decreased abdominal bloating and pain, as well as less flatulence. Ong et al\(^22\) found that malabsorption of FODMAPs is not more common in people with IBS than those without IBS; however, people with IBS produce more gas and report more symptoms.

Initial studies in adults showed that reducing FODMAPs in an individual’s diet led to a significant decrease in symptoms of IBS.\(^23\) Subsequently, a randomised controlled crossover trial by Shepherd et al\(^23\) has shown that dietary FODMAPs triggered IBS symptoms in 25 adult participants. More recently, Halmos et al\(^23\) conducted a double-blind randomised controlled crossover trial that compared a low FODMAP diet with a standard, nutritionally balanced Australian diet in 30 adults with IBS. They found that a low-FODMAP diet significantly improved satisfaction with stool consistency, and decreased bloating, abdominal pain and breath hydrogen. These data from randomised controlled trials support that a low-FODMAP diet warrants...
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There is emerging evidence for consideration of a low-FODMAP diet when treating children with abdominal pain related to FGIDs. Chumpitazi et al conducted a double-blind randomised controlled trial of 54 children with IBS, aged 7–17 years. They compared a low-FODMAP diet to a high-FODMAP diet using a crossover design and found fewer episodes of abdominal pain, less bloating, less nausea and lower breath hydrogen production after only 2 days on the low-FODMAP diet. Further studies in children are needed to confirm these findings and, as with adults, to determine the value of the low-FODMAP diet in other forms of FGID.

Practicalities of food elimination diets

Following any dietary restriction has risks and there is evidence that food elimination diets can result in weight loss, failure to thrive, food aversions, eating disorders and an increased risk of nutritional deficiency, especially in those who adhere long term to strict dietary eliminations. The risk of nutritional deficiency is magnified in growing children, which highlights the importance of clinical supervision to ensure adherence to a balanced diet. Consultation with a dietitian will help ensure maximum liberalisation of an individual’s long-term diet.

Challenges of managing FDIG

Table 2 presents typical clinical scenarios of paediatric FGIDs and outlines appropriate management strategies.

Conclusion

Although patients report that certain foods trigger symptoms of FGIDs, there are limited data to support the role of food intolerance in the literature. While there is some evidence suggesting a role for dietary therapies when treating children with FGIDs, much of what we know currently is extrapolated from studies involving adults. There is increasing evidence from randomised controlled trials to support the low-FODMAP diet for adults with abdominal pain related to FGID and, more recently, has emerged for children. It is noted that any elimination diet should be undertaken with clinical supervision, especially in growing children. More research is needed to establish the efficacy of the low-FODMAP diet in children with FGID and which subtypes of FGID are most likely to respond to a low-FODMAP diet. Literature addressing the role of food chemical intolerances is scarce, and further studies are needed.

Key points

- More randomised controlled trials are needed to address the therapeutic role of food intolerance in the treatment of children with FGIDs.
- The low-FODMAP diet is emerging as a successful dietary therapy for adults with IBS, with somewhat less evidence for children.
- More research is needed to establish whether other subtypes of FGID also respond to a low-FODMAP diet, and to investigate other potential food intolerances.
- Care should be taken with dietary restrictions especially in growing children and clinical supervision by a dietitian is strongly recommended.

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