Subtypes of Irritable Bowel Syndrome in Children: Prevalence at Diagnosis and at Follow-Up

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Objectives To assess the prevalence of irritable bowel syndrome (IBS) subtypes in childhood at diagnosis and their changes over 1 year.

Study design This is an observational, prospective, multicenter study. Consecutive pediatric patients with IBS, according to Rome III criteria, were enrolled over a 1-year period. Parents recorded weekly stool frequency and consistency and gastrointestinal and extraintestinal symptoms in a diary. Stool consistency was scored according to the Bristol Stool Form Scale. Children were evaluated after 2, 3, 6, and 12 months.

Results We enrolled 100 children with IBS (median age 9.9 years, range 4.2-16.7 years, 52 girls and 48 boys). At time of enrollment, constipation-IBS was the prevalent subtype (45%), with a prevalence of girls at 62% ($P < .005$); diarrhea-IBS was reported in 26% of children, with a prevalence of boys at 69% ($P < .005$); and alternating-IBS was described in 29% of children, without a difference between sexes. During the follow-up, 10% of patients changed their IBS subtypes at 2 months, 9% at 3 months, 7% at 6 months, and 6.3% at 12 months. Twenty-four percent of patients changed IBS subtype between the time of enrollment and 12 months.

Conclusions Constipation-IBS is the prevalent subtype in children, with a higher frequency in girls. In boys, diarrhea-IBS is the most common subtype. It is important to acquire knowledge about IBS subtypes to design clinical trials that may eventually shed new light on suptype-specific approaches to this condition. *(J Pediatr 2014;164:1099-103).*

Irritable bowel syndrome (IBS), as described by using the Rome criteria, includes symptoms of abdominal pain or discomfort accompanied by changes in bowel patterns.[1,2] Studies have estimated the prevalence of IBS to range between 6% and 14% in children and between 22.0% and 35.5% in adolescents.[3,4] A confident diagnosis, confirmation, and explanation of pain experience and reassurance can by itself be therapeutic.[5] Specific goals of therapy include modifying severity and developing strategies for dealing with symptoms.[1] In adults, the Rome III committee recommends a subclassification into different subtypes based on the predominant bowel habit (constipation-IBS [C-IBS] or diarrhea-IBS [D-IBS]).[6] Different authors[7] consider that patients with symptoms of both constipation and diarrhea should constitute an alternating-IBS (A-IBS) or a mixed-IBS subtype.

A systematic review showed that the clinical course of IBS is highly heterogeneous because IBS clinical subtype distribution differs depending on the population evaluated, the geographical location, and the criteria used to define IBS and bowel habit subtypes. In most cases, clinical course is characterized by the presence of mild-to-moderate symptoms appearing sequentially.[8] A recent study in adults showed that the distribution of IBS subtypes is stable over time in most of the patients, although 30%-40% of patients with IBS changed intestinal pattern at least once during a 2-week period.[9]

As reported in guidelines and review articles, drug therapy in IBS should be chosen on the basis of the predominant bowel symptom.[10-13] Only 1 study performed in pediatric patients in Sri Lanka showed an equal distribution of IBS subtypes.[14]

The aims of the present study were to establish the predominant IBS subtypes in children at diagnosis and to observe the changes over time of IBS subtypes.

Methods

Patients eligible for the study were children aged 5-17 years who were referred for abdominal pain and subsequently received a diagnosis of IBS at 1 of 5 different Italian pediatric clinics—University of Naples "Federico II", University of Foggia, Hospital-University of Parma, University "Magna Graecia" of Catanzaro, and University of Insubria, Varese—between January 2010 and January 2012. IBS was diagnosed

5-HT	5-hydroxytryptamine
A-IBS	Alternating-irritable bowel syndrome
C-IBS	Constipation-irritable bowel syndrome
D-IBS	Diarrhea-irritable bowel syndrome
FGID	Functional gastrointestinal disorder
IBS	Irritable bowel syndrome

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using the Rome III criteria for pediatric functional gastrointestinal disorders (FGIDs).[1] Exclusion criteria were: (1) FGIDs other than IBS; (2) any underlying chronic disorders; (3) cerebral palsy; (4) delayed psychomotor development; and (5) children who had received drugs that modify bowel habits, such as probiotics, laxatives, and antidiarrheals, during the previous month.

An informed consent was obtained at enrollment from parents of all children younger than 10 years and from both parents and children if older than 10 years. The study was approved by the independent ethics committees of all participant centers.

The study had a multicenter, observational, prospective design. At the first visit (T0 [enrollment]), a medical history was collected and all patients underwent clinical evaluation, laboratory tests (full blood cell count, inflammatory markers, antitransglutaminase and antiendomysial antibodies, fecal calprotectin), and a trial with a lactose-free diet for 2 weeks, to exclude lactose intolerance. Information regarding abdominal pain characteristics, bowel habits, and associated symptoms were recorded using a previously validated self-administered questionnaire. The questionnaire was developed according to the Rome III diagnostic questionnaire for pediatric FGIDs.[15] Parents received a diary in which to record weekly stool frequency and consistency, the presence of specific behaviors during the evacuation such as retentive posturing or excessive volitional stool retention, and the presence of gastrointestinal symptoms. A score of the stool consistency was subsequently attributed according to the Bristol Stool Form Scale.[16] Patients were subclassified in different subtypes of IBS based on the adult Rome III classification, due to the lack of a classification in the pediatric age.[6] Children were prospectively evaluated at 2 (T1), 3 (T2), 6 (T3), and 12 (T4) months after enrollment. At each visit, the interim history was assessed, weekly diaries were reviewed and discussed, a physical evaluation was performed, and the children and/or their parents were asked to again complete the IBS symptoms questionnaire. If a child did not return for a planned follow-up visit, follow-up data were obtained through a telephone call by the authors.

After inclusion in the study, all children were treated with reassurance and with lifestyle changes provided by means of oral and written instructions; in particular, families were explained that IBS is a functional bowel disorder in the absence of any organic cause and were educated to face episodes of abdominal pain by attempting to reduce the patient's anxiety and worries. Furthermore, children were invited to play sports and encouraged to practice outdoor activities,[17] they were recommended to eliminate excess of fructose and spices from the diet,[18-20] and they were encouraged to consume a regular fiber diet (age in years plus 5 g/day)[21,22] by means of written recommendations (**Appendix**; available at www.jpeds.com). No drug treatment was started during the follow-up period.

Compliance with these recommendations and failure to take other forms of therapy were assessed at each follow-up visit by examination of the diary completed by patients and/or their parents.

Statistical Analysis

Statistical analysis was carried out using SPSS statistical software package for Windows (13.0; SPSS Inc, Chicago, Illinois). A value of $P < .05$ was considered as significant. Fisher exact test was used to assess the prevalence of symptoms in the 3 groups.

Results

Of 113 patients eligible for the study, 11 (9.7%) declined participation. Two children (1.8%) were excluded from the study because they improved after the 2-week lactose-free diet trial. In all subjects, laboratory findings were unremarkable. No children changed from IBS to another FGID during the study period.

We enrolled 100 children with diagnosis of IBS (48 boys and 52 girls, median age 9.9 years, range 4.2-16.7 years). Median time between onset of symptoms and diagnosis was 6.2 months (range 2-10 months).

At the time of enrollment (T0), C-IBS was the prevalent subtype, present in 45 of 100 children (45%), with a prevalence of 62% in girls (28/45; $P < .05$); D-IBS was reported in 26 of 100 (26%) children, with a prevalence of 69% in boys (18/26; $P < .05$); and A-IBS was described in 29 of 100 children (29%), with no significant difference in prevalence between sexes. The prevalence of the different subtypes at diagnosis is shown in **Figure 1**.

At diagnosis, 41% of patients had difficulty falling asleep, 53% of patients reported recurrent absences from school and/or interruption of their activities, 32% of patients had joint pain, and 43% had headache. Difficulty falling asleep, absences from school and/or interruption of activities, and the other reported extraintestinal symptoms were not significantly related to IBS subtype (**Table I**).

At 2-month follow-up (T1), 10 of 100 (10%) patients presented changes in IBS subtypes: 3 from C-IBS to D-IBS, 3 from A-IBS to C-IBS, and 4 from A-IBS to D-IBS. At 3-month follow-up (T2), 9 of 100 (9%) patients presented

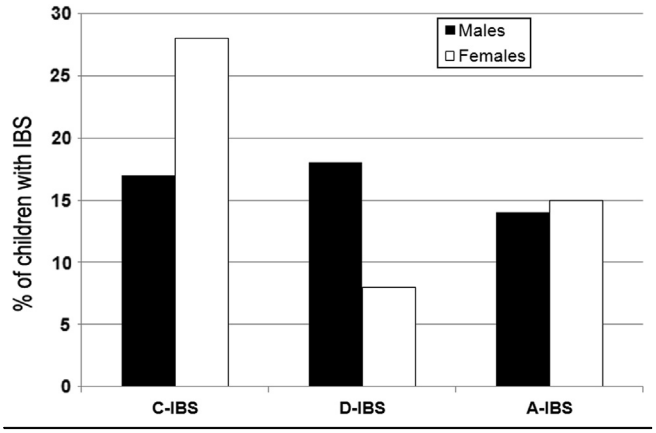

Figure 1. Prevalence of the different IBS subtypes and distribution according to sex at diagnosis.