



# A Population-Based Study on the Epidemiology of Functional Gastrointestinal Disorders in Young Children

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**Objective** To perform a population-based study with Rome III criteria to describe the prevalence of functional gastrointestinal disorders (FGIDs) in children in Colombia.

**Study design** We conducted a multicity cross-sectional study to investigate the epidemiology of FGIDs in children 0-48 months of age using the Rome III criteria in Colombia. Children with organic medical diseases were excluded. Parents provided demographic information and completed the Spanish version of the Questionnaire on Pediatric Gastrointestinal Symptoms for Infants & Toddlers.

**Results** Parents of 1231 subjects completed the questionnaires; 48 children were excluded due to presence of organic diseases and being older than 48 months of age. Four hundred eighty children (40.5%) were diagnosed with at least 1 FGID according to the Rome III diagnostic criteria (49% female, median 12 months). Functional constipation was the most commonly diagnosed disorder in infants (up to 12 months of age) and children of ages 13-48 months (16.1% and 26.8%, respectively). Analysis revealed that the prevalence of FGID was significantly greater in children who were the only child in the family ( $P = .003$ ), children who were first-born ( $P = .007$ ), and children with divorced or separated parents. ( $P = .001$ ).

**Conclusions** FGIDs are common in children younger than 4 years of age. Functional constipation and infant colic were the most common FGIDs in infants (up to 12 months of age), and functional constipation and rumination were the most common FGIDs in children 13-48 months of age. (*J Pediatr* 2016;179:139-43).

Functional gastrointestinal disorders (FGIDs) are common in children and adults.<sup>1,2</sup> Studies from the US,<sup>1,3-5</sup> Germany,<sup>6</sup> United Kingdom,<sup>7</sup> China,<sup>8</sup> Sri Lanka,<sup>9</sup> El Salvador,<sup>1</sup> Panama,<sup>10</sup> Ecuador,<sup>11</sup> and Colombia<sup>12</sup> have found a high prevalence of FGIDs in school-age children (range, 20%-29%). The prevalence in infants and toddlers largely is unknown. An international group of physicians, nutritionists, and educators who were surveyed on their perceived prevalence of FGIDs estimated that up to 30% of infants younger than 12 months had a FGID.<sup>1</sup> The survey found a great range of prevalence of FGIDs and heterogeneity in methods and definitions. Only 2 studies have used the Rome III criteria to diagnose FGIDs in infants and toddlers. None of these studies has been conducted in Latin America. A prospective study conducted in Italy and a large, cross sectional study in the US have investigated the prevalence of FGIDs in this age group by using the Rome III criteria.<sup>1,2</sup> The latter study found that 27% of infants/toddlers met criteria for at least 1 FGID.

Infection patterns and health care delivery vary by region. The use of antibiotics in the first 2 years of life,<sup>3</sup> intestinal and extraintestinal infections,<sup>4</sup> gastrointestinal allergies,<sup>5</sup> diet, breastfeeding time period, and early adverse life events<sup>6</sup> are likely to differ among countries. Ethnic differences, culture, parental beliefs, and coping abilities may affect the prevalence of FGIDs and the way the family and society relates to them. The Rome criteria are based on the report of clinical signs and symptoms, which at very young age are dependent exclusively on information provided by parents. Some of the criteria rely on the parents' interpretation of nonverbal child's behavior (painless or painful stools) and stool consistency (hard or unformed stools) and size (large diameter stools) that may vary by culture and the parents' own experience. Parental perception of illness and fears also are likely to vary by culture. The presence of FGIDs at early stages of life may have long-term consequences and influence the child's sick role in the family, perception of vulnerability, the family dynamics, parental quality of life, and health care use.<sup>7</sup>

The relevance of the aforementioned factors and their impact on the child and family life underscore the need for large studies that use standardized diagnostic criteria in children of different regions and ethnicity. Using the Rome III criteria, we conducted a multicity study to investigate the epidemiology of FGIDs in infants, toddlers, and children younger than 4 years of age in Colombia. Because of the dearth of data on the epidemiology of FGIDs in young children and the

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FGID	Functional gastrointestinal disorder
QPGS-III IT	The Rome III Functional Gastrointestinal Disorders Questionnaire for Infants and Toddlers

potential long-term implications of FGIDs, our study has the potential to fill an important void in the literature and help understand the pathogenesis of FGIDs in children.

## Methods

We performed a cross-sectional study in children 0-48 months of age presenting for a well-child visit at primary care clinics in Colombia. Colombia (northwest of South America) is the third-most populous country (48 million inhabitants) in Latin America, after Brazil and Mexico. The study was conducted in 4 geographically dispersed cities of various sizes; 2 large cities, Bogotá (population 6 840 116; Department of Cundinamarca) and Cali (population 2 119 908; Department of Valle del Cauca) and 2 small cities, Florencia (population 143 871; Department of Caquetá) and San Andrés de Sotavento (population 63 147; Department of Córdoba). Colombia is an ethnically and culturally diverse country, with its people descending from the original native inhabitants, Spanish colonists, Africans slaves, and immigrants from Europe and the Middle East. The climate in Colombia is varied but mostly tropical and isothermic as the result of its proximity to the equator. All the cities included in the study have a tropical-subtropical climate. These factors may be important at the time of comparing results of studies from different countries.

The Rome III Functional Gastrointestinal Disorders Questionnaire for Infants and Toddlers (QPGS-III IT) is a validated tool to diagnose FGIDs according to the Rome III criteria.<sup>7</sup> The questionnaire is only available in the English language. To conduct this study, first, the QPGS-III IT was translated into Spanish (QPGS-III IT-Spanish) and adapted to the local language by 3 bilingual physicians of the Functional International Digestive Epidemiological Research Survey. The Spanish version subsequently underwent reverse translation and was assessed for fidelity by comparison of the original English version of the QPGS-III IT with the translated version. Focus groups of mothers attending primary care clinics confirmed their understanding of the terms of the questionnaire.

Local nurses at primary care clinics invited all consecutive parents of children 1-48 months of age of both sexes (age group of infant/toddler version of the Rome III criteria) arriving for well child visits to participate in an epidemiologic study. Consenting parents received an explanation on the definitions and symptoms of FGIDs before completing the QPGS-III IT-Spanish. Parents/caregivers provided information regarding medical history and the sociodemographic (age, sex) and familial (family structure and size, family history of gastrointestinal disorders) variables of the participants. Subjects with organic medical diseases and those more than 48 months of age were excluded. The institutional review board and Human Subjects Committee of Universidad del Valle of Cali, Colombia, approved the study. The Rome III criteria are included in the [Appendix](#) (available at [www.jpeds.com](http://www.jpeds.com)).

## Statistical Analyses

Prevalence data were pooled from the 4 cities for the initial analysis. We evaluated group comparisons by using a 2-sample

*t* test and  $\chi^2$  test as appropriate. To evaluate possible risk factors for FGIDs, univariate analysis with OR calculation and logistic regression analysis were performed between each of the exposure variables of interest: the sociodemographic variables (age, sex), the familial variables (family structure and size, family history of gastrointestinal disorders), and the effect variable (presence or absence of FGIDs). *P* values of less than .05 were considered statistically significant.

## Results

Parents/caregivers of 1620 children were invited to participate. Of these, 1530 (94.4%) agreed to be included in the study. Parents of 1231 children (75.9%) completed the questionnaires. Twenty-four children (1.5%) were excluded from the study due to presence of organic disease (cow milk protein allergy, bronchopulmonary dysplasia, organic constipation, lactose intolerance, laryngomalacia, gastroesophageal reflux disease). Another 24 children (1.5%) were excluded due to being more than 48 months of age (wrongly included). A total of 1183 children (73%) were included in the study. ([Figure](#); available at [www.jpeds.com](http://www.jpeds.com)). There was no significant difference in age or sex between the children who participated in the study and those who were excluded from the study.

Participants had a mean age of 19.3 months  $\pm$  15.3 SD (median 15 months, range 1-48 months) and 585 (49.5%) were female participants ([Table I](#)); 527 children of ages 1-12 months, 276 children of ages 13-24 months, 186 children of ages 25-36 months, and 194 children of ages 37-48 months of age. Four hundred eighty children (40.5%) fulfilled the Rome III

**Table I. Sociodemographic and familial variables in the study population**

Age	
Age range	1-48 mo
Mean $\pm$ SD	19.3 $\pm$ 15.3 mo
Median age	15 mo
Sex	
Female	585 (49.4%)
Male	598 (50.6%)
Cities	
Cali	616 (52.1%)
Florencia	330 (27.9%)
Sotavento	119 (10.1%)
Bogotá	118 (10.0%)
Parents separated/divorced	
No	768 (64.9%)
Yes	415 (35.1%)
Only child	
No	597 (50.5%)
Yes	586 (49.5%)
First-born child	
No	564 (47.7%)
Yes	619 (52.3%)
Family history of FGIDs	
No	1174 (99.2%)
Yes	9 (0.8%)
Previous history of diarrhea	
No	1036 (87.6%)
Yes	147 (12.4%)

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