

Prevalence, possible associations and characteristics of functional gastrointestinal disorders in children between 2 and 4 years of age in Cali, Colombia

Jorge Luis Buitrago-Escobar, MD,¹ Carlos Alberto Velasco-Benítez, MD,^{2*} Eder Antonio Villamarín Betancourt, MD.³

¹ Pediatrician at the Universidad del Valle in Cali, Colombia

² Gastroenterologist and pediatric nutritionist, Professor at Universidad del Valle in Cali, Colombia

³ Pediatrician and Associate Professor at Universidad del Valle in Cali, Colombia

*Correspondence: carlos.velasco@correounivalle.edu.co.

Received: 12-02-18

Accepted: 13-04-18

Abstract

Introduction: Studies of functional gastrointestinal disorders (FGDs) among preschoolers are scarce. **Objective:** The objective of this study is to describe the prevalence, possible associations and characteristics of pre-school children with FGDs from private clinics and hospital outpatient clinics in Cali, Colombia. **Materials and method:** This is a descriptive study of prevalence in children between 2 and 4 years of age. The parents and/or guardians responded to the Rome III Criteria in Spanish. Sociodemographic, family and clinical variables were taken into account. The statistical analysis included measures of central tendency, two-tailed Student's t-tests, chi-square tests, Fisher's exact test, univariate and multivariate analyses, and calculation of ORs and 95% CI with $p < 0.05$ established as statistically significant. **Results:** One hundred eighty-eight children were included (3.4 ± 0.7 years, 51.6% male, 63.3% private consultation) The prevalence of FGDs was 39.9%, the prevalence of functional constipation was 36.2%, the prevalence of functional diarrhea was 2.7% and the prevalence of cyclic vomiting syndrome was 1.1%. The main symptoms were for functional constipation were two or less bowel movements per week and pain during defecation. Functional constipation was predominant when the patient had separated or divorced parents. **Conclusion:** The prevalence of FGDs was high and was the main cause of functional constipation. A possible risk factor is separated or divorced parents.

Keywords

Constipation, preschool, prevalence, digestive diseases, risk factors.

INTRODUCTION

Functional Gastrointestinal Disorders (FGDs) in infants and preschoolers are defined according to the Rome IV Criteria as diverse and variable combinations of recurrent or chronic gastrointestinal symptoms that, after adequate medical evaluation, are not attributable to other medical conditions. (1) These disorders are one of the main reasons that children are referred to gastroenterologist. (2) In addition, FGDs have significant impacts on the quality of life of patients and their families, as well as on the cost of health care. (3)

Given that there are no biochemical markers or structural abnormalities that can be used for objective diagnosis or

monitoring of the progression of these disorders, diagnosis is based on clinical history and physical examination. (1, 3, 4)

In children, diagnosis of FGD is based on the Rome Criteria. (3, 4) Incomplete development of verbal language makes it impossible to discriminate between emotional and physical discomfort among preschool children, so diagnosis depends on reports and interpretations of parents and doctors' observations doctor that for differentiation between healthy and ill children. (1, 5)

Reported prevalence rates in studies of FGD in preschool children according to the Rome III Criteria vary greatly, ranging from 26% to 52%. (2, 5-8) This variability in reported epidemiological studies is related to factors such as geographical

areas, genetic and cultural factors, and the populations studied. (6, 7, 9) Because the Rome IV Criteria are recent, there are few reports about infants and preschoolers, but 21.4% of children between 1 and 3 years of age in the United States are reported to have experienced at least one episode of FGD. (10)

One of the main limitations of epidemiological studies of FGD prevalence in preschoolers published to date has been the methods of patient recruitment. Many studies use either data from patient follow-ups after treatment for some pathology, or they use data from hospitalized patients in referral centers. As a result, these studies cannot be extrapolated to the general population. (6, 7)

Despite the benign nature of FGD, (1) it has been suggested that FGDs in early stages of life could have long-term consequences and influence a child's perception of vulnerability and family dynamics. (7, 9)

In the United States, increasing hospitalization rates of pediatric patients due to FGDs was reported from 1997 to 2009, and this resulted in increased costs for the health care system according to studies of these patients. (9)

This study's objectives are to identify the prevalence of FGDs according to the Spanish language version of the Rome III Criteria and to determine possible risk factors for FGDs and the characteristics of FGDs among children between the ages of two and four years at an outpatient clinic of a second-level care hospital and at a private medical practice in Cali, Colombia.

MATERIALS AND METHODS

This is a descriptive, observational, non-experimental cross-section prevalence study of children between two and four years of age who were treated between July 1, 2015 and June 30, 2016. Subjects had been treated at a second level public hospital's outpatient clinic for growth and development of healthy children and at a private medical practice in Cali, Colombia. The children's parents and/or guardians were interviewed using the Rome III Spanish-language Pediatric Gastrointestinal Symptoms Questionnaire for Infants and Preschoolers to identify FGD. This questionnaire has been validated in English and in Spanish. (11, 12) Other information collected included patients' ages and sexes; family information including whether or not the patient was an only child, the child's birth order, firstborn, whether or not parents were separated or divorced parents, and family history of FGDs, and clinical variables of previous bouts of diarrhea and type of stools according to the Bristol scale (1 and 2: hard, 3 to 5: normal, 6 and 7: liquid).

A sample size of 109 preschool children was calculated on the assumptions of an expected prevalence of 0.5% for functional diarrhea (FD) and 6.1% for cyclic vomiting syndrome (CVS) in accordance to the findings for Colombian

children of Chogle et al. (7) The margin of error was 0.05 with a 15% adjustment for loss of surveys and unanswered surveys.

The parents and/or guardians of children were interviewed with the Rome III Spanish-language Pediatric Gastrointestinal Symptoms Questionnaire for Infants and Preschoolers to determine whether children had symptoms compatible with FGD. The outcome variable, diagnosis of FGD, was determined according to the FGD scoring manual. FD was defined as long, large, unformed, recurrent and painless daily stools for at least 4 weeks with symptoms occurring between 6 and 36 months of age during waking hours but without failure to grow and with adequate caloric intake. Functional constipation (FC) was defined as one month of at least two of the following in a child under four years of age: two or fewer bowel movements per week, at least one episode of fecal incontinence after being toilet trained, a history of excessive stool retention, a history of pain or difficulty defecating, the presence of a large mass in the rectum, a history of stool sizes large enough to clog the toilet, and accompanying symptoms such as irritability, decreased appetite and/or early satiety which disappear immediately when stool is evacuated, CVS (two or more periods of severe nausea), and nausea or vomiting lasting for hours to days before return to usual state of health for weeks and months.

We excluded children who had any basic organic diseases including cardiac, respiratory, renal, central nervous system, congenital, metabolic, and hematological diseases, as well as premature children and children who failed to thrive.

The data were recorded in Excel 2011, and statistical analyses including averages, standard deviations and percentages were performed with Stata 10 (StataCorp, College Station, Texas). To determine prevalence and possible risk factors, the data were analyzed with a 2-tailed Student's t-test, a chi-square test (χ^2) and Fisher's exact test. For possible risk factors for FGD, univariate and multivariate analyses were performed and the odds ratios (OR) between the variable of interest and the effect variable were calculated. $p < 0.05$ was considered to be statistically significant.

This study was authorized by the ethics committee of the Universidad del Valle and the Hospital Mario Correa Rengifo in Cali, Colombia. In accordance with Article 11 of Resolution 8430 of October 4, 1993 of the Colombian Ministry of Health, this work is classified as risk-free. The parents or legal guardians of each child agreed to participate by signing written informed consent forms.

RESULTS

General Sociodemographic Characteristics

We included 188 children whose average age was 3.4 ± 0.7 years (range two to four years). The male: female ratio

was 1.1:1. Of this sample, 36.7% came from a second level public hospital, 34.6% had separated or divorced parents, 46.3% were only children, 53.7% were firstborn children, 2.7% had family histories of FGD, 23.9% had had previous bouts of diarrhea, and 21.0% suffered from hard or liquid stools (Table 1).

Table 1. General characteristics of two to four year-old children with and without FGD in Cali, Colombia.

| | Total sample (n = 188) | Without FGD (n = 113) | With FGD (n = 75) | p |
|-------------------------------|---------------------------|-----------------------------|----------------------|-------|
| Sex | | | | |
| Female | 91 (48.4) | 54 | 37 | 0.8 |
| Male | 97 (51.6) | 59 | 38 | |
| Separated or divorced parents | | | | |
| No | 123 (65.4) | 81 | 42 | 0.030 |
| Yes | 65 (34.6) | 32 | 33 | |
| Only child | | | | |
| No | 101 (53.7) | 65 | 36 | 0.2 |
| Yes | 87 (46.3) | 48 | 39 | |
| Firstborn | | | | |
| No | 87 (46.3) | 57 | 30 | 0.1 |
| Yes | 101 (53.7) | 56 | 45 | |
| Family history of FGD | | | | |
| No | 183 (97.3) | 110 | 73 | 1.0 |
| Yes | 5 (2.7) | 3 | 2 | |
| Previous diarrhea | | | | |
| No | 143 (76.1) | 86 | 57 | 1.0 |
| Yes | 45 (23.9) | 27 | 18 | |
| Bristol | (n = 167) | (n = 132) | (n = 147) | |
| Normal | 132 (79.0) | 87 | 45 | 1.0 |
| Hard/liquid | 35 (21.0) | 23 | 12 | |

Prevalence of FGD

Of the total sample of children between two and four years of age from the outpatient clinic of a second level hospital and from a private medical practice in Cali, Colombia, 39.9% presented some FGD according to the Spanish language version of the Rome III Criteria. The most common FGD was FC at 36.2% (Table 2).

Table 2. Prevalence of FGDs in children between 2 and 4 years of age (n = 188) in Cali, Colombia

| | Number | % |
|-----|--------|------|
| CVS | 2 | 1,1 |
| FD | 5 | 2,7 |
| FC | 68 | 36,2 |

General characteristics of children with FGD

The most common characteristics of children between 2 and 4 years of age with FD, FC and CVS are shown in Table 3.

Table 3. General characteristics of children between 2 and 4 years old with FGD in Cali, Colombia.

| | FD (n = 5) | FC (n = 68) | CVS (n = 2) |
|-------------------------------|---------------|----------------|----------------|
| | n (%) | | |
| Sex | | | |
| Female | 5 (100.0) | 32 (47.1) | 0 (0.0) |
| Male | 0 (0.0) | 36 (52.9) | 2 (100.0) |
| Separated or divorced parents | | | |
| No | 1 (20.0) | 40 (58.8) | 1 (50.0) |
| Yes | 4 (80.0) | 28 (41.2) | 1 (50.0) |
| Only child | | | |
| No | 1 (20.0) | 35 (51.5) | 0 (0.0) |
| Yes | 4 (80.0) | 33 (48.5) | 2 (100.0) |
| Firstborn | | | |
| No | 0 (0.0) | 30 (44.1) | 0 (0.0) |
| Yes | 5 (100.0) | 38 (55.9) | 2 (100.0) |
| Family history of FGD | | | |
| No | 5 (100.0) | 66 (97.1) | 2 (100.0) |
| Yes | 0 (0.0) | 2 (2.9) | 0 (0.0) |
| Previous diarrhea | | | |
| No | 5 (100.0) | 51 (75.0) | 1 (50.0) |
| Yes | 0 (0.0) | 17 (25.0) | 1 (50.0) |
| Bristol | | (n = 50) | |
| Normal | 3 (60.0) | 40 (80.0) | 2 (100.0) |
| Hard/liquid | 2 (40.0) | 10 (20.0) | 0 (0.0) |

Clinical characteristics of children with FGD

Functional diarrhea

Five children aged 3.3 ± 0.6 years (range 2-4 years) had FD. Their most common symptom was liquid or variable stools ($p = 0.000$) (Table 4).

Functional constipation

Sixty-eight children aged 3.4 ± 0.7 years (range 2-4 years) had FC. Their most common symptoms were pain during defecation, and defecations only two times or less per week ($p < 0.05$) (Table 4).

Cyclic Vomiting Syndrome

Two children between two and four years of age (3.4 and 3.5 years old) developed CVS. Their main symptoms were two or more bouts of repetitive nausea and vomiting followed by

Table 4. Symptoms of children between 2 and 4 years old with diarrhea and FC in Cali, Colombia.

| FD | | | FC | | |
|-------------------------------------|------------------|-------|-----------------------------------|------------------|-------|
| Present (n = 5) | Absent (n = 183) | p | Present (n = 68) | Absent (n = 120) | p |
| Daily stool/2-3 t/d vs. > 3 t/d | | | Stool 2 times or less per week | | |
| Yes | 5 | 0.08 | Yes | 51 | 0.000 |
| No | 0 | | No | 17 | |
| Fluid/variable stools | | | Hard/very hard stools | | |
| Yes | 5 | 0.000 | Yes | 23 | 0.000 |
| No | 0 | | No | 45 | |
| Fluid stools for less than 2 months | | | Pain during defecation | | |
| Yes | 0 | 0.3 | Yes | 56 | 0.000 |
| No | 5 | | No | 12 | |
| Defecation while sleeping | | | Large stools that clog the toilet | | |
| Yes | 0 | 1.0 | Yes | 19 | 0.000 |
| No | 5 | | No | 49 | |
| Normal growth and development | | | Fecaliiths | | |
| Yes | 5 | 0.1 | Yes | 6 | 0.027 |
| No | 0 | | No | 62 | |
| Pain during defecation | | | Retentive maneuvers | | |
| Yes | 0 | 0.1 | Yes | 7 | 0.503 |
| No | 5 | | No | 61 | |

t/d: times per day.

healthy and normal periods after these episodes and normal growth and development ($p < 0.05$) (Table 5).

Possible Risk Factors

Only one potential FGD risk factor, separated or divorced parents, was found to have a statistically significant association with FGDs in children between two and four years of age from the outpatient clinic of a second level hospital and from a private medical practice in Cali, Colombia (OR: 1.98, 95% confidence interval: 1.02 - 3.83, $p = 0.0268$) Neither gender, age, being an only child, being a firstborn child, having a family member with FGD, having previous bouts of diarrhea nor Bristol scale scores had significant associations ($p > 0.05$).

DISCUSSION

The most common FGD in this group of Colombian preschoolers was FC which is consistent with the findings of other authors. (2, 5, 7, 10, 13) The prevalence of at least one occurrence of an FGD was 40.0%, similar to the fin-

Table 5. Symptoms of children between 2 and 4 years old with CVS in Cali, Colombia.

| Cyclic vomiting syndrome | | | |
|---|-----------------|------------------|-------|
| | Present (n = 2) | Absent (n = 186) | p |
| Hematemesis | | | |
| Yes | 0 | 1 | 1.0 |
| No | 2 | 185 | |
| Weight loss | | | |
| Yes | 0 | 1 | 1.0 |
| No | 2 | 185 | |
| Wheezing or difficulty breathing | | | |
| Yes | 0 | 0 | n/a |
| No | 2 | 186 | |
| Nausea, chills and pallor | | | |
| Yes | 0 | 1 | 1.0 |
| No | 2 | 185 | |
| Opisthotonos | | | |
| Yes | 0 | 1 | 1.0 |
| No | 2 | 185 | |
| Pain or crying while eating | | | |
| Yes | 0 | 1 | 1.0 |
| No | 2 | 185 | |
| Two or more incidents of repeated nausea and vomiting | | | |
| Yes | 2 | 30 | 0.028 |
| No | 0 | 156 | |
| Healthy and normal after these episodes | | | |
| Yes | 2 | 43 | 0.05 |
| No | 0 | 143 | |
| Normal growth and development | | | |
| Yes | 2 | 1 | 0.000 |
| No | 0 | 177 | |

dings of Rouster et al. (2) and Chogle et al. (7) and close to twice the percentages found by van Tilburg et al., (5) Velasco a et al., (13) and Tharner et al., (8) and Robin et al. (10) who all used the Rome IV Criteria.

Our findings for FD and CVS were dissimilar to those of other studies. A systematic review by Ferreira-Maia et al. of 13 studies of children between 0 and 6 years of age that followed the Rome II and III Criteria and which were published between 2004 and 2015 described prevalences for PE of between 1.6% and 64.0%, prevalences for FD of between 0.3% and 8.8% and children between 0 and 6 years of age for CVS of between 3.4% and 10.2%. (6) These differences in the prevalences of FGDs in preschool children depend

on several factors related to the regions in which the studies were conducted and the populations interviewed. Rouster et al. (2) studied 332 American children under 4 years of age who consulted a pediatric gastroenterological clinic (1.2 ± 0.9 years, 52.0% male, 57.0% white); Chogle et al. (7) analyzed 1,183 Colombian children under 4 years of age who consulted an outpatient clinic for growth and development of the healthy child (19.3 ± 15.3 months, 49.5% female); Koppen et al. (14) reported on 1,049 children under 4 years of age who consulted outpatient clinics for growth and development of healthy children in four Colombian cities (median age: 15 months, 50.8% male, 50.6% from Cali); van Tilburg et al. (5) described 320 American mothers of children under 3 years of age who were interviewed online (1.4 ± 1.2 years, 52.3% male, 26.7% Hispanic); Velasco et al. (12) identified 318 children between 2 and 4 years of age (2.4 ± 0.9 years of age, 52.2% female) from outpatient clinics for healthy growth and development in Ecuador, Nicaragua and Panama; Tharner et al. (8) studied 4,823 Dutch children between 2 and 6 years of age (50.0% male children in a cohort study based on population level from fetal life onwards); and Robin et al. (10) recently described 238 American children between 1 and 3 years of age from a representative population sample.

Table 6 compares prevalences reported in these studies, except for those that only include FC such as Koppen et al. (14), in children with a prevalence of 20.5%, and that of Tharner et al. (8) with prevalences of 11.2% at 2 years, 15.7% at 3 years and 14.2% at 4 years.

Possible Risk Factors

This study found that having separated or divorced parents was a possible risk factor. Rouster et al. (2) did not report

significant differences for sociodemographic variables; Chogle et al. (7) listed three possible risk facts: being an only child ($p = 0.003$), being the firstborn child ($p = 0.007$), and having separated or divorced parents ($p = 0.001$); van Tilburg et al. (5) mentioned that children with FGD had lower quality of life ($p < 0.001$), more numerous medical visits ($p < 0.05$), more numerous mental health visits ($p < 0.05$), and longer hospital stays ($p < 0.01$); and Velasco et al. (13) did not identify any possible risk factors.

The studies by Rouster et al. (2), Chogle et al. (7), van Tilburg et al. (5) and Velasco et al. (13) did not describe most frequently occurring symptoms of preschoolers with FGD. In this study, the main symptoms for FD were liquid or variable stools; the main symptoms for FC were stools two or fewer times per week and pain while defecating, and the main symptom for CVS was two or more incidents of repetitive vomiting and nausea.

Among the strengths of this study are its use of populations from both private and hospital outpatients, calculation of an a priori sample size, and validation and prior use of the questionnaire of the Spanish language version of the Rome III Criteria standardized to identify FGD in infants and preschoolers in epidemiological studies in Colombian and Latin American children by our FINDERS Group (Functional International Digestive Epidemiological Research Survey). (12-15) Among this study's limitations are the facts that FGD was not clinically diagnosed nor was it diagnosed through questions about toilet training, and diets of families and their children. Especially important in regard to diet would have been questions about breastfeeding maternal and complementary feeding with fruit and vegetables as well as questions about fluid intake.

In conclusion, the prevalence of FGD in this group of Colombian preschoolers was high, the main cause was

Table 6. Comparisons of prevalences of FGD in preschool children in Cali, Colombia with findings of Buitrago, Rouster, Chogle, van Tilburg, Velasco, (12) and Robin.

| | Buitrago | Rouster (2) | Chogle (7) | van Tilburg (5) | Velasco (12) | Robin* (10) |
|-------------|----------|-------------|------------|-----------------|--------------|-------------|
| Age (years) | 2-4 | 0-4 | 0-4 | 0-3 | 2-4 | 1-3 |
| n | 188 | 172 | 1183 | 320 | 164 | 238 |
| FGD | 40.0 % | 52.0 % | 40.6 % | 27.0 % | 16.40 % | 21.4 % |
| FD | 2.7 % | 0.3 % | 1.1 % | 8.8 % (6.4 %) | 0.0 % | 0.0 % |
| FC | 36.2 % | 29.2 % | 22.1 % | 14.1 % (9.4 %) | 14.6 % | 18.5 % |
| CVS | 1.1 % | 10.2 % | 5.1 % | 3.4 % (3.4 %) | 1.8 % | 2.1 % |

* Rome IV Criteria

FC, and separated or divorced parents was found to be a possible risk factor. In the future, it would be important to conduct cohort studies and cases and control studies to identify risk factors using the Rome IV Criteria.

REFERENCES

1. Benninga MA, Faure C, Hyman PE, St James Roberts I, Schechter NL, Nurko S. Childhood Functional Gastrointestinal Disorders: Neonate/Toddler. *Gastroenterology*. 2016. pii: S0016-5085(16)00182-7. doi: 10.1053/j.gastro.2016.02.016.
2. Rouster AS, Karpinski AC, Silver D, Monagas J, Hyman PE. Functional Gastrointestinal Disorders Dominate Pediatric Gastroenterology Outpatient Practice. *J Pediatr Gastroenterol Nutr*. 2016;62(6):847-51. doi: 10.1097/MPG.0000000000001023.
3. Koppen IJ, Nurko S, Saps M, Di Lorenzo C, Benninga MA. The pediatric Rome IV criteria: what's new? *Expert Rev Gastroenterol Hepatol*. 2017;11(3):193-201. doi: 10.1080/17474124.2017.1282820.
4. Hyman PE, Milla PJ, Benninga MA, Davidson GP, Fleisher DF, Taminiu J. Childhood functional gastrointestinal disorders: neonate/toddler. *Gastroenterology*. 2006;130(5):1519-26. doi: 10.1053/j.gastro.2005.11.065.
5. van Tilburg MA, Hyman PE, Walker L, Rouster A, Palsson OS, Kim SM, et al. Prevalence of functional gastrointestinal disorders in infants and toddlers. *J Pediatr*. 2015;166(3):684-9. doi: 10.1016/j.jpeds.2014.11.039.
6. Boronat AC, Ferreira-Maia AP, Matijasevich A, Wang YP. Epidemiology of functional gastrointestinal disorders in children and adolescents: A systematic review. *World J Gastroenterol*. 2017;23(21):3915-3927. doi: 10.3748/wjgv23.i21.3915.
7. Chogle A, Velasco-Benitez CA, Koppen IJ, Moreno JE, Ramírez Hernández CR, Saps M. A Population-Based Study on the Epidemiology of Functional Gastrointestinal Disorders in Young Children. *J Pediatr*. 2016;179:139-143. e1. doi: 10.1016/j.jpeds.2016.08.095.
8. Tharner A, Jansen PW, Kiefe-de Jong JC, Moll HA, Hofman A, Jaddoe VWV, et al. Bidirectional associations between fussy eating and functional constipation in preschool children. *J Pediatr*. 2015;166(1):91-96. doi: 10.1016/j.jpeds.2014.09.028.
9. Park R, Mikami S, LeClair J, Bollom A, Lembo C, Sethi S, et al. Inpatient burden of childhood functional GI disorders in the USA: an analysis of national trends in the USA from 1997 to 2009. *Neurogastroenterol Motil*. 2015;27(5):684-92. doi: 10.1111/nmo.12542.
10. Robin SG, Keller C, Zwiener R, Hyman PE, Nurko S, Saps M, et al. Prevalence of Pediatric Functional Gastrointestinal Disorders Utilizing the Rome IV Criteria. *J Pediatr*. 2018;195:134-139. doi: 10.1016/j.jpeds.2017.12.012.
11. van Tilburg MA, Rouster A, Silver D, Pellegrini G, Gao J, Hyman PE. Development and Validation of a Rome III Functional Gastrointestinal Disorders Questionnaire for Infants and Toddlers. *J Pediatr Gastroenterol Nutr*. 2016;62(3):384-6. doi: 10.1097/MPG.0000000000000962.
12. Velasco-Benítez CA, Sánchez-Pérez MP, Aragón-Calvo LE. Reability of the FINDERS questionnaire in spanish based on Rome III criteria for functional gastrointestinal disorders in infants and toddler from Colombia, Southamerica. *J Pediatr Gastroenterol Nutr*. 2015;61(9): S57.
13. Velasco-Benítez CA, Saps M, Chanis RA, Játiva E, Mejía M, Moreno JE, et al. Desórdenes gastrointestinales funcionales en lactantes y preescolares latinoamericanos. Grupo de trabajo de la Sociedad Latinoamericana de Gastroenterología, Hepatología y Nutrición Pediátrica (SLAGHNP). *Acta Gastroenterol Latinoam*. 2018;48(1):126-30.
14. Koppen IJN, Velasco-Benitez CA, Benninga MA, Di Lorenzo C, Saps M. Using the Bristol Stool Scale and Parental Report of Stool Consistency as Part of the Rome III Criteria for Functional Constipation in Infants and Toddlers. *J Pediatr*. 2016;177:44-48.e1. doi: 10.1016/j.jpeds.2016.06.055.
15. Chogle A, Velasco-Benitez CA, Chanis R, Mejia M, Saps M. Multicountry cross-sectional study found that functional gastrointestinal disorders such as colic and functional dyschezia were common in South American infants. *Acta Paediatr*. 2018;107(4):708-713. doi: 10.1111/apa.14196.