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Prevalence and Clinical Profile of Functional Gastrointestinal Disorders in Children Based on Rome IV Criteria at a Tertiary Care Hospital South India

Chandra Deve Varma B S K

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Abstract

Aim and Context: The objective of this study was to evaluate the clinical profile and estimate the prevalence of functional gastrointestinal disorders (FGID) in children based on recent Rome IV criteria.

Settings, Design, Methods and Materials: Using Rome IV diagnostic criteria, the questionnaire was prepared and a cross-sectional study was done on children attending pediatric department to assess the clinical profile of FGIDs in children under the age of 18.

Statistical Analysis: Categorical data were analyzed using the Fisher's exact test, and continuous data were analyzed using a two-sided t-test. Values of $P < 0.05$ were considered significant.

Results: The results showed that 1448 children (40%) fulfilled the criteria for having at least one FGID. FGIDs were found in 47% of infants between 1-48 months, 28% between 4 and 11 years, and 42% between 11and18 years. Functional constipation (53%) was the most prevalent FGID in children under the age of four, followed by infantile regurgitation (18%) and infantile colic (15%), and although functional constipation was the most common FGID in children aged four to eighteen. However, in older children aged 4 to 18, functional abdominal pain disorders and functional defecation disorders are about equal in prevalence. When it comes to subtypes, functional constipation (15%) outnumbers irritable bowel syndrome (5.5%) and functional abdominal pain (5%).

Conclusion: FGIDs are common in pediatric outpatient clinics. These disorders can be identified using the Rome IV criteria. Parental education and reassurance should be the first steps in managing FGIDs.

Keywords: Rome IV; Regurgitation; Constipation; Infantile colic; Abdominal migraine; Cyclic vomiting syndrome.

Key Messages: Rome IV criteria was proposed in May 2016 and very few studies are available basing on this criteria. This study estimated the prevalence of FGIDs basing on new criteria.

Author Affiliation: Associate Professor, Department of Pediatrics, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram 535217, Andhra Pradesh, India.

Corresponding Author: Chandra Deve Varma B S K, Associate Professor, Department of Pediatrics, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram 535217, Andhra Pradesh, India

E-mail: drkishore018@gmail.com

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Introduction

FGIDs are caused by a complex interplay of genetic, psychological, and social variables that predispose, trigger, and/or prolong the brain-gut axis. The difference between FGIDs in younger children (Infants/Toddlers) and older children (Child/adolescents) was delineated in the pediatric Rome IV criteria. Many of Rome IV suggestions were based on evidence-based medicine and experience gained over the last decade. The term "no evidence for organic disease" was withdrawn from all

definitions and replaced with "after appropriate medical evaluation, the symptoms cannot be attributed to another medical condition"; and FGIDs can co-occur with other medical diseases that cause GI symptoms themselves.[1,2] FGIDs are seen in children throughout the world, with variable frequency. According to the Rome IV criteria introduced in May 2016, there are seven clinical entities of FGIDs in this age group which are shown in Table I.[1, 2]

Table I: Shows the Rome IV classification of functional gastrointestinal disorders in infants and young children up to 4yrs.

	Rome IV Nomenclature	Age	Frequency	Duration
G1	Infant Regurgitation	3wks –12mths	2 or more times per day	3 or more weeks
G2	Infant Rumination Syndrome	3-8 months	–	At least 2 months
G3	Cyclic Vomiting Syndrome(CVS)	–	≥2 episodes lasting hrs-days	Within 6mths
G4	Infant Colic	< 5mths	3 or more hrs per day	≥3 days in a wk
G5	Functional Diarrhea	6-60 months	≥4 per day	More than 4wks
G6	Infant Dyschezia	< 9mths	>10 minutes straining	–
G7	Functional Constipation(FC)	Upton 4 yrs	≤2 defecations per week ≥1 incontinence per wk	1 month

The most prevalent is infant regurgitation (G1), while infant rumination (G2) is the least common. Avoidance of meals or reduced food intake in infancy or early childhood can lead to a variety of feeding disorders, such as pica, rumination disorder, and other disorders classified in the International Classification of Disease (ICD) and Diagnostic and Statistical Manual (DSM) systems. CVS (G3) is defined as repeated, stereotypic attacks of severe nausea and vomiting that range from hours to days and are separated by symptom-free intervals. Toddlers are more likely than infants to suffer from CVS. The most prevalent illness that causes parents to consult a doctor is infant colic (G4) "Crying for three hours or more on at least three days in at least three weeks," according to Wessel's classic definition of colic. The symptoms of functional diarrhea (G5) disappear on their own by the time a child reaches school age, and they are not linked to failure to thrive or poor nutritional intake. In an otherwise healthy newborn under 6 months of age, infant dyschezia (G6) is defined as a minimum of 10 minutes of straining and crying before the successful passage of soft stools. One of the most prevalent reasons for parents to seek gastroenterologist opinion is functional constipation (G7).[2] The FGIDs are classified into 3 categories in the child/adolescent Rome IV chapter[3]: (H1) nausea and vomiting disorders; (H2) abdominal pain-related disorders; and (H3) defecation problems, as indicated in Table II.

Table II: Shows the Rome IV classification of FGIDs in children and adolescents (4-18yrs)

	FGID	Frequency/Features	Duration
H1	Functional Nausea and vomiting disorders		
H1a	Cyclic vomiting syndrome	≥2 episodes lasting for hrs to days.	With in 6 months. Normal between episodes.
H1b	Functional nausea and functional vomiting	≥2 episodes of nausea or ≥1 episode of vomiting per week	2 months
H1c	Rumination syndrome	Begins after meal absent during sleep	2 months
H1d	Aerophagia	Air swallowing, distension, repetitive belching/flatus.	2 months
H2	Functional Abdominal pain disorders		
H2a	Functional Dyspepsia	4 days per month	2mths
H2b	Irritable bowel syndrome	4 days per month (changes related to defecation, change in form or consistency)	2mths
H2c	Abdominal Migraine	Episodes lasting 1hr or more are separated by wks to months	2 within 6mths
H2d	Functional Abdominal pain	4 per month	2 months
H3	Functional defecation disorders		

H3a	Functional constipation	≤2 defecations per week ≥1 incontinence per week	2mths
H3b	Non- retentive fecal incontinence		1mth

Cyclic Vomiting Syndrome (H1a) can affect anybody from infancy to adolescence, with 46 percent of people experiencing symptoms at or before the age of three. Cyproheptadine is recommended for children under the age of five, and amitriptyline is recommended for children beyond the age of five. For children of all ages, the second-line treatment is propranolol prophylaxis. Functional nausea and vomiting (H1b) are now included in Rome IV, based on clinical experience, particularly in children suffering from anxiousness or depressed mood. H1c rumination syndrome can affect anyone at any age; however, it appears to be more common in adolescent girls. Gastroparesis or other motility problems, such as persistent intestinal pseudo-obstruction, might be mistaken for H1d Aerophagia. For clinical and scientific purposes, the committee believes it is critical to distinguish between various forms of FAPD (H2a-H2d). We now use the terminology functional abdominal pain not otherwise specified for children who do not fit the criteria for IBS, Functional defecation disorders, or abdominal migraine (NOS). Functional constipation, not irritable bowel syndrome, affects children whose pain disappears (H2b). IBS in children can be classified similar to adults based on the predominant stool pattern (IBS with constipation, IBS with diarrhea, IBS with constipation and diarrhea, and unspecified IBS). Similar triggers (such as stress, exhaustion, and travel) as well as accompanying symptoms (such as anorexia, nausea, and vomiting) and alleviating factors are reported by children with abdominal migraine (H2c) (eg, rest and sleep). Weekly stomach pain is reported by 35 percent to 38 percent of primary school students. Only roughly a third of these children match the Rome IV criteria for FAP (H2d) diagnosis. The inherent desire to withhold defecation because of discomfort or social reasons is most likely the triggering event for functional constipation (FC, H3a). Non-retentive fecal incontinence (NFI, H3b) differs from FC in that patients have normal defecation frequency and colonic and anorectal motility characteristics.[4] 41 percent of India's population is under the age of 18, and the country is undergoing fast economic and cultural globalization. It is well recognised that the prevalence of FGIDs varies by culture, race, ethnicity, and geographic location. The goal of this study is to use Rome IV criteria to assess the prevalence of various FGIDs in children under the age of 18 in an OPD of a tertiary care hospital in South India.

Materials and Methods

We performed this cross-sectional study on children less than 18 years of age attending outpatient clinics of MIMS general hospital Vizianagaram from Feb 2021 to Jan 2022. Questionnaires were prepared in the local language based on Rome IV diagnostic criteria on pediatric FGIDs for 0-48 month old and 4-18 year old children separately. Interns and residents at OP clinics invited all consecutive parents of children less than 18 years. The institutional ethics committee has approved the study. For participating children, informed consent was obtained from parents of children up to 10 yrs, and from the participants themselves for older children (11 to 18 years of age). The questionnaire was distributed to parents/caregivers and children to ensure confidentiality and privacy. They were given unlimited time to complete the questionnaire, and a member of the research team was available to answer any questions during the completion of the questionnaire. Subjects with symptoms related to organic medical disease and those more than 18 years of age were excluded. The original questionnaires and the back-translated questionnaires (both in English) were compared to ensure that the meaning was not modified during the translation process. The sample size was calculated using an estimated 10% prevalence for FGIDs. Assuming a confidence level of 95%, power of 80%, and precision found to the nearest 2%, a sample size of 1500 children between 1-48 months age (group 1) and 2000 school children and adolescents 4-18 years age (group 2) were considered adequate. Group 2 was further stratified for age according to the following categories 4-10 years and 11-18 years. SPSS Package Version 17 (IBM, Armonk, NY, USA) was used. Results were summarized as mean with range. Categorical data were analyzed using the Fisher's exact test, and continuous data were analyzed using a two-sided t-test. Values of $P < 0.05$ were considered significant.

Results

Out of the 4000 children enrolled in the study, 3624 completed questionnaires were received. Based on the age group, 1526 children were under the age of

48 months, 1067 children were between the ages of 4 and 11, and 1031 children were between the ages of 11 and 18. Males comprised 52 percent of the participants (1900). In the end, 1448 youngsters (40%) matched the criteria for having at least one FGID. 717 (20%) were under the age of four, while 731 (20%) were between the ages of four and eighteen. FGIDs were found in 47 percent of kids aged 1-48 months, 28 percent of children aged 4-11 years, and 42 percent of children aged 11-18 years. Children with and without FGIDs were compared in terms of sociodemographic, family, clinical, and environmental factors. The prevalence of FGIDs was considerably higher in children who were the only child in the family (P <0.003), children who were the firstborn (P <0.008), and children with divorced or separated parents. The family history of FGIDs did not effect on the prevalence of FGIDs in children (P = 0.5).

Functional constipation (53%) was the most common FGID in children under the age of four, followed by infantile regurgitation (18%) and infantile colic (15%). However, in older children aged four to eighteen, functional abdominal pain disorders (H2) and functional defecation disorders (H3) are nearly equal in prevalence. When it comes to subtypes, functional constipation (15%) is more common than irritable bowel syndrome (5.5%) and functional abdominal pain disorders (H3) (5 %). The prevalence of FGIDs was higher in boys (52%) than girls (48%) in this trial, although the difference was not statistically significant. The only conditions in which there is a statistically significant difference between genders are functional abdominal pain and functional constipation. Males are more likely to have functional constipation, while females are more likely to have functional abdominal pain ($p<0.05$). We've observed some children with multiple FGIDs but considered the most predominant one. Between the ages of 4 and 11, there is a higher prevalence of FGIDs than in toddlers and adolescents ($p<0.05$). More than one FGID was found in 6% of infants, with infantile colic and regurgitation being the most prevalent. Table III shows the prevalence of FGIDs in children aged 1 month to 48 months, and Table IV shows the prevalence in children aged 4 to 18 years.

Table III: Shows the prevalence of FGIDs in Infants and toddlers.

	Rome IV nomenclature	Age in months	Total children	Children with FGID	Percentage
G1	Infant Regurgitation	1-12	642	116	18
G2	Infant Rumination Syndrome	1-12	642	54	8.5
		13-48	884	16	1.8
G3	Cyclic Vomiting Syndrome	1-48	1526	43	2.8
G4	Infant Colic	1-5	292	44	15
G5	Functional Diarrhea	1-48	1526	9	0.6
G6	Infant Dyschezia	1-9	442	18	4
G7	Functional Constipation	1-12	642	135	21
		13-48	884	282	32
	Total	1-48	1526	717	47

Table IV: Shows the prevalence of FGIDs in school going children and Adolescents (4-18yrs)

	ROME IV Nomenclature	Age 4-10 yrs (M+F) N=1067	Percentage (M+F)	Age 11-18yrs (M+F) N=1031	Percentage (M+F)
H1	Functional Nausea and vomiting disorders	35(17+18)	3.3(49+51)	62(36+26)	6(58+42)
H1a	Cyclic vomiting syndrome	5(3+2)	0.5(60+40)	9(6+3)	0.9(67+33)
H1b	Functional nausea and functional vomiting	2(1+1)	0.2(50+50)	4(1+3)	0.4(25+75)
H1c	Rumination syndrome	2(1+1)	0.2(50+50)	1(1+0)	0.1(100+0)
H1d	Aerophagia	26(12+14)	2.5(45+55)	48(28+20)	4.7(59+41)
H2	Functional Abdominal pain disorders	130(61+69)	12.2(47+53)	183(86+97)	17.7(47+53)
H2a	Functional Dyspepsia	2(1+1)	0.2(50+50)	8(6+2)	0.8(75+25)

H2b	Irritable bowel syndrome	42(24+18)	4(57+43)	76(36+40)	7.4(48+52)
H2c	Abdominal Migraine	28(13+15)	2.6(45+55)	52(24+28)	5(47+53)
H2d	Functional Abdominal pain	58(23+35)	5.5(40+60)	47(20+27)	4.5(44+56)
H3	Functional defecation disorders	133(76+57)	12.5(57+43)	188(102+86)	18.2(54+46)
H3a	Functional constipation	125(72+53)	11.7(58+42)	186(101+85)	18.1(54+46)
H3b	Non- retentive fecal incontinence	8(4+4)	0.75(50+50)	2(1+1)	0.2(50+50)
	Total	298(154+144)	100(52+48)	433(224+209)	100(52+48)

Conclusion

In paediatric outpatient clinics, functional gastrointestinal disorders are frequent, and they have a detrimental influence on the child's health, family's health, and quality of life. In infants and toddlers, functional constipation, infantile regurgitation, and infantile colic are prevalent, whereas, in school-aged children and adolescents, functional constipation and functional abdominal pain syndromes are prevalent. These disorders can be identified using the Rome IV criteria. Parental education and reassurance should be the first steps in managing FGIDs.

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