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Functional Gastrointestinal Disorders in a Primary Care Pediatric Clinic

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Abstract

Functional gastrointestinal disorders (FGIDs) are a common problem in pediatric patients and can affect quality of life. However, the extent of these disorders may vary in different subpopulations of children. This study investigated the prevalence of FGIDs in an inner-city primary care practice. Healthy patients between the ages of 9 and 17 were administered a validated questionnaire that assessed for FGIDs and other somatic complaints. Eleven of 145 patients (7.5%) met criteria for FGIDs based on Rome III Diagnostic Criteria. Raynaud-like symptoms tended to occur more often in patients meeting criteria for FGIDs, although this association was not statistically significant ($P = .07$). The lower prevalence of FGIDs in this population compared with earlier studies may suggest a link between socioeconomic status and the prevalence of FGIDs. Larger population-based studies consisting of a heterogeneous cohort from a variety of socioeconomic backgrounds are necessary to further elucidate the true connection between FGIDs and socioeconomic status.

Keywords

socioeconomic status, inner-city, somatic, recurrent abdominal pain, abdominal migraine, Raynaud, Rome Diagnostic Criteria

Introduction

Recurrent abdominal pain (RAP) is common among children, leading to absence from school and impaired quality of life.[1] A recent systemic review, including studies with a variety of definitions for RAP, found a prevalence as high as 19% in children.[2] The Rome III Diagnostic Criteria established a uniform method of classifying RAP into different categories of functional gastrointestinal disorders (FGIDs), such as abdominal migraine, cyclic vomiting syndrome, functional abdominal pain syndrome, functional dyspepsia, and irritable bowel syndrome.

External factors may influence the development of FGIDs. Although the data are limited, children of lower socioeconomic status may harbor a higher risk for developing RAP.[3,4] Many children with FGIDs have comorbid psychological disorders, including anxiety and depression.[1,5] Preliminary data from tertiary referral centers also suggest a relationship between FGIDs and somatic comorbidities, such as migraine headaches, fibromyalgia, sleep disturbances, and chronic fatigue. However, these associations were found in a self-selected, more affected population and may not be present in all children with FGIDs.[6]

This study aimed to investigate the prevalence of FGIDs in an inner-city primary care pediatric clinic in the United States using Rome III Diagnostic Criteria. A secondary aim was identification of comorbid nonpsychiatric symptoms among children meeting criteria for FGIDs in this population.

Methods

This cross-sectional questionnaire study was approved by the University Hospitals Case Medical Center Institutional Review Board. It was conducted between August 2012 and May 2013 at a large urban primary care clinic in Cleveland, Ohio. Healthy patients between the ages of 9 and 17 seen in clinic for well-child visits

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Table 1. Demographics and Overall Somatic Symptoms in Patients With and Without FGIDs.

	Overall	No FGIDs	FGIDs
Patients	145	134	11 (7.6)
Age (years)			
Median (IQR)	11.0-15.0	11.0-15.0	10.0-14.0
Gender (male)	59 (41.0)	54 (40.3)	5 (45.5)
Total somatic symptoms			
Median (IQR)	0.0-2.0	0.0-2.0	1.0-3.0
Any somatic symptom	96 (66.2)	87 (64.9)	9 (81.8)

Abbreviations: FGID, functional gastrointestinal disorder; IQR, interquartile range.

Table 2. Characteristics of the Patients With FGIDs.

Patient	Age	Gender	Type of FGIDs
1	9	Female	Childhood functional abdominal pain syndrome
2	10	Male	Cyclic vomiting syndrome
3	10	Male	Abdominal migraine and functional dyspepsia
4	10	Male	Abdominal migraine
5	11	Male	Cyclic vomiting syndrome
6	11	Female	Childhood functional abdominal pain syndrome
7	12	Male	Irritable bowel syndrome
8	12	Female	Abdominal migraine
9	14	Female	Abdominal migraine and irritable bowel syndrome
10	16	Female	Abdominal migraine and irritable bowel syndrome
11	17	Female	Abdominal migraine

Abbreviation: FGID, functional gastrointestinal disorder.

were recruited. Parents provided written informed consent, and participants provided written assent. Patients in clinic for a sick visit or patients with a history of organic gastrointestinal disorders including inflammatory bowel disease, cancer, celiac disease, liver disease, peptic ulcer disease, and food allergies were excluded.

A modified version of the Ohio Dysautonomia (ODYSA) instrument was administered to participants (see the appendix). The questions were read aloud and the answers were recorded by a study coordinator. The ODYSA is a comprehensive survey of somatic symptoms across organ systems developed for both adult and pediatric use.[7] It uses validated published question sets where available (e.g. Rome III modular questions for FGIDs, International Headache Association criteria for migraine headache symptoms, and the Epworth Sleepiness Scale for daytime sleepiness) or, alternatively, face-valid questions.[8-14] The ODYSA instrument was modified by removing question-sets relevant only to adults. Besides FGIDs, the ODYSA instrument assessed participants for migraine headache symptoms, recurrent syncope, daytime sleepiness, chronic body pains, chronic fatigue, urinary frequency (defined as feeling a strong need to urinate with little or no warning), orthostatic symptoms, and Raynaud-like symptoms (defined as fingers or toes turning white, red, or blue on cold exposure).

Statistical analyses were performed using SAS version 9.3 (SAS Institute Inc, Cary, NC). The prevalence of FGIDs and other somatic complaints were summarized descriptively using frequency and percentage. Demographics were compared between patients with and without FGIDs using Fisher exact tests and Wilcoxon 2-sample tests. The association between FGIDs and other somatic complaints were examined using Fisher exact tests. Two-sided P values were reported; $P < .05$ was considered statistically significant.

Results

A total of 165 patients were approached for the study. Eight patients refused participation and 12 patients were excluded due to food allergies. Participant demographics are described in Table 1. Of the 145 participants, 11 (7.6%) fulfilled criteria for FGIDs. A proportion of patients fulfilled criteria for several FGIDs, most commonly abdominal migraine (Table 2).

The prevalence of each somatic complaint in this cohort is shown in Figure 1. Somatic complaints were

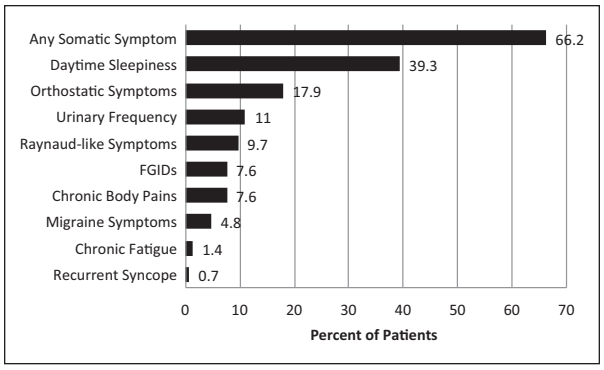

Figure 1. Prevalence of somatic complaints in all patients.
Abbreviation: FGID, functional gastrointestinal disorder.

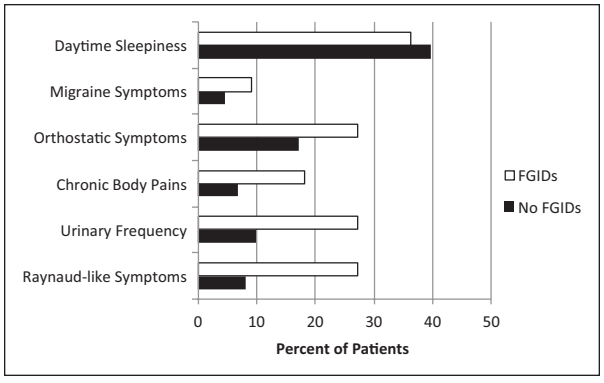

Figure 2. Somatic complaints in patients with and without FGIDs.
Abbreviation: FGID, functional gastrointestinal disorder.

reported in 66.2% of patients. Daytime sleepiness was the most common complaint, reported by 39.3% of patients. Raynaud-like symptoms occurred more often in participants with FGIDs, and while trending toward significance, there was likely inadequate power to achieve true statistical significance. Raynaud-like symptoms were reported in 3/11 (27.2%) of participants with FGIDs as compared to 11/134 (8.2%) of participants without FGIDs, $P = .07$. No statistical association was found between FGIDs and the other symptoms investigated (Figure 2).

Discussion

FGIDs, while not extensively studied, are highly prevalent and often underrecognized in the pediatric population. Children with FGIDs may manifest symptoms that affect physical and emotional well-being as well as have a negative effect on academic performance. Overall, it is a significant cause of impaired quality of life in pediatrics. In order to provide better care for children with FGIDs, it is necessary to understand the extent of the disorder, identify potential associated risk factors, and recognize comorbid conditions.

This study investigated the prevalence of FGIDs in an inner-city primary care pediatric practice in the United States and found the prevalence using Rome III Diagnostic Criteria to be 7.6%. To our knowledge, this is the first study investigating the prevalence of FGIDs based on Rome III criteria in this population. Previous studies report the prevalence of RAP to be as high as 19%.[2] There are several reasons why this study population may have had a lower prevalence of FGIDs. First, whereas other studies defined RAP in a variety of ways, this study used Rome III Diagnostic Criteria, which has strict diagnostic cutoffs. Additionally, whereas several Scandinavian studies suggested that socioeconomic status may be associated with RAP,[3,4] this is the only known US study to investigate this association. The results of the current study may suggest a lower prevalence of FGIDs among US children of low socioeconomic status. Further research will need to investigate the association between socioeconomic status and FGIDs among children in the United States.

Another difference found in this study, compared with prior literature, was the high prevalence of abdominal migraine, typically present in only a small portion of the population.[15] Our cohort is too small to meaningfully interpret this finding, but this does suggest that the prevalence of FGIDs and the predominant type of FGIDs should be further investigated in this population.

Additional thought-provoking findings from this data set include the high prevalence of any somatic symptom, daytime sleepiness, and orthostatic symptoms in this population, regardless of the presence or absence of FGIDs. The high prevalence of these symptoms in an unselected group of subjects without FGIDs is surprising and requires further investigation to understand the basis of these findings.

The main limitations of this study include the small sample size and the use of a questionnaire as a diagnostic tool rather than physician assessment. Additionally, participants with food allergies were excluded from the study—possibly lowering the prevalence of FGIDs in the study population.

In summary, the lower prevalence of FGIDs in this study compared to previous studies may suggest a link between socioeconomic status and the prevalence of FGIDs. Additionally, these data are consistent with the prior literature that depicts an association between FGIDs and other somatic complaints,[7] such as Raynaud-like symptoms, although likely related to the small sample size this was not statistically significant in our study. A similar population-based study with a larger sample size and a heterogeneous cohort from a variety of socioeconomic backgrounds may provide new insight regarding any possible association between FGIDs and socioeconomic status.

Appendix

Modified ODYSA Questionnaire

Age: _____ Male / Female

Definitions of some terms used in the questionnaire:

***Dizzy**:* A feeling of motion such as spinning, whirling or sliding, or a sensation that you may fall.
***Lightheaded**:* A feeling of weakness or loss of blood to the brain that might eventually lead to fainting.
***Faint**:* A feeling that you are about to faint or lose consciousness immediately.

HISTORY

1	**Have you ever been diagnosed with any of the following medical problems?**	☐ Crohn's Disease ☐ Ulcerative Colitis ☐ Celiac Disease ☐ Liver Disease ☐ Food Allergies ☐ Bleeding Ulcers ☐ Cancer
2	**Have you ever seen a gastroenterologist? If so, then what was the diagnosis?**	☐ No ☐ Yes (Diagnosis: _____)
3	**Have you had any other significant illnesses? If so, then specify.**	☐ No ☐ Yes. I have had the following significant illnesses: _____ _____ _____ _____
4	**Do you any medications regularly? If so, then please list them.**	☐ No ☐ Yes. I take the following medications regularly: _____ _____ _____ _____

For the following sections (A through J) listen to each statement and reply with which comes closest to how you have been feeling.

A1	**During the last month, on and off, I have felt . . .**	Faint	☐YES	☐NO
		Dizzy	☐YES	☐NO
		Lightheaded	☐YES	☐NO
		A change in vision	☐YES	☐NO
		My thinking is "off"	☐YES	☐NO
		Nauseated	☐YES	☐NO
		If all above are checked "No" ***(skip to question B1)***		

*For each situation, please choose **ONE** number to describe the frequency of your symptom that is clearly linked to that situation.*

		None of the Time	A Little of the Time	Some of the Time	A Good Bit of the Time	Most of the Time	All of the Time	If you circled more than 0, indicate how long the symptom typically lasts.		
A2		▼	▼	▼	▼	▼	▼	▼		
a.	**Immediately *upon standing up* from lying or sitting, I feel…**									
	Faint	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	Dizzy	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	Lightheaded	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	A change in vision	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	My thinking is "off"	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	Nauseated	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
b.	**When *standing in one place for 20 minutes or more*, I feel . . .**									
	Faint	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	Dizzy	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	Lightheaded	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	A Change in vision	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	Thinking is "off"	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
	Nauseated	0	1	2	3	4	5	☐Seconds	☐Minutes	☐Hours
A3	**Group A symptoms appeared when my age was . . .**							Age:		
A4	**Group A symptoms disappeared when my age was . . .**							☐ Still Present Age:		

B1	**Do you ever faint (completely lose consciousness)?**	☐ No ***(skip to C1)***	☐ Yes, once or twice in my life	
		☐ Yes, 3 -10 times in my life	☐ Yes, more than 10 times in my life	
B2	**How often have you fainted soon after standing up?**	☐ Never	☐ 1 to 7 times per *week*	
		☐ 1 to 5 times per *year*	☐ Every time I try to stand	
		☐ 1 to 3 times per *month*		
B3	**Do you usually know that you are about to lose consciousness?**	☐ No or rarely	☐ Yes	
B4	**How long does the period of loss of consciousness last?**	☐ Less than 1 minute	☐ 20-59 minutes	☐ more than 24 hours
		☐ 1-5 minutes	☐ 1-4 hours	
		☐ 6-19 minutes	☐ 5-24 hours	
B5	**How old were you when the (Group B) symptoms first began?**		Age:	
B6	**How old were you when these symptoms stopped?**		☐ Still Present	Age:

C1	**In the past 12 months have you ever vomited again and again without stopping for 2 hours or longer?**	☐ Never (skip to D1) ☐ Once ☐ 3 times	☐ 2 times ☐ 4 or more times
C2	**How long have you had these episodes of vomiting?**	☐ 1 month or less ☐ 2 months ☐ 3 months	☐ 4 to 11 months ☐ 12 months or more
C3	**Did you usually feel nausea when you vomited again and again without stopping?**	☐ No	☐ Yes
C4	**Were you in good health for several weeks or longer between the episodes of vomiting again and again?**	☐ No	☐ Yes
C5	**How old were you when the (Group C) symptoms first began?**	Age:	
C6	**How old were you when these symptoms stopped?**	☐ Still Present Age:	

During the past month how often have you . . .

D1	**. . . felt a strong need to urinate with little or no warning?**	☐ Not at all ☐ Less than 1 time in 5 ☐ Less than half the time		☐ About half the time ☐ More than half the time ☐ Almost always
D2	**. . . had pain or burning in your bladder?**	☐ Never or rarely ☐ Sometimes	☐ Often ☐ Most of the time	☐ Always
D3	**Were you diagnosed with a urinary tract infection? If so, was there a positive urine culture?**	☐ No ☐ Yes, but the urine culture was negative		☐ Yes and the urine culture was positive ☐ Yes but I am unsure if a urine culture was sent
D4	**How old were you when the (Group D) symptoms first began?**	Age		
D5	**How old were you when these symptoms stopped?**	☐ Still Present	Age	

E1	**Do your <u>fingers</u> turn white in the cold?**	☐ No or rarely ***(skip to question F1)***				☐ Yes
E2	**Do your <u>fingers</u> turn blue or red in the cold?**	☐ Never	☐ Sometimes	☐ Often	☐ Always	
E3	**Do your <u>toes</u> turn white in the cold?**	☐ Never	☐ Sometimes	☐ Often	☐ Always	
E4	**Do your <u>toes</u> turn blue or red in the cold?**	☐ Never	☐ Sometimes	☐ Often	☐ Always	
E5	**How old were you when the (Group E) symptoms first began?**					Age:
E6	**How old were you when these symptoms stopped?**	☐ Still Present				Age:

F1	**Have you had pain that was unexplained or lasted longer than expected after an injury?**	☐ No or rarely ***(skip to question G1)*** ☐ Yes				
F2	**How long was the pain there?**	_____Years / Months / Weeks (circle)				
F3	**Which body part(s)? (check all the apply)**	☐ Both legs	☐ Right leg ☐ Left leg	☐ Both arms	☐ Right arm ☐ Right arm	☐ Both arms
F4	**If you checked a box, write a number below to describe the pain on a scale of 0 to 10, where 0 is no pain and 10 is the worst pain you can imagine**					
	_____	_____	_____	_____	_____	_____

F5	**What events preceded the pain?**	☐ None	☐ Sprain	☐ Fracture	☐ Cast/splint
		☐ Operation	☐ Infection	☐ Trauma	☐ Other: _____
F6	**How much time elapsed between the injury and the start of pain**	☐ None	_____Years / Months / Weeks (circle)		
F7	**How old were you when the (Group F) symptoms first began?**				Age:
F8	**How old were you when these symptoms stopped?**	☐ Still Present			Age:

G1	**Do you have headaches?**	☐ No	☐ Yes, occasionally	
		☐ Yes, once a week	☐ Yes, several times a week	
G2	**How many severe headaches have you had in your lifetime?**	☐ None	☐ 1-4	☐ 51-500
		(skip to H1)	☐ 5-50	☐ More than 500
G3	**An untreated headache typically lasts . . .**	☐ no longer than 4 hours	☐ 4-72 hours	☐ over 72 hours
G4	**The headaches may sometimes be (check all that apply):**	☐ Pulsating (throbbing)		
		☐ One-sided (but they need not always be on the same side)		
		☐ Moderate or severe (they interfere with my usual activities)		
		☐ Made worse by moving (I try to be still during a headache)		
G5	**During a headache, you may (check all that apply):**	☐ Be nauseated or vomit		
		☐ Be bothered by bright lights and loud noises		
G6	**How old were you when these headaches STARTED?**	Age:		
G7	**Have the headaches STOPPED? If yes, how old were you?**	☐ No	☐ Yes (Age: _____)	
G8	**Did a DOCTOR give you a diagnosis for these headaches?**	☐ No	☐ Yes Diagnosis: _____	

H1	**In the past 2 months have you had discomfort or pain anywhere in your belly?**	☐ Never *(skip to I-1)*	☐ 1 to 3 times per month	
		☐ Once a week	☐ Several times a week	
		☐ Every day		
H2	**Where is this pain located (select all that apply)?**	☐ Above the belly button	☐ Below the belly button	☐ Around the belly button
H3	**How long have you had this pain?**	☐ Less than 2 months	☐ 3-4 months	☐ 1 year or longer
		☐ 2-3 months	☐ 4-12 months	
H4	**. . . did it get better or stop after having a poop?**	☐ Never or rarely	☐ Once in a while	☐ Most of the time
			☐ Sometimes	☐ Always
H5	**. . . were your poops softer and more mushy or watery than usual?**	☐ Never or rarely	☐ Once in a while	☐ Most of the time
			☐ Sometimes	☐ Always
H6	**. . . were your poops harder or lumpier than usual?**	☐ Never or rarely	☐ Once in a while	☐ Most of the time
			☐ Sometimes	☐ Always
H7	**. . . did you have fewer poops than usual?**	☐ Never or rarely	☐ Once in a while	☐ Most of the time
			☐ Sometimes	☐ Always
H8	**. . . did you have a headache?**	☐ Never or rarely	☐ Once in a while	☐ Most of the time
			☐ Sometimes	☐ Always
H9	**. . . did you have difficulty sleeping?**	☐ Never or rarely	☐ Once in a while	☐ Most of the time
			☐ Sometimes	☐ Always

H10	**. . . did you have pain in the arms, legs, or back?**	☐ Never or rarely	☐ Once in a while ☐ Sometimes	☐ Most of the time ☐ Always
H11	**. . . did you feel faint or dizzy?**	☐ Never or rarely	☐ Once in a while ☐ Sometimes	☐ Most of the time ☐ Always
H12	**. . . did you miss school or stop activities?**	☐ Never or rarely	☐ Once in a while ☐ Sometimes	☐ Most of the time ☐ Always
H13	**In the last year how many times did you have an episode of severe intense pain around the belly button that lasted 2 hours or longer and made you stop everything that you were doing?**	☐ Never (***skip to I-1)***	☐ 1 time ☐ 2 times	☐ 3 to 5 times ☐ 6 or more times
H13a	**During the episode of severe intense pain, which of the following (if any) did you experience?**	☐ No appetite ☐ Vomiting ☐ Headache	☐ Feeling sick to your stomach ☐ Pale skin ☐ Eyes sensitive to light	
H13b	**Between episodes of severe intense pain, do you return to your usual health for several weeks of longer?**	☐ No	☐Yes	
H14	**How old were you when the (Group H) symptoms first began?**			Age:
H15	**How old were you when these symptoms stopped?**		☐ Still Present	Age:

I-1	**Do you have pain other than headache and/or abdominal pain?**	☐ No (*skip to J1*)	☐ Yes
I-2	**Do you have pain in your arms, legs or back?**	☐ No ☐ Yes, 1-3 times a month ☐ Yes, once a week	☐ Yes, several times a week ☐ Yes, every day
I-3	**How long have you had this pain?**	☐ Less than 3 months ☐ 3 to 6 months ☐ 7 to 12 months	☐ 1 to 4 years ☐ 5 to 10 years ☐ more than 10 years
I-4	**Where is your pain?**	_____ _____	

I-5	**How old were you when the (Group I) symptoms first began?**		Age:
I-6	**How old were you when these symptoms stopped?**	☐ Still Present	Age:
I-7	**Compared to when they began, my symptoms are:**	☐ Better ☐ Worse	☐ Same

J-1 Epworth Sleepiness Scale[11]

J-2	**Do you have unexplained severe fatigue?**	☐ Never ☐ Yes. For 1 to 5 months ☐ Yes. For 6 to 12 months	☐ Yes. For 1 to 4 years ☐ Yes. For 5 years or more

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