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Original article

Prevalence of Functional Dyspepsia in Cuban Adolescents

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Abstract

Introduction: functional gastrointestinal disorders (FGID) are common in children. However, data on functional dyspepsia (FD) in Cuban adolescents is scarce. **Objective:** to determine the prevalence of FD in Cuban adolescents and their possible associations. **Methodology:** the questionnaire for pediatric digestive symptoms of Rome IV was used in Spanish to identify the presence of DF in adolescents from 3 schools in La Havana, Cuba. Sociodemographic, personal, family, clinical, and epidemiological variables were considered. **Results:** of the 318 adolescents who participated in the study, 11 (3.5%) aged 11.4 ± 1.2 years, 81.8% female, presented FD. Functional dyspepsia was more frequent in females (*odds ratio* [OR]: 5.33; 95% confidence interval [CI]: 1.06–51.45; $p = 0.019$). The postprandial distress syndrome (PDS) was higher than the epigastric pain syndrome (SDE) by a 1.8:1 ratio. There was an overlap between DF and functional constipation in 63.6% of the patients. There was an FD predominance in children with separated or divorced parents (OR: 4.74; 95% CI: 1.09–28.31; $p = 0.014$). **Conclusion:** functional dyspepsia is most common in female adolescents, PSD is the most frequent subtype, and its presence is associated with separated or divorced parents.

Keywords

Functional dyspepsia, postprandial distress syndrome, epigastric pain syndrome, adolescents.

INTRODUCTION

Functional dyspepsia (FD) is a common disorder in childhood. This disorder is associated with upper gastrointestinal symptoms, including epigastric pain or burning sensation, early satiety, and postprandial fullness, unrelated to bowel movements or other etiology to explain these symptoms. This disorder can cause a significant deterioration in the quality of life[1,2].

In recent years, FD's prevalence has increased (3%–27%), with a high demand for consultation of pediatric specialties. In many cases, FD may be associated with other gastrointestinal functional disorders, one of the most common after irritable bowel syndrome. Approximately 4.5% of children worldwide experience symptoms of FD at some point in their lives[2,3].

Patients with functional gastrointestinal disorders (FGIDs), which include FD, have higher rates of anxiety,

depression, poor coping skills, and somatization symptoms than children without FGIDs. Children with FD may be associated with significant morbidity, and symptoms may negatively impact the child's quality of life, adversely affecting school attendance[3].

Over time, FD diagnostic criteria have evolved. For the first time, the Rome IV criteria identified epigastric pain syndrome (EPS) and postprandial distress syndrome (PDS) as two subtypes of FD in children, as recognized in adults.[3-5]

According to the Rome IV Criteria, no studies have demonstrated the prevalence of FD in Cuban children. Understanding the associated factors would be extremely useful for diagnosing and managing this disorder. Thus, this study aims to determine the prevalence of FD in Cuban adolescents and their possible associations.

METHODOLOGY

The study was conducted between March 2, 2020, and January 7, 2021, in 3 schools (2 primary schools and 1 basic secondary) in La Havana, Cuba. It was applied using the methodology in previous studies and those currently in progress by our group, *Functional International Digestive Epidemiological Research Survey* (FINDERS), an established international collaborative group that conducts epidemiological studies in Latin American children. Thus, parents or guardians of adolescents between fourth and ninth grades were invited and agreed to participate in the study after signing an informed consent/assent. We used the Questionnaire of Pediatric Gastrointestinal Symptoms-Rome IV Criteria (QPGS-IV) in Spanish, which has an appropriate criterion validity[6]. Sociodemographic (age, gender, race); personal (cesarean section, preterm birth); family (only child, firstborn, separated/divorced parents, intrafamily FGIDs); clinical (weight, height, body mass index [BMI], height-for-age, dengue history), and epidemiological (overlap, confinement) variables were obtained. The Hospital Dr. Luis Díaz Soto's Ethics Committee approved this study. Statistical analysis included the student's t-test two-sided, the Chi-Square test, and Fisher's exact test. To evaluate the possible risk factors for DF, a univariate and multivariate analysis was performed, calculating the *odds ratio* (OR) with its corresponding 95% confidence intervals (CI) and a p significant < 0.05.

RESULTS

From a group of 318 adolescents who answered the QPGS-IV in Spanish, 29.1% showed some FGID. We identified FD in 3.5% (2.2% postprandial distress syndrome – PDS, and 1.3% epigastric pain syndrome –EPS) (**Table 1**).

Table 1. Prevalence of FGIDs in Cuban schoolchildren

n = 318	
FGIDs	
- No	225 (70,9)
- Yes	93 (29,1)
Associated with nausea and vomiting	5 (1,5)
Functional nausea and vomiting	3 (0,9)
- Nausea	1 (0,3)
- Vomiting	2 (0,6)
Aerophagia	1 (0,3)
Cyclic vomiting syndrome	1 (0,3)
Associated with abdominal pain	16 (5,0)
Functional dyspepsia	11 (3,5)
- PDS	7 (2,2)
- EPS	4 (1,3)
Irritable bowel syndrome	1 (0,3)
- With diarrhea and constipation	1 (0,3)
Abdominal Migraine	1 (0,3)
FAD not otherwise specified	3 (0,9)
Associated with defecation	72 (22,6)
- Functional constipation	72 (22,6)

FAD: functional abdominal distension.

The 11 children with FD were 11.4 ± 1.2 years, 81.8% were female and 54.4% mestizo, 54.5% were firstborn, 72.7% had separated/divorced parents, and 63.6% and 100.0%, respectively, were eutrophic for BMI and height-for-age according to the World Health Organization (WHO). There was an overlap of FD in 8 of the 11 children, primarily with functional constipation in 7 children. There were no significant differences between the sociodemographic (age, gender, race); personal (cesarean section, preterm birth); family (only child, firstborn, separated/divorced parents, intrafamily FGIDs); clinical (weight, height, BMI, height-for-age, dengue history), and epidemiological (overlap, confinement) variables (**Table 2**).

The prevalence of FD was higher in females (OR: 5.33; 95%CI: 1.06–51.45; p = 0.019). The same was the case for children whose parents were separated/divorced (OR: 4.74; 95%CI: 1.09–28.31; p = 0.014), predominantly in paternal absence (OR: 3.64; 95%CI: 0.88–17.42; p = 0.033) rather than maternal absence. The multivariate analysis did not show any variable contributing to FD overlap prevalence (**Table 3**).

DISCUSSION

As far as we know, this is the first study that evaluated the prevalence and factors associated with FD in Cuban children according to the Rome IV criteria. Findings in this research showed that 29.1% of adolescents met the criteria for some FGID, FD was identified in 3.5%, and PDS is more frequent than EPS.

Our results are similar to those reported by Saps *et al*[7] in Colombian children, with a 3% FD prevalence, which is lower than the results reported by Robin *et al*[8] in North American children and by Baleeman *et al*[9] in Colombian children, between 7.2% and 16.1%, respectively, and higher than those reported by Zeevenhooven *et al*[10] in adolescents from Curacao, whose prevalence for FD was 1.9%. One of the possible explanations for these different figures, among others, is how these interviews were conducted. The data from North American children[8] were taken from the mothers' self-responses. Conversely, Colombian children[7,9] completed the questionnaires through self-

Table 2. General characteristics of children with functional dyspepsia

n = 11				
	FD	Postprandial	Epigastric pain	*p*
	n = 11	n = 7	n = 4	
Sociodemographic variables				
Age				
- Average ± standard deviation	11.4 ± 1.2	11.4 ± 1.1	11.5 ± 1.7	0.9072
- Range	10 and 14	11 and 14	10 and 14	
Age groups				
- Schoolchildren (10–12 years)	9 (81.8)	6 (85.7)	3 (75.0)	0.618
- Adolescents 13–18 years old	2 (18.2)	1 (14.3)	1 (25.0)	
Gender				
- Female	9 (81.8)	6 (85.7)	3 (75.0)	0.618
- Male	2 (18.2)	1 (14.3)	1 (25.0)	
Race				
- Hispanic	6 (54.5)	5 (71.4)	1 (25.0)	0.197
- White	4 (36.4)	2 (28.6)	2 (50.0)	0.470
- Afro-descendant	1 (9.1)	0 (0.0)	1 (25.0)	0.364
Personal variables				
- C-Section	4 (36.4)	1 (14.3)	3 (75.0)	0.088
- Preterm birth	2 (18.2)	0 (0.0)	2 (50.0)	0.109
Family variables				
- Only child	3 (27.3)	1 (14.3)	2 (50.0)	0.279
- Firstborn	6 (54.5)	4 (57.1)	2 (50.0)	0.652
- Separated/divorced parents	8 (72.7)	4 (57.1)	4 (100.0)	0.212
- Intra-family FGIDs	0 (0.0)	0 (0.0)	0 (0.0)	N/A

Table 2. General characteristics of children with functional dyspepsia (*continued*)

n = 11				
	FD	Postprandial	Epigastric pain	*p*
	n = 11	n = 7	n = 4	
Clinical variables				
Nutritional condition				
- According to BMI				
Eutrophic	7 (63.6)	5 (71.4)	2 (50.0)	0.470
Malnourished	4 (36.4)	2 (28.6)	2 (50.0)	0.470
Overweight/obese	4 (36.4)	2 (28.6)	2 (50.0)	0.470
Overweight	1 (9.1)	1 (14.3)	0 (0.0)	0.636
Obese	3 (27.3)	1 (14.3)	2 (50.0)	0.279
- According to H/A				
Eutrophic	11 (100.0)	7 (100.0)	4 (100.0)	N/A
Altered height	0 (0.0)	0 (0.0)	0 (0.0)	
History of dengue	2 (18.2)	1 (14.3)	1 (25.0)	0.618
Epidemiological variables				
Overlapping	**8 (72.7)**	**5 (71.4)**	3 (75.0)	**0.721**
- Constipation	6 (54.5)	3 (42.9)	3 (75.0)	0.348
- Constipation and nausea	1 (9.1)	1 (14.3)	0 (0.0)	0.636
- Vomiting	1 (9.1)	1 (14.3)	0 (0.0)	0.636
Confinement	4 (36.4)	1 (14.3)	3 (75.0)	0.088

N/A: not applicable; H/A: height-for-age.

response, and the QPGS-III was applied to the children in Curaçao[10], while the data interpretation to identify any FGID was conducted according to QPGS-IV.

On the other hand, other authors have only studied FD as part of FGIDs. Some of them[1,8,11], like us, have described a higher prevalence to present the PDS over the EPS subtype. Even Wei *et al*[11] found a 0.3% overlap between both FD subtypes, similar findings to ours with only 1 patient presenting such overlap, and different from the high prevalence reported by Turco *et al*[1]. The latter found a 36.0% overlap between both FD subtypes, which suggests a common pathophysiological mechanism. However, it is worth noting that Turco *et al*[1] classified FD subtypes according to the QPGS-III for adults.

Our results show that FD occurred more in female adolescents, as described by Kumagai *et al*[12], but different from Wei *et al*[11] and Turco *et al*[1], who did not find this association. Other authors have described some possible factors for presenting FD like Wei *et al*[11] that found age (OR: 1.112; 95%CI: 1.031–1.201; $p = 0.006$) and independent living from parents (OR: 1.677; 95%CI: 1.255–2.242; $p < 0.001$) as possible causes to develop FD. In their study with Japanese children, Kumagai *et al*[12] associated FD prevalence with sleeping habits. Although many patients with FD associate their dyspeptic symptoms with eating habits, few studies show that dietary factors may be involved in developing this FGID. For example, Wei *et al*[11] describe that delayed school meals (OR: 2.107; 95%CI: 1.447–

Table 3. Association between FD, overlapping, and variables

n = 11						
	Functional dyspepsia			Overlapping		
	OR	95 % CI	*p*	OR	95 % CI	*p*
Age groups						
- Schoolchildren (10–12 years)	1.00			1.00		
- Adolescents 13–18 years old	0.51	0.05-2.57	0.3933	0.79	0.07-4.55	0.7806
Gender						
- Male	1.00				N/A	
- Female	5.33	1.06-51.45	0.0194			
Race						
- Hispanic	1.80	0.44-7.67	0.3376	2.34	0.44-15.31	0.2362
- White	0.79	0.16-3.24	0.7220	0.49	0.04-2.82	0.3842
- Afro-descendant	0.44	0.01-3.32	0.4394	0.64	0.01-5.17	0.6799
- Confinement	0.36	0.07-1.49	0.1053	0.62	0.11-3.45	0.5152
- C-section	0.57	0.12-2.34	0.3849	0.64	0.09-3.40	0.5553
- Preterm birth	1.62	0.16-8.47	0.5420	2.6	0.24-15.21	0.2363
- Only child	2.18	0.35-9.68	0.2562	0.85	0.01-6.94	0.8865
- Firstborn	1.50	0.36-6.39	0.5108	1.23	0.22-6.73	0.7706
- History of dengue	1.39	0.13-7.17	0.6809	0.93	0.02-7.55	0.9468
- Separated/divorced parents	4.74	1.09-28.31	0.0141	2.87	0.54-18.79	0.1362
Father	3.64	0.88-17.42	0.0328	2.01	0.36-11.04	0.3180
Mother	1.63	0.03-13.16	0.650	2.30	0.04-19.52	0.4343
- Intra-family FGIDs		N/A			N/A	
Nutritional condition						
- According to BMI						
Eutrophic	1.00			1.00		
Malnourished	0.57	0.12-2.34	0.3849	0.14	0.003-1.15	0.0378
Overweight/obese	0.61	0.12-2.51	0.4505	0.15	0.03-1.23	0.0467
Overweight	0.20	0.004-1.46	0.0929		N/A	
Obese	2.18	0.35-9.68	0.2562	0.81	0.01-6.58	0.8485
- According to H/A						
Eutrophic		N/A			N/A	
Altered height						

3.068; $p < 0.001$), skipping breakfast (OR: 2.192; 95%CI: 1.103–3.688; $p = 0.003$), eating frequently (OR: 2.296; 95%CI: 1.347–3.912; $p = 0.002$), and eating cold foods daily (OR: 2.736; 95%CI: 1.263–5.927; $p = 0.011$) are possible food-related risk factors leading to FD. Likewise, Kumagai *et al*[12] found that impaired eating habits constitute a risk factor for developing FD.

Another risk factor we found leading to develop FD is children from separated parents. According to the biopsychosocial model, we cannot ignore that psychosocial factors play a crucial role in the pathogenesis of FGIDs. Stress has pathophysiological effects on the gastrointestinal tract, triggering or exacerbating abdominal pain through visceral hypersensitivity and changes in motility. Children with depressive or anxious symptoms are more likely to develop FGIDs[1,5,12]. Divorce is a major stressor at this age. Several Latin American studies associate the presence of separated/divorced parents with the prevalence of FGIDs [13,14], consistent with this study. Wei *et al*[11] also identified that children living independently from their parents were at higher risk of developing FD, comparable to the separated parents in this study. These two factors may trigger anxiety and stress in these patients.

Thus, the main strength of our study is that it is the first cross-sectional study conducted on Cuban adolescents that determined the prevalence of FD and its associated factors. However, this study also has limitations since, like other studies using the Questionnaires of Pediatric Gastrointestinal Symptoms, Rome IV version, it includes failure to ensure external validity of the results since the symptoms depend on the adolescent's report, which is based on the recollection of the event and its frequency, so there may be a memory bias. On the other hand, with the existing situation due to the 2019 coronavirus disease (COVID-19) and school closures, the series could not be larger and more representative.

In conclusion, functional dyspepsia is most common in female adolescents, PDS is the most frequent subtype, and its presence is associated with separated/divorced parents.

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