ORIGINAL ARTICLE

AG-2022-5
doi.org/10.1590/S0004-2803.202202000-47

Clinical spectrum of functional constipation and bowel-habit patterns of schoolchildren recruited from two elementary schools and a specialized outpatient clinic

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Received: 5 January 2022
Accepted: 24 March 2022

ABSTRACT – Background – Early diagnosis of functional constipation is important for reducing its negative consequences on the health of children and adolescents. **Objective –** To describe the clinical spectrum of functional constipation and bowel habit patterns in schoolchildren recruited from two primary schools and patients from a pediatric gastroenterology outpatient clinic. **Methods –** This cross-sectional study included 452 students from two elementary schools in the city of Osasco and 81 patients with functional constipation seen in an outpatient clinic specializing in pediatric gastroenterology. All children were aged between 6 and 12 years. The Rome IV criteria (two features for more than 1 month) and the Bristol scale were used. **Results –** The prevalence of functional constipation among the elementary school students was 22.3% (n=101). Among the 351 students who did not have functional constipation, 182 (51.9%) had one of the clinical manifestations of the Rome IV criteria. Bristol stool scale types 1 and 2 were observed in 14 (8.3%) of the 169 students without any clinical manifestation of the Rome IV criteria and in 28 (15.4%) of the 182 students who presented one of the Rome IV criteria for functional constipation (P=0.060). A comparison of the clinical manifestations of children with functional constipation identified at school in relation to those seen at the specialized clinic showed the following differences: fewer than two bowel movements per week (21.8% and 54.3%; P<0.001, respectively), one or more episodes of fecal incontinence per week (14.8% and 53.1%; P<0.001), and retentive posturing (70.3% and 40.7%, P<0.001). Only 18 (17.8%) of the 101 students identified at the schools with functional constipation had received any treatment for this disease in the previous 2 months. **Conclusion –** As expected, the frequency of more severe clinical manifestations was higher in children seen at specialized clinics. Only a small proportion of the children identified with functional constipation at primary schools had undergone any form of treatment in the previous 2 months. More than half of the children without functional constipation in elementary schools reported one of the Rome IV clinical manifestations. Finally, functional constipation has a broad clinical spectrum and also requires attention for the prevention and the management of its early clinical manifestations.

Keywords – Functional constipation; child; signs and symptoms.

INTRODUCTION

Constipation is a frequent gastrointestinal symptom in all age groups, including children and adolescents. The vast majority of cases of constipation in pediatric patients are of functional origin, which means that constipation is not caused by any specific organic disease. The etiology of functional constipation is multifactorial and includes biopsychosocial factors that lead to the behavior of avoiding defecation with consequent stool retention. In the long term, this process can result in complications, such as fecal incontinence[1-5].

Constipation is the main complaint in 25% of medical appointments in pediatric gastroenterology outpatient clinics[1-5]. In the general population, the prevalence varies widely because epidemiological studies have used heterogeneous diagnostic criteria[1,6]. In Brazil, studies on children and adolescents showed a prevalence of 15% to 35%[7-10]. It should be emphasized that constipation is not always recognized as a problem by the family[11].

On the other hand, a long interval between the onset of symptoms and seeking medical care only when alarming symptoms such as fecal incontinence and abdominal pain arise are frequently observed in specialized outpatient clinics[1,5,12]. Late diagnosis and treatment are associated with worse prognosis and a greater probability of persistent functional constipation in adulthood[3,4].

In pediatric guidelines, only the treatment of severe cases of functional constipation has been highlighted[3]. The importance of dietary interventions, such as a higher consumption of dietary fiber and liquids, is not emphasized for the prevention and treatment of mild forms of functional constipation from its onset[1,5,13,14].

Declared conflict of interest of all authors: none
Disclosure of funding: CNPq Scientific Initiation Scholarship for Lorena Bellan Domiciano da Silva, CAPES Doctoral Scholarship for Francine Canova Dias.
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In this context, although differences in the severity of the clinical picture of functional constipation are expected among children identified in schools compared to those seen at specialized outpatient clinics, to our knowledge, this subject has not yet been explored in the literature. This comparison may provide evidence to aid the early recognition and treatment of functional constipation.

To this end, the present study aimed to describe the clinical spectrum of functional constipation and bowel-habit patterns in students recruited from two elementary schools and patients treated at a specialized pediatric gastroenterology clinic.

METHODS

Study design

In this cross-sectional study, the clinical manifestations of functional constipation were evaluated in two groups of children aged 6–12 years. One group was composed of students from two elementary schools in the metropolitan area of São Paulo (city of Osasco). The second group consisted of patients with functional constipation at their first visit to the Pediatric Gastroenterology Clinic at the *Escola Paulista de Medicina, Universidade Federal de* São Paulo (UNIFESP).

Demographic information, bowel habit pattern, clinical manifestations of the Rome IV criteria, and stool classification according to the Bristol scale were obtained in both groups. The clinical characteristics of children with functional constipation identified at school were compared with those of children who attended a specialized clinic. The presence of single manifestations of the Rome IV criteria for more than 2 months was also taken into account for schoolchildren who did not meet the Rome IV criteria for functional constipation. This project was evaluated and approved by the Research Ethics Committee of UNIFESP (CAAE: 23072619.1.0000.5505).

Participants

In the two elementary schools, all students aged between 6 and 12 years were invited to participate in the study, regardless of sex, nutritional status, race, or economic status, as long as their parents or guardians signed an informed consent form. Thus, 480 children from the two schools, selected by the Municipal Department of Education, were authorized by their parents to participate in the study. Only one student did not agree to participate in this study. Patients with severe chronic diseases (genetic, neurological, cardiac, inflammatory, endocrine, or renal) were excluded from the study. Two students were excluded: one with myelomeningocele and another with cerebral palsy. Twenty-six children were excluded because their parents or guardians were unavailable for the interview. Thus, 452 students were included in this study. The data were collected between November 2014 and November 2015.

The second group included 81 patients aged 6–12 years who consecutively attended the pediatric gastroenterology outpatient clinic with functional constipation. The patients were observed between 2016 and 2020.

Clinical data

The features of the Rome IV criteria[4] were evaluated in both groups:

1. Two or fewer defecations in the toilet per week in a child of developmental age of at least 4 years.
2. At least one episode of fecal incontinence per week.
3. History of retentive posturing or excessive volitional stool retention.
4. History of painful or hard bowel movements.
5. Presence of a large fecal mass in the rectum.
6. History of large diameter stools that can obstruct the toilet.

Functional constipation must include two or more of the six features described above, at least once per week for a minimum of 1 month[4]. For the students of the two elementary schools, a duration of 2 months was required for the clinical manifestations of the Rome IV[4] criteria, as previously recommended[2].

At school, parents answered questions that allow the characterization of functional constipation according to the information above described. Information was obtained through face-to-face interviews. The Portuguese questions used in the interview had previously been tested for comprehension and successfully used to identify functional constipation[8-10] in accordance with the Rome criteria[2,4]. In the specialized outpatient clinic, information was obtained from medical records whose fulfillment requires that clinical manifestations of the Rome IV criteria[4] are recorded during the consultation.

The Bristol scale was used to define stool form and consistency in both the groups[15]. The frequency of bowel movements and occurrence of abdominal pain were also recorded.

In schools, data were collected regarding the use of any type of treatment for constipation in the last 2 months. As in other studies carried out in schools, a digital rectal examination was not performed to examine fecal masses in the rectum.

Statistical analysis

Data were tabulated in a Microsoft Excel 2011 spreadsheet. Statistical analyses were performed using SigmaPlot version 11 (Systat Software, San Jose, CA, USA). Chi-square and Fisher's exact tests were used to compare proportions, as indicated. A significance level of 5% was considered to be statistically significant. To estimate the sample size (SigmaPlot), a power of 90%, alpha error of 1.0%, and the following expected differences between groups were considered, taking into account the results from previous studies[8,10,12]: 1) Fecal incontinence in a maximum of 10% of school students and 50% of patients in the specialized outpatient clinic; therefore, n=42; 2) Evacuation frequency was less than three times a week for a maximum of 15% of school students and 50% of outpatients; therefore, n=57. Considering a safety margin of 20%, each group should consist of at least 70 individuals.

RESULTS

Of the 452 children evaluated in public elementary school, 101 (22.3%) had functional constipation. Functional constipation frequency rates were similar in children evaluated in schools (P=0.419, chi-square test) among boys (20.1%, 36/179) and girls (23.8%, 65/273). At the outpatient clinic, 53 (65.4%) of the 81 patients with functional constipation were male and 28 (34.6%) were female.

It must be pointed out that in elementary schools, 182 (40.3%) of 452 students had only one clinical manifestation of Rome IV criteria and, therefore, they did not meet the criteria for the diagnosis of functional constipation. The remaining 169 (37.4%) students did not meet any Rome IV criteria for functional constipation. TABLE 1 shows the Bristol scale scores of children without functional constipation according to the presence or absence of one of the clinical manifestations of the Rome IV criteria. Bristol

TABLE 1. Bristol scale from children recruited at elementary school and who did not meet the Rome criteria for functional constipation.

Clinical manifestation of the Rome IV criteria	Bristol Scale			Total (n=351)
	1 or 2 (n=42)	3 or 4 (n=289)	5 to 7 (n=20)	
No clinical manifestations of Rome IV criteria	14 (33.3%)	141 (48.8%)	14 (70.0%)	169 (48.1%)
Painful or hard bowel movements	20 (47.6%)	99 (34.3%)	2 (10.0%)	121 (34.5%)
Two or fewer defecations in the toilet per week	2 (4.8%)	2 (0.7%)	0 (0.0%)	4 (11.4%)
Retentive posturing or excessive volitional stool retention	6 (14.3%)	38 (13.1%)	3 (15.0%)	47 (13.4%)
History of large diameter stools that can obstruct the toilet	0 (0.0%)	8 (2.8%)	1 (5.0%)	9 (2.6%)
At least one episode of fecal incontinence per week	0 (0.0%)	1 (0.03%)	0 (0.0%)	1 (0.3%)

stool scale types 1 and 2 were observed in 14 (8.3%) of the 169 students without any clinical manifestation of the Rome IV criteria and in 28 (15.4%) of the 182 who presented with one of the Rome IV criteria for functional constipation (P=0.060, chi-square test).

TABLE 2 shown the clinical manifestations of the Rome IV criteria in both groups. There is no statistical difference in the frequency of painful or hard bowel movements and history of large diameter stools that can obstruct the toilet. The frequencies of less than three defecations per week and fecal incontinence were higher in the outpatient group than in the schools group. On the other hand, retentive posturing or excessive volitional stool retention was more frequent in the schools group.

TABLE 2. Clinical manifestations of the Rome IV criteria in children with functional constipation recruited at the elementary schools or treated at the outpatient pediatric gastroenterology clinic.

	Elementary school (n=101)	Outpatient clinic (n=81)	P[1]
Painful or hard bowel movements	96 (95.0%)	72 (88.9%)	0.204
Two or fewer defecations in the toilet per week	22 (21.8%)	44 (54.3%)	<0.001
Retentive posturing or excessive volitional stool retention	71 (70.3%)	33 (40.7%)	<0.001
History of large diameter stools that can obstruct the toilet	33 (32.7%)	25 (30.9%)	0.920
At least one episode of fecal incontinence per week	15 (14.8%)	43 (53.1%)	<0.001

[1]Chi-square test.

TABLE 3 shows that children with functional constipation in schools have a predominance of types 3 and 4 on the Bristol scale, while types 1 and 2 predominated in patients from the specialized outpatient clinic. The presence of abdominal pain and intervals of more than 1 week between bowel movements were more frequent among patients with functional constipation seen at the specialized outpatient clinic.

TABLE 3. Bristol scale, abdominal pain, and interval between bowel movements greater than 1 week in children with functional constipation recruited at the elementary schools or treated at the outpatient pediatric gastroenterology clinic.

	Elementary school (n=101)	Outpatient clinic (n=81)	P[1]
Bristol Stool Scale			
Type 1 and 2	17 (16.8%)	50 (61.7%)	
Type 3 and 4	81 (80.2%)	25 (30.8%)	<0.001
Type 5 to 7	3 (3.0%)	6 (7.5%)	
Abdominal pain	25 (24.7%)	34 (41.9%)	0.021
Interval between bowel movements greater than 1 week	2 (2.0%)	34 (41.9%)	<0.001

[1]Chi-square test.

Of the 101 children with functional constipation identified at school, only 18 (17.8%) had undergone any type of treatment in the previous 2 months. The proportion of students with constipation and fecal incontinence who had undergone treatment in the preceding 2 months (40.0%; 6/15) was higher (P=0.025, Fisher's exact test) than that of students with functional constipation but without fecal incontinence (14.0%; 12/86).

DISCUSSION

As expected, this study showed that the clinical manifestations of functional constipation in patients seen at a specialized outpatient clinic were more severe than those in children identified as having functional constipation in elementary schools. Only a small number of students identified as having functional constipation underwent any form of treatment in the last 2 months. Furthermore, a large number of students (40.3%) who did not meet the diagnostic criteria for functional constipation had one of the clinical manifestations of the Rome IV criteria; that is, they did not fulfill the diagnostic criteria for functional constipation but showed a possible deviation from normal intestinal habits.

The prevalence of functional constipation among students in the two elementary schools was 22.3% (101/452). Two months was considered the required duration[2] for the clinical features recommended by the Rome IV[4] criteria before 2016[2]. The prevalence

of functional constipation was similar to that found in previous studies in Brazil[1,7-10]. This prevalence also falls within the wide range of functional constipation reported in a systematic review[6] of pediatric epidemiological studies performed worldwide. A description of the percentage of each clinical manifestation of the Rome criteria was not reported in this systematic review[6]. Most of the studies included in this systematic review[6] were conducted before 2016; therefore, the Rome IV criteria[4] have not yet been published. It is worth mentioning that the only modification from the Rome III criteria (2006)[2] to the 2016 Rome IV[4] was a decrease in the required duration of symptoms, which was reduced from 2 months to 1 month. Two recent epidemiological studies showed that this decrease in symptom duration did not result in a significant difference in the prevalence of functional constipation[16,17].

In our study, each of the clinical manifestations of the Rome IV criteria was described and classified according to the Bristol scale in the evaluation of the intestinal habits of schoolchildren (TABLE 1). It should be noted that the shape and consistency of stools are not considered directly in the evaluation of functional constipation using the Rome IV criteria[4]. The Rome IV criteria also require the presence of at least two of its clinical features to define functional constipation[4]. Among the 351 children without functional constipation evaluated at the two elementary schools, 182 (40.3%) met one of the characteristics of the Rome IV criteria[4]. Type 1 and 2 stools on the Bristol scale were found more frequently in children with one clinical feature of the Rome IV criteria than in those with no Rome IV criteria; however, the difference was not statistically significant (P=0.060). These data suggest that some students in elementary schools have a pattern of bowel habits that could potentially evolve into functional constipation.

With regard to sex, data from both groups reflected the expected patterns. The prevalence of functional constipation in the children evaluated in elementary schools was similar in both sexes. This result is consistent with a systematic review of epidemiological studies on disorders of defecation[6].

In contrast, in the outpatient clinic, there was a predominance of boys, which is in agreement with a previous study in our outpatient clinic[12] and studies in outpatient clinics of other countries[18,19]. The main differences in the clinical characteristics of the two groups were the greater frequency of increase in the interval between bowel movements, fecal incontinence, and abdominal pain in patients seen in the specialized clinic (TABLES 2 and 3). The current data concerning fecal incontinence in the outpatient clinic (53.1%) is lower than the rate (68.2%) observed in a previous study conducted in the same outpatient clinic[12]. In turn, the fecal incontinence rate was similar to the 53.9% found in 245 patients evaluated at the Pediatric Gastroenterology Outpatient Clinic in India[18] and 48.9% of 333 patients seen at an outpatient clinic in South Korea[19].

In contrast, fecal incontinence was found in 16 (3.5%) of 452 students recruited from elementary schools, 15 of whom met the Rome IV criteria for functional constipation. Prevalence of fecal incontinence of 1.6%[8] and 2.3%[10] was found in two Brazilian studies with adolescents. These data might not be comparable with the prevalence of 0.4% of non-retentive fecal incontinence mentioned in the above literature review about defecation disorders in pediatrics[6]. The above-mentioned review[6] did not provide data on retentive fecal incontinence associated with functional constipation.

Retentive posturing was the only feature that was found to be more frequent in the elementary school group than in the outpatient clinic group. Retentive posturing plays an important role in generating the vicious pain-retention circle, which is part of the pathophysiology of functional constipation in children[1-5]. Thus, the retentive posturing present from the onset of functional constipation may be involved in the persistence of the disease for a long period until the advent of an increase in the interval between bowel movements, formation of fecaloma, and retentive fecal incontinence[1,5]. To the best of our knowledge, no epidemiological study has previously described a higher frequency of retentive posturing in relation to a specialized clinical case series. Another important result of the present study is that only 17.8% of the children with functional constipation identified at elementary schools had undergone any type of treatment in the previous two months. The association between fecal incontinence and recent treatment confirms the hypothesis that patients with severe functional constipation are treated more frequently. It must be noted that a significant portion of the children studied at the schools had one of the features adopted by the Rome IV criteria[4]. It is possible to speculate that some of these children may progress to functional constipation, and only when the clinical manifestations become severe will the family seek medical assistance.

Notably, no study has explored the clinical picture of children in different clinical scenarios. Thus, the present study is one of the first to describe the wide spectrum of severity of functional constipation in children identified in elementary schools and seen in specialized clinics.

In this context, the NASPGHAN/ESPGHAN (North American and European Pediatric Gastroenterology, Hepatology, and Nutrition Societies) guidelines[3] do not suggest differences in the treatment of functional constipation according to severity. In addition, these guidelines emphasize the importance of early treatment to improve prognosis. Our data suggest that preventive and therapeutic measures designed specifically for the initial forms of functional constipation and also for its prevention are important from the perspective of public health[13,14]. A dietary fiber-rich diet, adequate fluid intake, and a non-sedentary lifestyle should be encouraged as preventive measures against functional constipation and other chronic diseases, such as obesity[13,14,20-23].

Some limitations of this study that explore the spectrum of functional constipation in two different clinical scenarios should be addressed. The age range was restricted (6 to 12 years), and the subjects lived in a single urban geographic region. Therefore, future studies are needed to investigate other age groups, geographic regions, and socioeconomic statuses. It should be noted that a small modification was used for the Rome IV criteria. However, this modification does not have any clinical relevance, as proven in recent articles[16,17].

In conclusion, as expected, the frequency of more severe clinical manifestations was higher in children seen at specialized clinics. Only a small proportion of the children identified with functional constipation at primary schools had undergone any form of treatment in the previous 2 months. More than half of the children without functional constipation in elementary schools reported one of the Rome IV clinical manifestations. Finally, functional constipation has a broad clinical spectrum and also requires attention for the prevention and the management of its early clinical manifestations.

Authors' contribution

Silva LBD: study design, data collection, data analysis, statistical analysis, article writing, approval of the final version of the manuscript. Dias FC: study design, data collection, data analysis, statistical analysis, approval of the final version of the manuscript. Melli LCFL: study design, data collection, data analysis, statistical analysis, approval of the final version of the manuscript. Tahan S: study design, data collection, article writing, approval of the final version of the manuscript. Morais MB: conception and supervision of the study, data analysis, statistical analysis, article writing, approval of the final version of the manuscript.

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Silva LBD, Dias FC, Melli LCFL, Tahan S, Morais MB. Espectro clínico da constipação intestinal funcional e características do hábito intestinal de escolares recrutados em duas escolas e em um ambulatório especializado. Arq Gastroenterol. 2022;59(2):263-7.

RESUMO – Contexto – Diagnóstico precoce da constipação intestinal funcional é importante para reduzir suas consequências negativas para a saúde da criança e do adolescente. **Objetivo –** Descrever o espectro clínico da constipação intestinal funcional e o hábito intestinal de crianças recrutadas em escola de primeiro grau e de pacientes atendidos em ambulatório especializado de gastroenterologia pediátrica. **Métodos –** Estudo observacional que avaliou 452 alunos de duas escolas públicas da cidade de Osasco e 81 pacientes atendidos em ambulatório especializado em gastroenterologia pediátrica com constipação intestinal funcional. Todas as crianças tinham idade entre 6 e 12 anos. Foram utilizados os critérios de Roma IV (duas manifestações clínicas por mais de 1 mês) e a escala de Bristol. **Resultados –** Na escola constatou-se que 22,3% (101) das crianças apresentavam constipação intestinal funcional. Dentre os 351 alunos que não apresentavam constipação intestinal funcional, verificou-se que 182 (51,9%) apresentavam uma das manifestações clínicas do critério de Roma IV. A comparação das características clínicas das crianças com constipação intestinal funcional identificadas na escola (n=101) em relação aos pacientes atendidos no ambulatório especializado (n=81) evidenciou, respectivamente, as seguintes diferenças: menos de duas evacuações por semana (21,8% e 54,3%; *P*<0,001); um ou mais episódios de incontinência fecal por semana (14,8% e 53,1%; *P*<0,001) e comportamento de retenção (70,3% e 40,7%, *P*<0,001). Apenas 18 (17,8%) dos 101 alunos identificados na escola com constipação intestinal funcional havia realizado algum tratamento para esta doença nos últimos dois meses. **Conclusão** – Conforme esperado, a frequência de manifestações clínicas mais graves foi maior nas crianças atendidas no ambulatório de gastroenterologia pediátrica. Apenas uma pequena parcela das crianças com constipação intestinal funcional identificadas nas escolas recebeu algum tratamento nos últimos dois meses. Mais da metade das crianças sem constipação intestinal funcional da escola apresentava pelo menos uma das manifestações do critério de Roma IV. Para finalizar, constipação intestinal funcional apresenta um amplo espectro clínico que também requer atenção para a sua prevenção e controle de suas manifestações clínicas precoces.

Palavras-chave – Constipação intestinal; criança; sinais, sintomas.

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