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Stooling Characteristics in Children with Irritable Bowel Syndrome

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INTRODUCTION

Irritable bowel syndrome (IBS) is a highly prevalent and multifactorial functional gastrointestinal disorder affecting up to 20% of school aged children worldwide.¹ Clinically IBS is characterized by abdominal discomfort that improves with defecation and/or is associated with changes in stool frequency or stool form.

Stool form in both adults and children often is assessed using the Bristol Stool Form Scale (BSFS).² The BSFS categorizes stools into one of seven stool types ranging from type 1 (hard lumps) to type 7 (watery diarrhea).² Individuals with IBS are subtyped based on predominant stool form: IBS with constipation (IBS-C), IBS with diarrhea (IBS-D), IBS mixed subtype (IBS-M), and IBS un-subtyped (IBS-U).³ However, little is known about how children with IBS differ from healthy children (HC) with respect to either stool form or stool frequency.

METHODS

Participants

Participants were children ages 7-12 years enrolled in clinical trials from 2007-2015. Only baseline data (i.e., prior to any intervention) were used. Children with IBS were included if they met criteria for pediatric Rome III IBS via a phone screening questionnaire.⁴ Controls were included if they did not currently or previously have chronic abdominal pain. Children were excluded if chart review by a pediatric gastroenterologist (RJS) or phone screening

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revealed a significant chronic medical/pain condition, vomiting 2 times a month, unexplained weight loss, hematochezia, major gastrointestinal tract surgery, significant developmental delay, or an organic gastrointestinal disorder.

Recruitment and study procedures were approved by the Baylor College of Medicine Institutional Review Board. Parental informed consent and child assent were obtained.

Stool Diaries

Children independently completed a validated 14-day Stool Diary.⁴ Time of stool passage and stool form per the BSFS were both recorded for each bowel movement.² IBS subtypes were determined as per Rome III criteria.^{3, 5}

Data Analysis

IBM SPSS Statistics (version 23, 2013, IBM Corporation) was used for statistical analyses. Independent student's t-test was used for comparisons between IBS vs. HC; one-way analysis of variance was used for comparisons between IBS subtypes.

RESULTS

A total of 303 children (185 IBS and 118 HC) were included. There were no demographic differences between the children with IBS vs. HC (data not shown).

Stooling Characteristics in Children with IBS vs. HC

Children with IBS and HC both had all stool form type categories. Overall mean stool type did not differ between children with IBS vs. HC. However, children with IBS (vs. HC) had a greater number of type 1 (constipated), type 6 (diarrheal), and type 7 (diarrheal) stools (Table 1). Children with IBS (vs. HC) had modestly more bowel movements per day (Table 1).

Stooling Characteristics by IBS Subtype

By definition, there were significant differences in the stool forms among IBS subtypes. However, stool frequency did not differ by IBS subtype (Table 1).

DISCUSSION

This is the first study to prospectively evaluate stooling frequency by pediatric IBS subtype. We compared these data to those obtained from HC who also had their stools characterized using the BSFS. We found that children with IBS have more frequent bowel movements, as well as more constipation and diarrheal type stools vs. HC. We also found that while stool form differed amongst IBS subtypes; bowel movement frequency did not.

Although HC in our cohort had a stooling frequency comparable to HC in other studies,⁶ our results show HC have a wide range of BSFS stool types. Given this and our finding that overall mean stool type did not differ between children with IBS vs. HC, it is unclear whether the BSFS alone is able to differentiate between the two groups. This is particularly salient given that reliability of the BSFS decreases when categorizing stools as normal vs.

either constipation or diarrhea type.⁷ Future consideration might be given to adding other stool parameters to differentiate children with IBS vs. HC including stool volume, color, or other characteristics.

The lack of differences in bowel movement frequency among IBS subtypes may reflect a lack of correlation between BSFS type and stooling frequency. Though the BSFS was validated in adults as a measure of stool transit,² a large US population-based survey found poor correlations in both adult men ($r=0.06$) and women ($r=0.12$) between BSFS stool form and stooling frequency.⁸ Future prospective trials characterizing either stool form or frequency in children with IBS may benefit from formal transit study evaluations.

We conclude that there are only modest differences in stool form and frequency between children with IBS vs. HC. Furthermore, childhood IBS subtypes cannot be differentiated by stooling frequency.

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Abbreviations

BSFS	Bristol Stool Form Scale
HC	healthy children
IBS	irritable bowel syndrome
IBS-C	irritable bowel syndrome with constipation
IBS-D	irritable bowel syndrome with diarrhea
IBS-M	mixed type irritable bowel syndrome
IBS-U	unsubtyped irritable bowel syndrome

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Table 1

Stooling Characteristics over Two Weeks in Children with Irritable Bowel Syndrome (IBS) vs. Healthy Children (HC)

	IBS (n=185)	HC (n=118)	IBS-C n=88	IBS-U n=74	IBS-D n=15	IBS-M n=8
BSFS Stool Type (number of stools)						
Type 1	1.02 ± 1.97 ^a	0.42 ± 0.90 ^{a,d}	1.67 ± 2.59	0.32 ± 0.66	0.27 ± 0.46	1.75 ± 1.04 ^b
Type 2	2.64 ± 2.81	2.42 ± 2.59 ^d	4.42 ± 3.04	1.03 ± 1.02	0.40 ± 0.63	2.25 ± 1.58 ^b
Type 3	3.94 ± 3.58	3.89 ± 3.58	3.13 ± 2.69	5.20 ± 4.05	4.20 ± 4.31	0.75 ± 1.17 ^b
Type 4	2.42 ± 2.80	2.31 ± 3.23	1.58 ± 1.92	3.53 ± 3.53	2.40 ± 1.77	1.38 ± 1.30 ^b
Type 5	1.43 ± 1.99	1.28 ± 2.58	0.97 ± 1.39	1.93 ± 2.45	1.73 ± 2.09	1.38 ± 2.00 ^c
Type 6	0.91 ± 1.35	0.34 ± 0.96 ^{a,e}	0.44 ± 0.83	0.76 ± 1.02	3.73 ± 1.71	2.13 ± 0.99 ^b
Type 7	0.24 ± 0.72	0.03 ± 0.22 ^{a,e}	0.07 ± 0.25	0.07 ± 0.25	1.40 ± 1.18	1.63 ± 1.92 ^b
Mean BSFS Type	3.30 ± 0.79	3.17 ± 0.72	2.75 ± 0.55	3.63 ± 0.50	4.65 ± 0.58	3.90 ± 0.42 ^b
Mean bowel movements per day	0.91 ± 0.36	0.77 ± 0.30 ^a	0.89 ± 0.36	0.92 ± 0.35	1.01 ± 0.44	0.79 ± 0.31

BSFS = Bristol Stool Form Scale; IBS-C = IBS with constipation; IBS-U = IBS un-subtyped; IBS-D = IBS with diarrhea; IBSM = IBS mixed subtype

^a Mean ± SD^a P value < 0.001; comparison IBS vs. HC^b P value < 0.001; comparison between IBS subtypes^c P value of 0.02; comparison between IBS subtypes^d P value of 0.04; comparison of combined constipation (both Types 1 and 2) stools IBS vs. HC^e P value < 0.001; comparison of combined diarrheal (both Types 6 and 7) stools IBS vs. HC