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Bowel Habit Pattern and Perception about Bowel Habit Pattern of Medical Students

Irin Perveen[1*], Rukhsana Parvin[2], Madhusudan Saha[3], Md. Shafiqul Bari[4], Md. Saif Uddoula[5] and Mridul Kanti Ghosh[6]

[1]*Department of Gastroenterology, Enam Medical College, Dhaka, Bangladesh*

[2]*Department of Medicine, Enam Medical College, Dhaka, Bangladesh*

[3]*Department of Gastroenterology, North East Medical College, Sylhet, Bangladesh*

[4]*Department of Medicine, Sylhet MAG Osmani Medical College, Sylhet, Bangladesh*

[5]*Department of Gastroenterology, Mymensingh Medical College, Mymensingh, Bangladesh*

[6]*U Chicago Research, Bangladesh*

[*]**Corresponding author:** Irin Perveen, Associate Professor of Gastroenterology, Enam Medical College, B-11, Tropical kader Garden, 335 Tongi Diversion Road, Bara Magh Bazar, Dhaka-1217, Bangladesh, Tel: +8801552365100; Fax: +88-02-7743777; E-mail: irinperveen@yahoo.com

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Abstract

Objectives: This study aimed at evaluating the bowel habit pattern of medical students along with their perception regarding their bowel habit.

Materials and methods: In this observational study normal bowel habit was defined by both Western criteria (Rome III) and Asian diagnostic criteria.

Results: Out of 249 (M = 155) students, 139 (55.8%) had predominantly Bristol type T4 stools, 51 (20.5%) had T3 stools, 18 (7.2%) had T5 stools, 23 (9.2%) had T 6/T7 stools and19 (7.6%) had T1/T2 stools. Weekly mean stool frequency was 9.09 ± 4.058(Male 9.6 vs. female 8.2, P = 0.016), with a range of 3- 28 motions/week.

According to Western criteria 156 (62.65%, M = 101) had normal bowel habit, while by Asian criteria the figure was 109(43.8%). Predominant stool form in Western normal bowel habit group was T4 (n = 109, 69.9%); 34 (21.8%) had T3 stools. Mean stool frequency of normal bowel habit group (8.66/week) was different from constipation group (6.0/week, P = 0.004) but not from diarrhea group (9.38/week, P = 0.540).

A total of 189 (75.9%) students perceived their bowel habit as normal, 17 as constipation, 2 as diarrhea and 12 as alternating diarrhea and constipation. Out of 156 students with normal bowel habit, 134 (85.9%) perceived their bowel habit as normal. A moderate agreement (K = 0.603, P < 0.0005) was found between western criteria and Asian criteria. Agreement between western normal bowel habit and students' perception was poor (K = 0.61, P < 0.0005).

Conclusion: Mean stool frequency of medical students was lower than some Asian countries but the predominant stool from was like most other countries. A wide mismatch was apparent between students' perception of their bowel habit and Western criteria.

Keywords: Bowel habit; Medical students; Perception

Introduction

Defining normal bowel habit is important when evaluating diarrhea or constipation. Normal stool frequency and consistency vary from person to person and in different populations due to several factors including dietary habit, quantity of fiber intake and difference in gut transit time [1-7]. Studies showed that 98% normal persons had bowel movement ranging between three stools per day and three per week and Some degree of urgency, straining, and incomplete evacuation should be considered normal [8]. Studies reported that mean stool frequency is higher in several Asian populations (7.09 -14/week), [3,4, 9,10] but data on stool form is lacking. A recent community-based study reported a mean stool frequency of 9 ± 3.7 per week and T4 (55.9%) as the predominant stool type in the general population of Bangladesh [11]. Daily fecal output varies depending on dietary pattern. In most of the Asian communities due to high fiber intake stool volume is higher than Western population [2,3]. In North India, among the vegetarians' a stool output of 312 gm/24 hour was reported [3].

Misconception regarding bowel habit is common among general population. A wide mismatch exists between patient perception of constipation and diarrhea in Asia, and physician's rating based on standard Western criteria [2,3,12-15]. Definition of diarrhea has traditionally been based upon the frequency, volume, and consistency of stools. However, the relationship between these features and patients' perception of diarrhea is variable [16,17]. Studies showed that general population is acquainted with the term "diarrhea" and they

express it in various ways. In a household survey [17] general population defined diarrhea as the increase in the frequency of depositions, demanding defecations; continuous stools; loose stools, stomach cries; as if it were water; he/she defecates liquid, and so on. Apart from infective, organic, metabolic and drug causes of diarrhea a large group comprised of diarrhea predominant IBS and functional diarrhea (FD). Reliable data on FD is not available as the disorder is under reported, not fatal, and is not well represented in hospital statistics.

In the earlier frequency-based definition of constipation, a stool frequency less than 3 per week was considered as constipation [18]. Although physicians almost define constipation according to stool frequency patients define this problem as a multi-symptom disorder such as- infrequent bowel movements, hard/lumpy stool, straining, bloating, and feeling of incomplete evacuation after a bowel movement and abdominal discomfort [19,20]. The word "constipation" has several meanings, and the way it is used may differ not only between patients but also between different cultures and regions [21,22]. Constipation has multitude of causes with higher prevalence among females, older age group, low education and economic group [23-26].

These gastrointestinal disorders are important public health problem due to their effects on patients' life-style, lost productivity and to the costs of medical consultation [13,27,28]. We are lacking in data on stool form and stool type in our population which is a prerequisite for defining normal bowel habit as well as bowel disorders particularly constipation. Proper conception regarding common bowel disorders is important for appropriate diagnosis and management of patients. This observational study was designed to find out the bowel habit pattern of medical students along with their perception regarding their bowel habit pattern, constipation and diarrhea.

Materials and Methods

Design and subjects

Apparently healthy students (n = 293) from four Government and Non-government Medical colleges were asked to volunteer in this questionnaire-based observational study. Students with organic bowel disorders, gastro-intestinal (GI) malignancy, GI surgery or with other major organic or psychiatric disorders were excluded from the study. Students taking drugs with effects on GI motility or secretion were also excluded from the study. The study was carried out during the period of July 2013 to December 2013. In each institute at least one doctor was assigned to collect data from the students and to clarify the queries raised by the students.

Questionnaire

Data were collected by a previously validated self-report questionnaire based on Extended Asian Rome III bowel disease questionnaire [29]. A part of the questionnaire also included demographic data and questions on diarrhea and constipation.

Study definitions

For the study, functional bowel diseases were diagnosed according to "Rome-III" definition and Asian diagnostic criteria [29].

Normal bowel habit: Western criteria: Persons having a stool frequency of 3-21/week and predominant stool type T3/T4/T5 of Bristol stool chart after excluding different bowel disorders and alarm symptoms.

Asian criteria: Persons having a stool frequency of 3-21/week and predominant stool type T4 of Bristol stool chart after excluding different bowel disorders and alarm symptoms.

Statistical Issue

Sample size and power: Anticipating a prevalence of different bowel disorders in medical students not exceeding 20% and the prevalence to be estimated within 5 percentage points of the true value with 95% confidence , Table 1, page 25 showed that for P = 0.20 and d = 0.05, a sample size of 246 students would be needed [30].

We included 140 students from private institutions and 153 from government institutions. Students were enrolled from both basic science departments (n = 142) and from clinical students (n = 151).

The statistical analysis was performed with a SPSS 20.0 program (SPSS Inc., Chicago, IL, USA). A Student's *t* test was used to compare the distributions of continuous data and Pearson's chi-square test was used during comparison of categorical variables. A Kruskal-Wallis H test was used to compare the bowel motion frequencies of different bowel habit groups. A kappa (K) statistic was calculated to see agreement between western criteria and Asian criteria and bowel habit and students' perception. During comparisons significance level was set at ≤ 0.05.

	Normal bowel habit	IBS	FD†	Functional Bloating	FC††	Un-specified FBD†††
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
	101 (65.2)	9 (5.8)	2 (1.3)	1 (0.65)	3 (2.08)	40 (25.8)
Male (n = 155)	55 (58.5)	3 (3.2)	0	10 (10.52)	10 (10.5)	15 (16.0)
Female (n = 94)	P = 0.344	P = 0.543	P = 0.592	P = 0.001	P = 0.006	P = 0.083
	91(74.0)	4 (3.3)	1 (0.8)	4 (3.3)	4 (4.9%)	17 (13.8)
Preclinical (n = 123)	65 (51.6)	8 (6.3)	1 (0.8)	7 (5.6)	7 (5.6%)	38 (30.2)
Clinical(n = 126)	P = 0 .000	P = 0.376	P = 1.00	P = 0.540	P .1.00	P = 0.002
	83 (64.8)	9 (7.0)	2 (1.6)	4 (3.1)	4 (3.1%)	26 (20.3)

Government (n = 128)	73 (60.3)	3 (2.5)	0	7 (5.8)	9 (7.4%)	29 (24.0)
Non-government (n = 121)	P = 0.513	P = 0.138	P = 0.498	P = 0.366	P = 0.158	P = 0.542

Table 1: Demography of normal bowel habit group and different bowel disorder groups of medical students. † FD: Functional diarrhea, ††FC: Functional constipation, ††† FBD: Functional bowel disorder.

Results

Forty four students were excluded after evaluating their questionnaire for incomplete information and for alarm features. Two hundred and forty nine questionnaires were included for final analysis. Among them 144 (62.2%) were male and 95 (37.8%) were female and 121 were from private institutions and 128 from Government institutions.

Bowel habit patterns of students

Out of 249 students, 139 (55.8%, M=83) had predominantly Bristol type T4 stools(sausage like, smooth and soft), 51 (20.5%, M=31) had T3 stools(sausage like with surface cracks), 18 (7.2%, M=16) had T5 stools(soft blobs with clear cut edges), 23 (9.2%, M=16) had T 6(fluffy pieces with ragged edges)/T7(watery, no solid pieces) stools and 19 (7.6%, M=11) had T1(separate hard lumps, like nuts)/T2(sausage like but lumpy) stools. They had a mean stool frequency of 9.09 ± 4.058 (Male 9.6 ± 4.3 vs. female 8.2 ± 3.4, P = 0.016) per week, with a range of 3- 28 motions/week.

According to western definition 156 (62.65%, M = 101) students had normal bowel habit. Predominant stool form in them was T4 (n = 109, 69.9%); 34 (21.8%) had T3 stools and 13 (8.3%) had T5 stools. Table 1 showed the demography and prevalence of normal bowel habit group and bowel disorders groups. Normal bowel habit was less prevalent in clinical students than students of basic science. Mean stool frequencies of clinical students (9.14 ± 5.768 per week) and preclinical students (8.91 ± 3.453 per week, P = 0 .701) were comparable. A Kruskal-Wallis H test showed that there was a statistically significant difference in stool frequency between the different bowel disorder groups, i.e., $\chi^2(2) = 8.856$, $p = 0.031$, with a mean rank bowel frequency of 68.62 for Constipation, 135.19 for Diarrhea, 130.19 for other bowel disorders and 126.78 for normal bowel habit. The mean frequency of stool of subjects with constipation (6 ± 2.55 per week) was significantly different from that of diarrhea group (9.38 ± 4.609 per week, P= 0.030) and normal bowel habit group (8.66 ± 3.164 per week, P = 0.004). But mean stool frequencies of normal bowel habit group and diarrhea group were comparable (P = 0.540) (Table 2).

	Weekly mean stool frequency ± S.D.	**P-value ***
Normal bowel habit	8.66 ± 3.164	
IBS	8.25 ± 4.16	0.673
Functional Diarrhea	7 ± 1	0.461
Functional bloating	8.18 ± 4.02	0.635
Functional constipation (constipation group)	6.0 ± 2.55	0.004
Un-specified FBD	11.2 ± 7.713	0.001
Diarrhea group(IBS-D + FD)	9.38 ± 4.609	0.45
Perceived diarrhea group	13.0 ± 1.141	0.102
Perceived constipation group	6.41 ± 2.808	0.006

Table 2: Mean stool frequency of students with normal bowel habit and different bowel disorders.*when compared with normal bowel habit group.

A total of 201 (M = 125) commented on their stool type during diarrhea; 186 (M = 116) had T6/T7 stools, 4 (M = 2) had T5 stools, 6 had T4 (M = 3) and 4 (M = 3) had T3 stools. Total 198 (M = 123) commented on their stool type during constipation; 132 (M = 86) had T1/T2 stools, 47(M = 26) had T3 stools, 12 (M = 6) had T4 stools and 7 (M = 5) had T6/T7 stools during constipation. So 98% students had T5-T7 stool during diarrhea and 90% students had T1-3 stool during constipation.

Students' perception regarding their bowel habit: Western vs. Asian criteria

A total of 189 (75.9%, M=120) students consider their bowel habit as normal, two female as diarrhea, 12 (M=10) as alternate diarrhea and constipation, 17 (M=4) as constipation and 13 (M=9) had no idea about their bowel habit.

Out of these 189 normal bowel habit perceivers, 134 had normal bowel habit according to western criteria, five had IBS, eight had functional constipation, two had functional diarrhea, three had functional bloating and another 37 had un-specified functional bowel disorder.

Out of the 156 students having normal bowel habit (Western criteria), 134 (85.9%) considered their bowel habit as normal. According to Asian criteria 109 (43.7%) had normal bowel habit; among them 98 students thought their bowel habit as normal and 107 students met the western criteria for normal bowel habit.

Five out of 17 students who perceived to have constipation, had fewer than five motions /week and four of the remaining 12, described their stool as T1/T2. Rest eight had normal frequency and consistency of stools. Seventy five percent male and 77% female constipation perceivers did not met the western criteria for constipation. In case of two female diarrhea perceivers, one had T5 stool and both of them had < 14 stools/week.

A moderate agreement (K = 0.603, P < 0.0005) was found between western criteria and Asian criteria regarding normal and abnormal bowel habit pattern. But agreement between western normal bowel habit and patients perception regarding their bowel habit was poor (K = 0.061, P < 0.0005) (Table 3a).

Regarding constipation agreement between western criteria and patients perception was fair (K = 0.221, P < 0.0005), but in case of diarrhea a poor (K = 0.013, P = 0.656) agreement was found (Tables 3b and 3c).

A fair agreement was found between students perception of their normal bowel habit and bowel habit according to Asian criteria (K = 0.230, P < 0.0005).

		Students' perception		
		Normal bowel habit	Others	Total
	Normal bowel habit	134	55	189
western criteria	Others	22	38	60
Total		156	93	249

Table 3a: Agreement between different bowel habit patterns and students' perception of their bowel habit pattern. Normal bowel habit by western criteria vs. students' perception of normal bowel habit. Poor agreement, (K = 0.061, P ≤ 0.0005) was found between normal bowel habit by western criteria and students' perception of normal bowel habit.

		Western criteria		
		Constipation (FC)	others	Total
Students' perception	Constipation	4	13	17
	Others	9	223	232
Total		13	236	249

Table 3b: Students' perception of constipation vs. constipation by Western criteria. Slight agreement (K = 0.221, P = 0.000) was noted between constipation by western criteria and students' perception of constipation.

		Western criteria		
		Diarrhea (FD & IBS-D)	Others	Total
Students' perception	Diarrhea	0	2	2
	Others	8	239	247
Total		8	241	249

Table 3c: Students' perception of diarrhea vs. diarrhea by western criteria. Poor agreement (K = 0.013, P = 0.796) was found between diarrhea by Western criteria and students' perception of diarrhea.

Students' concept regarding diarrhea and constipation

According to 108 male and 74 female passage of frequent loose stool constitute diarrhea (Table 4). Around 104 male and 74 female define constipation as passage of hard stool infrequently. Besides hard and infrequent stool (M = 72.2%, F = 77.9%, P = 0 .036) at least two altered act of defecation (straining, blockage at anus and incomplete evacuation) was considered as constipation by 79 (54.9%) male and 56 (58.94%, P = 0.145) female and all three by 49 (34.0%) male and 46 (48.4%) female (P = 0.005).

	Male	Female	Total	P-value
Diarrhea				
Passage of loose/watery stool	25 (16.12)	8 (8.5)	33 (13.25)	0.121
Passage of frequent stool	11 (7.1)	6 (6.4)	17 (6.8)	1
Passage of frequent loose stool	108 (69.7)	74 (78.72)	182 (73.1)	0.123
Mucus with stool	28 (18.06)	22 (23.4)	50 (20.1)	0.328
None	5 (3.2)	3 (3.2)	8 (3.2)	
Constipation				
Passage of hard/pellety stool	33 (21.3)	14 (14.9)	47 (18.9)	0.314
Infrequent bowel motion	13 (8.4)	5 (5.3)	18 (7.2)	0.455
Passage of hard & infrequent stool	104 (67.09)	74 (78.72)	178 (71.5)	0.036
Feeling of incomplete evacuation	78 (50.3)	62 (65.95)	140 (56.2)	0.011
Stool blockage at anus	68 (43.9)	53 (56.4)	121(48.6)	0.047
Straining at stool	84 (54.2)	58 (61.7)	142 (57.0)	0.227
None	2 (1.3)	3 (3.2)	5 (2.0)	

Table 4: Student's conception regarding diarrhea and constipation.

Discussion

This study was conducted to assess the bowel habit pattern and to find out the perception of students about their bowel habit. We also tried to evaluate the students' perception regarding two common bowel disorders- diarrhea and constipation. From the study results it was apparent that according to western definition 156(62.65%) students had normal bowel habit. On the other hand according to Asian criteria 109 had normal bowel habit. A moderate agreement (K = 0.603, P < 0.0005) was noted between western criteria and Asian criteria. On the other hand a poor agreement (K = 0.061, P < 0.0005) was noted between students perception of their bowel habit and bowel habit according to western criteria.

Studies showed that 98% normal persons had bowel movement ranging between three stools per day and three per week [1]. In our study 156 students had normal bowel habit according to western criteria with a mean stool frequency of 8.66 ± 3.164 per week and at 98th percentile it was 18.5 motions per week. Mean stool frequency of males and females were comparable (8.96 ± 3.502 vs. 7.96 ± 2.582, P = 0.075). The result of our study is similar to our rural survey where a mean stool frequency of 9 ± 3.7 per week was reported [11]. Mean stool frequency of our students was somewhat lower than that of some Asian countries [3,9,10]. This may be related to food habit of our

young educated generation. They are increasingly becoming accustomed with junk food and Western type food. In our study the predominant stool form, T4 was found in 55.8% of whole population and 69.9% of subjects with normal bowel habit. This data corresponds to our rural population (55.9%) and to Indian healthy population where 58.2% predominantly passed type 4 stool [3]. Studies in Western countries also showed T4 type stool as predominant stool form in the general population [1,6,8].

A wide mismatch exists in Asia between patients' perception of their bowel habit and patients categorization based on Western criteria. In a recent Indian study 655, 709 and 254 subjects were diagnosed as IBS-C, IBS-D and IBS_A respectively by western criteria. According to patients' perception, 462, 541 and 452 had IBS_C, IBS_D and IBS-A respectively [12]. This mismatch was also apparent in our study. In our study among the 13 students with constipation (FC) only four perceived it as constipation, (K = 0.221, P = 0.000). On the other hand among the eight (six IBS_D and two FD) subjects with diarrhea none perceived it as diarrhea (K = 0.013, P = 0.656). Moreover, In Indian studies [3,12] median stool frequency of patients who felt constipated or had diarrhea was not different. But in our study the mean stool frequency between subjects with constipation and with diarrhea (Table 2) and students who felt constipated (6.41 ± 2.808/week) or perceived to have diarrhea (13.00 ± 1.141/week, P = 0.005) were different. This may be due to better perception of medical students regarding these terms.

Query on diarrhea revealed that students are well aware of definition of diarrhea. Seventy-three percent students answered that passage of loose/liquid/watery stool frequently constitute diarrhea. In a recent study it was shown that general population were well aware of the term "diarrhea". In the household survey [17], more than half of the interviewees (59.6% in rural area and 57.8% in urban areas) defined diarrhea as the increase in the frequency of depositions; demanding defecations; continuous stools; excessive defecations; he/she goes several times to do the necessary. The second most frequently mentioned characteristic was feces consistency i.e., loose stools; stomach cries; as if it were water; he/she defecates liquid; defecates with a gritty element [17]. We expected that medical students would be more knowledgeable regarding the term of diarrhea. But unexpectedly a good proportion was deficient in this regard.

Majority (71%) of students answered that passage of hard stool infrequently constitute constipation. Besides hard and infrequent stool at least two altered act of defecation (e.g., straining, blockage at anus and feeling of incomplete evacuation) was considered as constipation by 135 (54.2%) and all three by 95 (38.15%) students. Clinicians and patients define constipation differently [13,18]. Clinicians consider the stool frequency, stool weight, colonic transit time, ano-rectal manometry as proxy measures for constipation [30,31]. Physicians focus more on defecation frequency and patients are more concerned with ease of passage and consistency rather than stool frequency.

In a Swedish population study, it was found that a need to take laxatives was the most common conception of constipation (57% of respondents) [22]. Women (41%) were twice as likely as men (21%) to regard infrequent bowel motions as representing constipation, whereas equal proportions of men and women regarded hard stools (43%), straining during bowel movements (24%), and pain when passing a motion (23%) as representing constipation [22]. Our students are not different from general population and by constipation they perceived altered acts of defecation in association with low frequency and/or hard-pellety consistency of stool.

We have a number of limitations in our study. This study was not population –based, so the results cannot be generalized. Bowel disorders were diagnosed on the basis of symptom criteria and appropriate investigations were not feasible in our settings. Normal stool frequency and consistency vary depending on dietary habit, quantity of fiber intake, level of physical activity and gut transit time. We did not examine the association of these factors with bowel habit. Further population-based studies with appropriate investigations are warranted for better understanding of our normal bowel habit pattern.

In conclusion, mean stool frequency of our students with normal bowel habit is lower than some Asian countries, and the predominant stool form was T4. Though agreement between western criteria and Asian diagnostic criteria was moderate, a wide mismatch existed between patients' perception of their bowel habit and Western criteria. Majority of the students had proper knowledge regarding definition of diarrhea and constipation, but a significant proportion was found to be deficient in proper ideas on this respect.

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