

Observational Study

Functional constipation in Bangladeshi school aged children: A hidden misty at community

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Abstract

BACKGROUND

Constipation is a common problem in children and a frequent cause of hospital visit in both primary & specialized care, which needs proper evaluation & management. Presentation of constipation is variable among children. In Bangladesh there has been no published data regarding constipation in community among school aged children.

AIM

To determine the magnitude of functional constipation and its risk factors in community among Bangladeshi school children.

METHODS

This descriptive cross sectional study was conducted in different schools of Dhaka division, Bangladesh. All school aged children between 5-16 years of age who attended school were included in this study. Samples were collected randomly. Proper clinical history & physical examinations (without digital rectal examination) & available investigations (if done previously) were recorded. Diagnosis of functional constipation was done by Rome IV criteria and was compared with children without constipation. Children with any red flag sign, known chronic

disease or any findings suggestive of organic disease and on treatment of constipation were excluded. Statistical analysis of the results was done by using Windows based software device with Statistical Packages for Social Science 20. For all statistical tests, *P* value of less than 0.05 was considered as statistically significant.

RESULTS

Total study populations were 707 and male was 443 and female 264. Among them, 134 (19%) children had constipation. In constipated children, 78 children fulfilled the Rome IV criteria for functional constipation and it was 11% of total population. Mean age of children having functional constipation was 11.24 ± 3.54 years and Male female ratio was 1:1.78. Anorexia, nausea, abdominal pain, hard stool, blood with hard stool, alternate hard and loose stool and fecal mass in left iliac fossa were analyzed between two group and all were significantly higher in children with functional constipation group. Children of school, where toilet numbers were inadequate had 2.5 times more constipation risk in comparison to children of school with adequate toilet number (OR = 2.493, 95% CI: 1.214-5.120). Children who feel embarrassed to use toilet at school, had 3.6 times higher risk of constipation (OR = 3.552, 95% CI: 1.435-8.794). Here children with H/O affected sibs and parents/grandparents had 4 and 2.6 times more chance of constipation respectively in comparison to children without H/O affected sibs (OR = 3.977, 95% CI: 1.884-8.397) and parents/grandparents (OR = 2.569, 95% CI: 1.172-5.629). Children with inadequate fluid intake had 2 times more risk of constipation in comparison to children with adequate fluid intake (OR = 1.972, 95% CI: 1.135-3.426). Children who passed electronic screen time of > 2 h/d had 2 times more chance of constipation in comparison to children who passed electronic screen time < 2 h (OR = 2.138, 95% CI: 1.063-4.301).

CONCLUSION

Constipation is not uncommon in Bangladeshi school aged children. Inadequate toilet number, family history of constipation, inadequate fluid intake, feeling embarrassed to use toilet at school, and electronic screen time for > 2 h/d were found as risk factors in the present study for functional constipation.

Key Words: Bangladesh; Children; Functional constipation

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Core Tip: The current study is the first population-based study of childhood constipation in Bangladesh. Frequency of constipation and functional constipation was 19% and 11% respectively. Inadequate toilet number, family history of constipation, inadequate fluid intake, feeling embarrassed to use toilet at school, and electronic screen time for > 2 h/d were found as risk factors in the present study for functional constipation. Alternate hard and loose stool as one of the presentation of functional constipation.

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INTRODUCTION

Constipation is a common problem in children and it is frequently overlooked. Constipation is not a disease; rather, it's only a symptom. Patients have variable perception regarding constipation, some regard constipation as straining or hard pellet like stool or infrequent defecation or inability to defecate when desire. Constipation is generally defined as infrequent stool, passage of hard stool or both[1]. But North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) defined constipation as delay or difficulty in defecation, present for 2 or more weeks and sufficient to cause significant distress to the patient[2].

Children with constipation quite often visit a general practitioner or pediatrician. These children are also regularly seen on the emergency ward or even admitted to the hospital for treatment. Although functional constipation is not related to mortality but significantly hamper the quality of life. In children constipation may be functional or due to organic causes. In contrast to organic causes, functional

constipation (FC) is not a result of a structural or biochemical abnormality. Constipation due to organic causes may contribute to mortality of patient. In functional constipation, onset of symptoms is within the first year in half of the cases, and the prevalence is highest in 2nd and 4–5 years of age[3]. FC is often not a self-limiting condition: despite treatment, one-third to half of the patients has significant problems after 5 years and symptoms persist into adulthood in approximately 25% of cases[4].

The prevalence of childhood constipation has been documented, with highly variable results from study to study and from country to country, ranging from 1% to 30%[3]. Despite the variations of prevalence in different countries, there is a global trend of increasing rate of childhood constipation, and this increase remains unexplained. The marked socioeconomic, cultural, political and demographic variations that exist between and within the different continents could influence the risk factors and prevalence of childhood FC[5]. The common belief is that constipation is not common in South-Asian countries like India, Bangladesh as diet is rich in fibre here. There are very few studies related to constipation in developing countries specially in South-Asian countries[6].

Most recently Rajindrajith[7] and Khanna *et al*[8] showed that it is not uncommon in sub-continental countries. On departmental survey in out-patient department of paediatric gastroenterology and nutrition, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, almost 40% patients presented with constipation. But there is no published data in Bangladesh about childhood constipation. The current study is the first population-based study of childhood constipation in Bangladesh. The present study has been undertaken to observe the clinical profile and risk factors of functional constipation in community among the Bangladeshi school aged children.

MATERIALS AND METHODS

This cross sectional study was conducted at different primary school and high school of Dhaka division of Bangladesh, from August 2018 to July 2019. The inclusion criteria were children of age 5-16 years who attended the school. The exclusion criteria were children already on treatment for constipation and any red flag sign or known chronic disease or symptoms suggestive of disease.

Sampling technique

A multistage sampling technique was used to select participants. Study place was selected by simple random sampling. Four schools and one madrasa were randomly selected. The schools were then stratified based on location as urban or rural and based on ownership as private or public schools. The participants were selected randomly from different class. Only those students, whose parents gave written consent willingly, were recruited in the study. The detailed clinical history, physical examination findings and investigation reports (if available) were recorded in a predesigned standard data sheet.

History was obtained directly from the students and parents, which included basic demography, age at onset of constipation/symptoms, duration of symptoms, consistency, frequency, volume/size of stool, straining, pain during defecation, bleeding per rectum/blood mixed stool, fecal soiling, abdominal pain, withholding behavior, urinary incontinence/burning urine, history of other sibs/family members affected, detailed family history.

Also history was taken regarding diet pattern (on 3 d recall method), outdoor activity/exercise, any school related condition, social history, past medical and surgical history, history regarding the red flag signs.

Physical examination of all samples was done by researcher himself. The following data were obtained during physical examination: fever, mouth ulcer, abnormal thyroid gland, growth parameters, skin survey, per abdominal examination, tone/reflex of lower limb, spine of vertebra, abdominal distension. Other significant physical findings were also recorded.

Diagnosis of constipation by NASPGHAN and functional constipation was done by Rome IV criteria and if there was red flag sign, organic cause was considered.

Among them who fulfilled the criteria of functional constipation were included in group 1 (children with functional constipation) and others were included in group 2 (children without constipation).

Operational definition

Constipation: NASPGHAN defines constipation as a delay or difficulty in defecation, present for 2 or more weeks and sufficient to cause significant distress to the patient[2]. Functional Constipation: As per Rome IV criteria, functional constipation is defined as presence of at least two of the followings at least once per week for a minimum period of one month: Two or fewer defecations in the toilet per week in a child of a developmental age of at least 4 years; At least one episode of fecal incontinence per week; History of retentive posturing or excessive volitional stool retention; History of painful or hard bowel movements; Presence of a large fecal mass in the rectum; History of large-diameter stools that may obstruct the toilet. The symptoms cannot be fully explained by another medical condition.

Table 1 Demographic data of children with functional constipation and without constipation

Characteristics	Functional constipation (n = 78), n (%)	Without constipation (n = 573), n (%)	P value
Sex			0.003 ¹
Male	38 (48.7)	378 (66)	
Female	40 (51.3)	195 (34)	
Age (mean ± SD, yr)	11.24 ± 3.51	12.67 ± 2.40	0.001 ²
Place of residence			0.190 ¹
Rural	17 (21.8)	156 (27.2)	
Urban	61 (78.2)	417 (72.8)	
Religion			0.214 ¹
Muslim	77 (98.7)	551 (96.2)	
Hinduism	1 (1.3)	22 (3.8)	

¹Chi-square test.²t-test.

P value < 0.05 considered as statistically significant.

In addition, the symptoms are insufficient to fulfill the diagnostic criteria of irritable bowel syndrome [9].

Red flag signs: H/O delayed passage of meconium, difficulty in passing stool from birth, ribbon like stool, failure to thrive, bilious vomiting, no response to treatment, coarse facial profile, abnormal thyroid gland, abnormal lumbo-sacral spine, abnormal neurological findings of lower limb, perianal disease, severe abdominal distention, blood in stool in absence of anal fissure[10].

Normal dietary fiber intake: age in years plus 5 g/d[11].

Normal water intake: children with body weight 1-10 kg = 100 mL/kg, for children with body weight 11-20 kg = 1000 mL + 50 mL/kg for every kg over 10 kg of body weight, for children with body weight above 20 kg = 1500 mL + 20 mL for every kilogram above 20 kg of body weight[12].

Weight for age and height for age less than 3rd percentile was considered as underweight and stunted respectively[13].

Overweight: Body mass index for age more than 85th percentile was considered as overweight[13].

Statistical method

After collection, data were checked manually and analyzed by computer based program Statistical package of social science 22.0 (Chicago, Illinois, 2016). Results were expressed as mean ± SD, or number or percentage. Chi-square test was used for categorical data while student t-test was used for comparison of continuous variable data. Binary logistic regression analysis was used to find risk factors. P value < 0.05 was considered as statistically significant.

Ethical issues

Prior to the commencement of this study, the thesis protocol was approved by the Institutional Review Board of BSMMU, Dhaka.

RESULTS

Total study populations were 707 and males-443, females-264. Among them, 134 (19%) children had constipation. Among the male children, 65 (14.67%) and among the female children, 69 (26.14%) had constipation. Male-female ratio of constipated child was 1:1.78. In constipated children, 78 children fulfilled the Rome IV criteria for functional constipation and it was 11% of total population. Among other 56 constipated children, 21 patients had one or more red flag sign, 6 were known case of hypothyroidism and rest 29 children had no red flag sign but they did not fulfill the Rome IV criteria.

Table 1 showing demographic data analysis of studied population and here Rome IV criteria were fulfilled by 78 children. Among the male (420) children, 38 (9.1%) had functional constipation and among the female (242) children, 40 (17%) had functional constipation and P value is significant. Male female ratio was 1:1.9.

Mean age of children having functional constipation was 11.24 ± 3.51 years and children without constipation were 12.67 ± 2.40 years and p value is significant.

Table 2 Symptoms analysis of children with functional constipation and without constipation

Characteristics	Functional constipation (n = 78), n (%)	Without constipation (n = 573), n (%)	P value
Anorexia			0.001 ¹
Yes	35 (44.9)	124 (21.6)	
No	43 (55.1)	449 (78.4)	
Nausea			0.001 ¹
Yes	17 (21.8)	46 (8)	
No	61 (78.2)	527 (92)	
Abdominal pain			0.001 ¹
Yes	37 (47.4)	122 (21.3)	
No	41 (52.6)	451 (78.7)	
Hard stool			0.001 ¹
Yes	63 (80.8)	32 (5.6%)	
No	15 (19.2)	541 (94.4)	
Blood with hard stool			0.001 ¹
Yes	6 (7.7)	3 (0.5)	
No	72 (92.3)	570 (99.5)	
Alternative hard and loose stool			0.001 ¹
Yes	22 (28.2)	10 (1.7)	
No	56 (71.8)	563 (98.3)	
Abdominal distension			0.537 ¹
Yes	0 (0)	78 (100)	
No	78 (100)	566 (98.8)	
Fecal mass in LIF			0.001 ¹
Yes	12 (15.4)	0 (0%)	
No	66 (84.6)	573 (100)	

¹Chi-square test, P value < 0.05 considered as statistically significant.

Residential area and religion of the studied group had no significant influence on constipation.

Table 2 showing symptoms analysis of studied population and here anorexia, nausea, abdominal pain, hard stool, blood with hard stool, alternative hard and loose stool, abdominal distension and fecal mass in left iliac fossa were analyzed between two groups and all were significantly higher in children with functional constipation group except abdominal distension.

Table 3 showing descriptive data of bowel habits of studied group and here defecation frequency at 2 d interval, 3 d interval, incontinence, painful bowel movements, H/O retentive posturing and large diameter stool all were significantly higher in children with functional constipation group.

Table 4 showing the school related factors analysis of studied population and here children with long periods of school, less number toilets at school/dormitory and feel embarrassed to use toilet at school had higher percentage of constipation and p value is significant.

Table 5 showing family related factors analysis of studied population. Here history of constipation in other siblings, history of constipation in parents/grandparents, family size, birth order, parent's education, household income, single or joint family was considered. But only children having history of constipation in other siblings and history of constipation in parents/grandparents were significant.

Table 6 showing diet related factors analysis of studied population. Here children with less fiber intake and less fluid intake had higher percentage of constipation and p value is significant.

Table 7 showing physical activity related factors analysis of studied group and children who preferred television; mobile watching for more than 2 h per day had higher percentage of constipation and P value is significant.

Table 8 showing Binary logistic regression analysis done for age, sex, residential school, long duration school, toilet number, feeling embarrassed to use toilet, H/O affected sibs and grandparents, fluid and

Table 3 Descriptive data of bowel habits of children with functional constipation and without constipation

Characteristics	Functional constipation (n = 78), n (%)	Without constipation (n = 573), n (%)	P value
Defecation frequency			0.001 ¹
Daily	43 (55.1)	501 (87.4)	
1 d interval	3 (3.8)	48 (8.4)	
2 d interval	12 (15.4)	24 (4.2)	
3 d interval	20 (25.6)	0 (0)	
Incontinence			0.014 ¹
Yes	2 (2.6)	0 (0)	
No	76 (97.4)	573 (100)	
Painful bowel movements			0.001 ¹
Yes	60 (76.9)	2 (0.3)	
No	18 (23.1)	571 (99.7)	
H/O retentive posturing			0.001 ¹
Yes	7 (9)	0 (0)	
No	71 (91)	573	
Large diameter stool			0.001 ¹
Yes	72 (92.3)	2 (0.3)	
No	6 (7.7)	571 (99.7)	

¹Chi-square test, P value < 0.05 considered as statistically significant.

fiber intake, physical activity and electronic screen time/day. Here inadequate toilet number, family history of affected sibs, parents/grandparents, inadequate fluid intake, feeling embarrassed to use toilet at school, and electronic screen time of > 2 h/d were found significant. Children of school, where toilet numbers were inadequate had 2.5 times more constipation risk in comparison to children of school with adequate toilet number (OR = 2.493, 95%CI: 1.214-5.120). Children who feel embarrassed to use toilet at school, had 3.6 times higher risk of constipation (OR = 3.552, 95%CI: 1.435-8.794). Here children with H/O affected sibs and parents/grandparents had 4 and 2.6 times more chance of constipation respectively in comparison to children without H/O affected sibs (OR = 3.977, 95%CI: 1.884-8.397) and parents/grandparents (OR = 2.569, 95%CI: 1.172-5.629). Children with inadequate fluid intake had 2 times more risk of constipation in comparison to children with adequate fluid intake (OR = 1.972, 95%CI: 1.135-3.426). Children who passed electronic screen time of > 2 h/d had 2 times more chance of constipation in comparison to children who passed electronic screen time < 2 h (OR = 2.138, 95%CI: 1.063-4.301).

DISCUSSION

The common belief is that constipation is not common in South-Asian countries like Bangladesh as here diet is rich in fiber. There are very few studies and very little information about constipation in developing countries especially in South-Asian countries. In the present study, 19% children were found to have constipation. In Saudi school aged children, prevalence of chronic constipation was 32.2% [14]. In china, the prevalence rate in pediatric population was 18.8% [15]. In Taiwan, the prevalence of constipation in pediatric population was 32.2% [16]. In Nigeria, Udoh *et al* [17] found 27% FC among adolescent Nigerians. Prevalence of childhood constipation varies from 0.7% to 29% around the world and median was 12% [18].

In the present study, prevalence of functional constipation was 11%. In Sri Lanka, prevalence of functional constipation in school aged children was 15.4% [7]. In Columbia, prevalence of functional constipation in school aged children was 13.2% [19]. In India, prevalence of functional constipation in children 2-12 years of age was 30.8% [20]. In Indonesia among school aged children, prevalence was 18.3% [21]. These findings are almost similar to findings of present study.

In the present study, 9.1% males and 17% females had functional constipation and male to female ratio was 1:1.9. In Saudi children too, females were affected more than males and male to female ratio

Table 4 School related factors analysis of children with functional constipation and without constipation

Characteristics	Functional constipation (n = 78), n (%)	Without constipation (n = 573), n (%)	P value
Type of school			0.221 ¹
Govt	50 (64.1)	396 (69.1)	
Non Govt	28 (35.9)	177 (30.9)	
Residential			0.091 ¹
Yes	32 (41)	187 (32.6)	
No	46 (59)	386 (67.4)	
Long periods of school			0.013 ¹
Yes	13 (16.7)	166 (29)	
No	65 (83.3)	407 (71)	
Unhygienic toilet			0.056 ¹
Yes	19 (24.4)	93 (16.2)	
No	58 (75.6)	480 (83.8)	
Toilet number			0.013 ¹
Adequate	64 (82.1)	523 (91.3)	
Inadequate	18 (17.9)	50 (8.7)	
Feeling embarrassed to use toilet			0.039 ¹
Yes	9 (11.5)	31 (5.4)	
No	69 (88.5)	542 (94.6)	

¹Chi-square test, P value < 0.05 considered as statistically significant.

was 1:3.5[14]. In India, Kondapalli *et al*[20] also found female predominance. In China pediatric population with functional constipation, ratio between male and female was 1:1.1[15]. Khanna *et al*[8] and Roma-Giannikou *et al*[22] also showed a male preponderance in functional constipation.

In the present study, mean age of children having functional constipation was 11.24 ± 3.54 years. Peralta-Palmezano *et al*[19] found mean age was 12.3 ± 2.7 years. In the present study, residential area (rural-urban) and religion had no significance association with constipation. But Rajindrajith[7], Udoh *et al*[17] and Kondapalli *et al*[20] found prevalence of constipation being higher in children living in urban areas.

Regarding bowel habits of functional constipated (78) children of present study, large diameter stool was found in 92.3%, painful bowel movements in 76.9%, incontinence in 2.6%, retentive posturing in 9% and defecation frequency daily was in 55.1% cases, 1 d interval in 3.8% cases, at 2 d interval in 15.4% cases, 3 d interval in 25.6% cases. Kondapalli *et al*[20] found, 58.4% of functional constipation children had retentive behavior in the form of abnormal posturing, fecal soiling was present in 44 % of children and 80.1% of children had stool frequency of < 3 per week.

Oswari *et al*[21], showed withholding behaviour in 68.3%, defecation of less than 3 times per week in 64.6% of subjects and passage of hard stools in 63.4% cases.

The most common symptoms associated with constipation, found were anorexia, nausea, abdominal pain, hard stool, blood with hard stool, alternate hard and loose stool, abdominal distension and fecal mass in left iliac fossa and these findings were analyzed between two groups and all were significantly higher in children with functional constipation group except abdominal distention.

Oswari *et al*[21], showed abdominal pain, loss of appetite and straining during defecation were associated with constipation. Kondapalli *et al*[20] also found, abdominal pain as the presenting complaint which was present in 30.6% of children, blood streaked stools in 10.8% children. About 26% of functional constipation children had abdominal pain in the study of Kokkonen *et al*[23]. Rajindrajith [7] showed, patients with functional constipation had more somatic symptoms than controls.

In the present study, school related factors like government or private school, residential or non-residential school, long periods of school, unhygienic toilet, toilet numbers, feeling embarrassed to use toilet were analyzed, and here children with long periods of school/home works, feel embarrassed to use toilet at school, and inadequate number toilet at school/dormitory had higher percentage of constipation and P value was significant on univariant analysis. But on regression analysis feeling embarrassed to use toilet at school and inadequate number of toilet at school/dormitory was found

Table 5 Family related factors analysis of children with functional constipation and without constipation

Characteristics	Functional constipation (n = 78), n (%)	Without constipation (n = 573), n (%)	P value
History of constipation in other sibling			0.001 ¹
Yes	18 (23.1)	25 (4.4)	
No	60 (76.9)	548 (95.6)	
History of constipation in parents/grand parents			0.001 ¹
Yes	17 (21.8)	27 (4.7)	
No	61 (78.2)	545 (95.1)	
Family size			0.296 ¹
Only child	3 (3.8)	28 (4.9)	
2-3 child	46 (59)	284 (49.6)	
≥ 4 child	29 (37.2)	261 (45.5)	
Birth order			0.794 ¹
Elder	29 (37.2)	209 (36.5)	
Youngest	27 (34.6)	182 (31.8)	
Other	22 (28.2)	182 (31.8)	
Mother's education			0.797 ¹
Primary	59 (75.6)	426 (74.3)	
SSC	11 (14.1)	83(14.5)	
HSC	5(6.4)	28 (4.9)	
Honors	3 (3.8)	36 (6.3)	
Father's education			0.610 ¹
Primary	53 (67.9)	392 (68.4)	
SSC	10 (12.8)	82 (14.3)	
HSC	9 (11.5)	43 (7.5)	
Honors	6 (7.7)	56 (9.8)	
Mother's occupation			0.831 ¹
Employed	9 (11.5)	73 (12.7)	
Housewife	69 (88.5)	500 (87.3)	
Household income (taka/mo)			0.393 ¹
< 30000	49 (62.8)	384 (67)	
30000-60000	23 (29.5)	131 (22.9)	
> 60000	6 (7.7)	58 (10.1)	
Family status			0.251 ¹
Single	72 (92.3)	510 (89)	
Joint	6 (7.7)	63 (11)	

¹Chi-square test, P value < 0.05 considered as statistically significant.

significant.

Children who feel embarrassed to use toilet at school and where toilet number inadequate, voluntarily hold the defecation reflex. The withholding behavior causes contraction of the external anal sphincter and gluteal and pelvic floor muscles. The fecal mass then moves out of the rectal ampulla and back into the rectosigmoid colon, where the stool becomes harder and larger[24].

Hasosah *et al*[14], showed cleanliness and the facilities of their school toilets and homework of > 3 h/d as risk factors of FC.

Table 6 Diet related factors analysis of children with functional constipation and without constipation

Characteristics	Functional constipation (n = 78), n (%)	Without constipation (n = 573), n (%)	P value
Cow's milk intake			0.469 ¹
Yes	40 (51.3)	301 (52.5)	
No	38 (48.7)	272 (47.5)	
Fiber			0.002 ¹
Adequate	45 (57.7)	428 (74.7)	
Inadequate	38 (42.3)	145 (25.3)	
Junk foods intake			0.341 ¹
Yes	26 (33.3)	209 (36.5)	
No	52 (66.7)	364 (63.5)	
Fluid intake			0.001 ¹
Adequate	37 (47.4)	424 (74)	
Inadequate	41 (52.6)	149 (26)	

¹Chi-square test, P value < 0.05 considered as statistically significant.

Table 7 Physical activity related factors analysis of children with functional constipation and without constipation

Characteristics	Functional constipation (n = 78), n (%)	Without constipation (n = 573), n (%)	P value
Games			0.216 ¹
Outdoor	49 (62.8)	0 (0)	
Indoor	29 (37.2)	160 (27.9)	
Physical disability	0 (0)	2 (0.3)	
Electronic screen time			0.001 ¹
< 1 h	42 (53.8)	410 (71.6)	
1-2 h	12 (15.4)	87 (15.2)	
> 2 h	24 (30.8)	76 (13.2)	

¹Chi-square test, P value < 0.05 considered as statistically significant.

In the present study, family related factors like, history of constipation in other siblings, history of constipation in parents/grandparents, family size, birth order, parents education, household income, single or joint family were analyzed but only children having history of constipation in other siblings and history of constipation in parents/grandparents were found significant in both univariate and regression analysis.

As family members share the same food and similar life style which may explain familial aggregation of constipation. But there is no scientific explanation for this, but some researchers suggested that there was a significant genetic and familial connection in patients with constipation that might have been exacerbated by environmental factors[25].

Rajindrajith[7] and Dehghani *et al*[26], showed positive family history of constipation as a risk factor for FC. Rajindrajith[7] and Oswari *et al*[21], also did not find any association with family size, birth order, parent's job. But Kilincaslan *et al*[27] found that maternal education (elementary) and employed mother were risk factors for FC. Kondapalli *et al*[20] found that 75% of constipated children belonged to nuclear family.

In the present study, diet related factors were analyzed. Here children with less fiber intake and inadequate fluid intake had higher percentage of constipation and p value was significant on univariate analysis. But on regression analysis only inadequate fluid intake was found significant.

The normal stool consists of about 70% of water. Comparatively a small change of water content of stool lead to considerable change in consistency, inadequate fluid intake results in hard stool that can be difficult to pass[28,29].

Table 8 Binary logistic regression analysis for risk factors

Characteristics	P value	95%CI		Exp β
		Lower	Upper	
Age	0.051	1.000	1.204	1.097
Sex	0.056	0.985	3.280	1.798
Long duration of school period	0.746	0.415	1.876	0.883
Inadequate number of toilet	0.013	1.214	5.120	2.493
Feeling embarrassed to use toilet	0.006	1.435	8.794	3.552
H/O affect sib	0.001	1.884	8.397	3.977
H/O affect parents/grandparents	0.018	1.172	5.629	2.569
Inadequate fiber intake	0.286	0.403	1.307	0.726
Inadequate fluid intake	0.016	1.135	3.426	1.972
Electronic screen time > 2 h/d	0.033	1.063	4.301	2.138

P value < 0.05 considered as statistically significant.

Wu *et al*[16] found that constipation was associated with lower intake of vegetables, fruits, soybean products, and eggs. Kondapalli *et al*[20] showed milk being consumed by 74.8% constipated children, vegetables and fruits intake were inadequate in 75% of children, junk foods in the form of fried items in 46% of children. de Araújo Sant'Anna *et al*[30] found dietary fiber intake was insufficient in all children and even lower in those with constipation. Olaru *et al*[31] showed that cow's milk intake was a risk factor for FC.

In the present study, physical activity related factors were analyzed and children who preferred electronic media more than 2 h/d had higher percentage of constipation and p value was significant on both univariate analysis and regression analysis. Olaru *et al*[31] found lack of exercise and television watching more than 3 h/d constitutes a risk factor in the occurrence of constipation. Children when watching television and mobile games, they frequently withheld the defecation urge, which initiate the vicious cycle of constipation.

CONCLUSION

Frequency of constipation and functional constipation was 19% and 11% respectively. Inadequate toilet number, family history of constipation, inadequate fluid intake, feeling embarrassed to use toilet at school, and electronic screen time for > 2 h/d were found as risk factors in the present study for functional constipation. A country wide study is recommended to find out actual burden and risk factors of functional constipation in Bangladeshi pediatric population.

ARTICLE HIGHLIGHTS

Research background

Constipation is a common problem in children and a frequent cause of hospital visit in both primary & specialized care, which needs proper evaluation & management. Presentation of constipation is variable among children. In Bangladesh there has been no published data regarding constipation in community among school aged children.

Research motivation

No published data or study regarding the magnitude and etiology of functional constipation till date in Bangladesh.

Research objectives

The present study has been undertaken to determine the magnitude of functional constipation and its risk factors in community among Bangladeshi school children.

Research methods

This descriptive cross sectional study was conducted in different schools of Dhaka division, Bangladesh. All school aged children between 5-16 years of age who attended school were included in this study. Samples were collected randomly. Proper clinical history & physical examinations (without digital rectal exam-ination) & available investigations (if done previously) were recorded. Diagnosis of functional constipation was done by Rome IV criteria and was compared with children without constipation. Children with any red flag sign, known chronic disease or any findings suggestive of organic disease and on treatment of constipation were excluded. Statistical analysis of the results was done by using Windows based software device with Statistical Packages for Social Science 20. For all statistical tests, *P* value of less than 0.05 was considered as statistically significant.

Research results

Total study populations were 707 and male was 443 and female 264. Among them, 134 (19%) children had constipation. In constipated children, 78 children fulfilled the Rome IV criteria for functional constipation and it was 11% of total population. Mean age of children having functional constipation was 11.24 ± 3.54 years and Male female ratio was 1:1.78. Anorexia, nausea, abdominal pain, hard stool, blood with hard stool, alternate hard and loose stool and fecal mass in left iliac fossa were analyzed between two group and all were significantly higher in children with functional constipation group. Children of school, where toilet numbers were inadequate had 2.5 times more constipation risk in comparison to children of school with adequate toilet number (OR = 2.493, 95%CI: 1.214-5.120). Children who feel embarrassed to use toilet at school, had 3.6 times higher risk of constipation (OR = 3.552, 95%CI: 1.435-8.794). Here children with H/O affected sibs and parents/grandparents had 4 and 2.6 times more chance of constipation respectively in comparison to children without H/O affected sibs (OR = 3.977, 95%CI: 1.884-8.397) and parents/grandparents (OR = 2.569, 95%CI: 1.172-5.629). Children with inadequate fluid intake had 2 times more risk of constipation in comparison to children with adequate fluid intake (OR = 1.972, 95%CI: 1.135-3.426). Children who passed electronic screen time of > 2 h/d had 2 times more chance of constipation in comparison to children who passed electronic screen time < 2 h (OR = 2.138, 95%CI: 1.063-4.301).

Research conclusions

Frequency of constipation and functional constipation was 19% and 11% respectively. Inadequate toilet number, family history of constipation, inadequate fluid intake, feeling embarrassed to use toilet at school, and electronic screen time for > 2 h/d were found as risk factors in the present study for functional constipation. A country wide study is recommended to find out actual burden and risk factors of functional constipation in Bangladeshi pediatric population.

Research perspectives

Frequency of constipation in Bangladeshi school children; Frequency of functional constipation (FC) in Bangladeshi school children; Alternate hard and loose stool as one of the presentation of FC; Inadequate toilet number is risk factor for FC.

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FOOTNOTES

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REFERENCES

- 1 **Brandt LJ**, Prather CM, Quigley EM, Schiller LR, Schoenfeld P, Talley NJ. Systematic review on the management of chronic constipation in North America. *Am J Gastroenterol* 2005; **100** Suppl 1: S5-S21 [PMID: 16008641 DOI: 10.1111/j.1572-0241.2005.50613_2.x]
- 2 **North American Society for Pediatric Gastroenterology**, Hepatology and Nutrition. Evaluation and treatment of constipation in children: summary of updated recommendations of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. *J Pediatr Gastroenterol Nutr* 2006; **43**: 405-407 [PMID: 16954970 DOI: 10.1097/01.mpg.0000232574.41149.0a]
- 3 **van den Berg MM**, Benninga MA, Di Lorenzo C. Epidemiology of childhood constipation: a systematic review. *Am J Gastroenterol* 2006; **101**: 2401-2409 [PMID: 17032205 DOI: 10.1111/j.1572-0241.2006.00771.x]
- 4 **Bongers ME**, Benninga MA. Long-term follow-up and course of life in children with constipation. *J Pediatr Gastroenterol Nutr* 2011; **53** Suppl 2: S55-S56 [PMID: 22470932]
- 5 **Rajindrajith S**, Devanarayana NM, Crispus Perera BJ, Benninga MA. Childhood constipation as an emerging public health problem. *World J Gastroenterol* 2016; **22**: 6864-6875 [PMID: 27570423 DOI: 10.3748/wjg.v22.i30.6864]
- 6 **Poddar U**. Approach to Constipation in Children. *Indian Pediatr* 2016; **53**: 319-327 [PMID: 27156546 DOI: 10.1007/s13312-016-0845-9]
- 7 **Rajindrajith S**. Constipation in children: From misty to understanding. *Sri Lanka Journal of Child Health* 2014; **43**: 121-141 [DOI: 10.4038/sljch.v43i3.7372]
- 8 **Khanna V**, Poddar U, Yachha SK. Etiology and clinical spectrum of constipation in Indian children. *Indian Pediatr* 2010; **47**: 1025-1030 [PMID: 20453267 DOI: 10.1007/s13312-010-0175-2]
- 9 **Hyams JS**, Di Lorenzo C, Saps M, Shulman RJ, Staiano A, van Tilburg M. Functional Disorders: Children and Adolescents. *Gastroenterology* 2016 [PMID: 27144632 DOI: 10.1053/j.gastro.2016.02.015]
- 10 **Tabbers MM**, DiLorenzo C, Berger MY, Faure C, Langendam MW, Nurko S, Staiano A, Vandenas Y, Benninga MA; European Society for Pediatric Gastroenterology, Hepatology, and Nutrition; North American Society for Pediatric Gastroenterology. Evaluation and treatment of functional constipation in infants and children: evidence-based recommendations from ESPGHAN and NASPGHAN. *J Pediatr Gastroenterol Nutr* 2014; **58**: 258-274 [PMID: 24345831 DOI: 10.1097/MPG.0000000000000266]
- 11 **Williams CL**, Bollella M, Wynder EL. A new recommendation for dietary fiber in childhood. *Pediatrics* 1995; **96**: 985-988 [PMID: 7494677]
- 12 **Holliday MA**, Segar WE. The maintenance need for water in parenteral fluid therapy. *Pediatrics* 1957; **19**: 823-832 [PMID: 13431307]
- 13 **Kuczmarski RJ**, Ogden CL, Grummer-Strawn LM, Flegal KM, Guo SS, Wei R, Mei Z, Curtin LR, Roche AF, Johnson CL. CDC growth charts: United States. *Adv Data* 2000; 1-27 [PMID: 11183293]
- 14 **Hasolah M**, Alsahafi A, Alghiribi A, Alqarni N, Babatin A, Matrafi A, Alamri A, AlQurashi MA, Atiah N, Sarkhy A. Prevalence, characterization and risk factors of chronic constipation among Saudi children: a cross-sectional study. *Int J Adv Res* 2018; **6**: 1319-1324 [DOI: 10.21474/IJAR01/6986]
- 15 **Chu H**, Zhong L, Li H, Zhang X, Zhang J, Hou X. Epidemiology characteristics of constipation for general population, pediatric population, and elderly population in china. *Gastroenterol Res Pract* 2014; **2014**: 532734 [PMID: 25386187 DOI: 10.1155/2014/532734]
- 16 **Wu TC**, Chen LK, Pan WH, Tang RB, Hwang SJ, Wu L, Eugene James F, Chen PH. Constipation in Taiwan elementary school students: a nationwide survey. *J Chin Med Assoc* 2011; **74**: 57-61 [PMID: 21354081 DOI: 10.1016/j.jcma.2011.01.012]
- 17 **Udoh EE**, Rajindrajith S, Devanarayana NM, Benninga MA. Prevalence and risk factors for functional constipation in adolescent Nigerians. *Arch Dis Child* 2017; **102**: 841-844 [PMID: 28446425 DOI: 10.1136/archdischild-2016-311908]
- 18 **Meyer JC**, Mashaba T, Makhele M, Sibanda M. Functional constipation in children. *S Afr Pharm J* 2017; **84**: 51-57

- 19 **Peralta-Palmezano JJ**, Guerrero-Lozano R. Prevalence of Functional Gastrointestinal Disorders in School Children and Adolescents. *Korean J Gastroenterol* 2019; **73**: 207-212 [PMID: [31030457](#) DOI: [10.4166/kjg.2019.73.4.207](#)]
- 20 **Kondapalli CS**, Gullapalli S. Constipation in children: incidence, causes in relation to diet pattern and psychosocial aspects. *Int J Contemp Pediatrics* 2018; **5**: 6-13 [DOI: [10.18203/2349-3291.ijcp20175055](#)]
- 21 **Oswari H**, Alatas FS, Hegar B, Cheng W, Pramadyani A, Benninga MA, Rajindrajith S. Epidemiology of Paediatric constipation in Indonesia and its association with exposure to stressful life events. *BMC Gastroenterol* 2018; **18**: 146 [PMID: [30285647](#) DOI: [10.1186/s12876-018-0873-0](#)]
- 22 **Roma-Giannikou E**, Adamidis D, Gianniou M, Nikolara R, Messaritakis A. Epidemiology of chronic constipation in Greek children. *Hellenic Journal of Gastroenterology* 1999; **12**: 58-62
- 23 **Kokkonen J**, Haapalahti M, Tikkanen S, Karttunen R, Savilahti E. Gastrointestinal complaints and diagnosis in children: a population-based study. *Acta Paediatr* 2004; **93**: 880-886 [PMID: [15303801](#)]
- 24 **Philichi L**. Management of Childhood Functional Constipation. *J Pediatr Health Care* 2018; **32**: 103-111 [PMID: [29229066](#) DOI: [10.1016/j.pedhc.2017.08.008](#)]
- 25 **Chan AO**, Hui WM, Lam KF, Leung G, Yuen MF, Lam SK, Wong BC. Familial aggregation in constipated subjects in a tertiary referral center. *Am J Gastroenterol* 2007; **102**: 149-152 [PMID: [17037990](#) DOI: [10.1111/j.1572-0241.2006.00886.x](#)]
- 26 **Dehghani SM**, Moravej H, Rajaei E, Javaherizadeh H. Evaluation of familial aggregation, vegetable consumption, legumes consumption, and physical activity on functional constipation in families of children with functional constipation versus children without constipation. *Prz Gastroenterol* 2015; **10**: 89-93 [PMID: [26557939](#) DOI: [10.5114/pg.2015.48996](#)]
- 27 **Kilincaslan H**, Abali O, Demirkaya SK, Bilici M. Clinical, psychological and maternal characteristics in early functional constipation. *Pediatr Int* 2014; **56**: 588-593 [PMID: [24373103](#) DOI: [10.1111/ped.12282](#)]
- 28 **Müller-Lissner SA**, Kamm MA, Scarpignato C, Wald A. Myths and misconceptions about chronic constipation. *Am J Gastroenterol* 2005; **100**: 232-242 [PMID: [15654804](#) DOI: [10.1111/j.1572-0241.2005.40885.x](#)]
- 29 **Aichbichler BW**, Wenzl HH, Santa Ana CA, Porter JL, Schiller LR, Fordtran JS. A comparison of stool characteristics from normal and constipated people. *Dig Dis Sci* 1998; **43**: 2353-2362 [PMID: [9824119](#) DOI: [10.1023/a:1026699525487](#)]
- 30 **de Araújo Sant'Anna AM**, Calçado AC. Constipation in school-aged children at public schools in Rio de Janeiro, Brazil. *J Pediatr Gastroenterol Nutr* 1999; **29**: 190-193 [PMID: [10435657](#) DOI: [10.1097/00005176-199908000-00016](#)]
- 31 **Olaru C**, Diaconescu S, Trandafir L, Gimiga N, Stefanescu G, Ciubotariu G, Burlea M. Some Risk Factors of Chronic Functional Constipation Identified in a Pediatric Population Sample from Romania. *Gastroenterol Res Pract* 2016; **2016**: 3989721 [PMID: [27994619](#) DOI: [10.1155/2016/3989721](#)]



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