

## Research Article

### Does Functional Constipation Affect Growth Status in Children? - A “cross sectional” pilot study

Md. Benzamin<sup>1</sup>, Masud Rana<sup>2</sup>, A.T.M Mijanur Rahamn<sup>2</sup>, Kaniz Fathema<sup>1</sup>, Rubaiyat Alam<sup>1</sup>, Asaduzzaman Asad<sup>2</sup>, Maria Kibtiar<sup>3</sup>

#### Author's Affiliation:

- 1- Pediatric Gastroenterology and Nutrition Department, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.
- 2- Department of applied nutrition and food technology, Islamic University, Kustia, Bangladesh.
- 3- Department of Pediatrics, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

#### Correspondence:

Md. Benzamin, Email: drmd.benzamin@yahoo.com

Received on: 09-Dec-2019

Accepted for Publication: 10-Mar-2020

### ABSTRACT

**Background:** Functional constipation is a common pediatric problem in both developed and developing countries. Most common belief being that functional constipation does not affect the growth status of children; however, there are some studies suggesting functional constipation-related growth retardation in children, especially in early childhood.

**Objective:** To study the association between functional constipation and growth status of school going children.

**Methods:** A total of 114 children aged 6 - 16 years, 57 with functional constipation and 57 as healthy children having no constipation, any red flag sign or any history / examination suggestive of chronic illness, were enrolled in this cross-sectional study. Participants were recruited by consecutive sampling from the 2 school of a rural area of Bangladesh from July to August 2019. Functional constipation was defined as Rome IV criteria. The growth status was evaluated using the growth charts, and Z scores for weight, height and BMI for age were recorded, with the consent of parents and child willingness. Data were analyzed by using SPSS version 20.

**Results:** Mean age of children with functional constipation  $9.99 \pm 3.46$  years and healthy children without constipation  $10.60 \pm 3.33$  years. Male female ratio in both group were almost similar 0.24:1. On symptoms analysis anorexia (54.4%), nausea (35.1%), abdominal pain (49.1%) was significantly higher in children with functional constipation group as compared to children without constipation and p value  $< 0.05$  was significant. On weight for age and Body mass index (BMI) centile, 29.8% and 19.3% respectively were below 3rd and 5th centile on children with functional constipation group and were significantly higher as compared to children without constipation and p value was significant. Height for age centile was almost similar in both groups. Mean weight for age Z score and height for age Z score were similar in both group but mean BMI Z score in children with functional constipation group  $-0.98 \pm 1.26$  and children without constipation  $-0.48 \pm 1.16$  and p value was significant.

**Conclusion:** Children with functional constipation may have retarded growth (weight for age and BMI) and poor intake due to anorexia, nausea, and abdominal pain may play contributory role.

**Keywords:** Children, Functional constipation, Growth, Body Mass Index.

### INTRODUCTION

Constipation is a common chronic disorder of pediatric age group, affecting 1 to 30% of children worldwide.<sup>1</sup> Constipation accounts for 3% of all primary pediatric care visit & 10 – 25% of paediatric gastroenterologist visit.<sup>2</sup> Management of children with constipation costs 3 times more than the children without constipation.<sup>3</sup> North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (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.<sup>4</sup> Functional constipation is defined as constipation without objective evidence of a pathologic condition.<sup>5</sup> As per ROME IV criteria for  $\geq 4$  years childrens, functional constipation is defined as presence of at least two of the followings with duration of at least one month: 1) Two or fewer defecations in the toilet per week in a child of a 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 may obstruct the toilet. (Note: These symptoms cannot be fully explained by another medical

condition and symptoms are insufficient to fulfill the diagnostic criteria of irritable bowel syndrome).<sup>6</sup> Regarding etiology of constipation 95% cases are functional constipation & 5% due to organic causes and from organic causes Hirschsprung's disease is the most common.<sup>7,8</sup> Functional constipation usually initiates with a painful bowel movement which leads to voluntary withholding of stools to avoid painful defecation. These events leads to large, hard stool & passage of such stool causes further pain & child become frightens, then avoid defecation by all means.<sup>9,10</sup>

Constipation has both physical and psychological effect on children. Many studies have shown that chronic constipation impairs the daily physical activity of children, also has adverse effects on children's social activity, mental health and even academic performance. It is a common belief that functional constipation does not affect the growth status of children, but it is frequently found that children with underweight or overweight have functional constipation frequently. Some recent studies have shown significant decreasing impacts of constipation on the children's weight and height growth and constipation treatment and elimination of underlying cause of constipation improve constipated children's growth status.<sup>11,12</sup> Simultaneously, some studies have shown that a high percentage of children with functional constipation having obesity.<sup>13-15</sup>

## OBJECTIVE

To study the correlation between functional constipation and growth status of school going children.

## METHODOLOGY

It was a Cross sectional descriptive study, done in a rural area of Bangladesh from June, 2019 to August 2019. Children with age 6-16 years attending the school without any organic disease, chronic disease or any red flag signs included in this study. Children with constipation who did not fulfill the Rome IV criteria of functional constipation, children having any organic disease, any chronic disease or any red flag signs, children already on treatment for constipation, children below 6 years and above 16 years were excluded.

Two schools were randomly selected. Then from every school equal number of students was selected randomly. The details clinical history and physical examination findings were recorded in a predesigned standard data sheet. Anthropometric measurements including height and weight were measured following the standardized procedures. Second group was selected randomly from children, without constipation, having no known organic disease, any chronic disease or any red flag signs were selected randomly.

## OPERATIONAL DEFINITION

Diagnosis of constipation by NASPGHAN definition and functional constipation were made by Rome IV criteria, if any red flag sign present, it will be consider as organic cause. Rome IV criteria along with inclusion criteria were fulfilled by 57 children. Same number of children without constipation, having no organic disease, any chronic disease or any red flag signs were selected randomly. Weight for age and height for age less than 3rd centile was consider as underweight and stunted respectively. BMI more than 85th was considered as overweight, between 5th to 85th percentiles was considered as normal weight, less than 5th centile was considered as underweight. 16

## RESULTS

First 66 Children with constipation were selected by open question regarding NASPGHAN definition of constipation. 57 children were fulfilling the criteria of functional constipation (case) then the consecutive 57 normal children taken as control.

Table 1 showing demographic data- age, sex. male- female ratio was almost equal between both group. Mean age of children with constipation was  $9.99 \pm 3.46$  years and without constipation  $10.60 \pm 3.33$  years and p value was not significant.

Table 1: Demographic characteristics of participants (6-16 years old school going children)

	With Functional constipation (n=57)	Without constipation (n=57)	P value
<b>Age (mean)</b>	9.99±3.46	10.60±3.33	0.59
<b>Sex</b>			
<b>Male</b>	11(19.3%)	10 (17.5%)	0.500
<b>Female</b>	46 (80.7%)	47 (82.5%)	

Table 2 showing associated symptoms analysis between two groups. Here anorexia, nausea and abdominal pain were significantly higher in children with functional constipation and p value was significant.

Table 2: Comparing the symptoms between children with constipation and without constipation

	With Functional constipation (n=57)	Without constipation (n=57)	P value
<b><u>Anorexia</u></b>			
<b>Yes</b>	31 (54.4%)	6 (10.5%)	<0.001
<b>No</b>	26 (45.6%)	51 (89.5%)	
<b><u>Nausea</u></b>			
<b>Yes</b>	20 (35.1%)	11 (12.6%)	0.002
<b>No</b>	37 (64.9%)	76 (87.4%)	
<b><u>Abdominal pain</u></b>			
<b>Yes</b>	28 (49.1%)	50 (87.7%)	<0.001
<b>No</b>	29 (50.9%)	7 (12.3%)	

Table 3 showing anthropometric parameter weight for age , height for age and BMI on centile chart of two groups. Here underweight children (weight for age below 3rd centile and BMI for age below 5th centile) were more in children with functional constipation and p value was significant.

Table 3: Weight for age, height for age, BMI for age centile in children with functional constipation and without constipation

	With Functional constipation (n=57)	Without constipation (n=57)	P value
<b>Weight for age centile</b>			
<b>&lt;3<sup>rd</sup> centile</b>	17 (29.8%)	6 (10.5%)	0.037
<b>3-97<sup>th</sup> centile</b>	39 (68.4%)	50 (87.7%)	
<b>&gt;97<sup>th</sup> centile</b>	1 (1.8%)	1 (1.8%)	
<b>Height for age centile</b>			
<b>&lt;3<sup>rd</sup> centile</b>	14 (24.6%)	6 (10.5%)	0.064
<b>3-97<sup>th</sup> centile</b>	42 (73.7%)	50 (87.7%)	
<b>&gt;97<sup>th</sup> centile</b>	1 (1.8%)	1 (1.8%)	
<b>BMI for age centile</b>			
<b>&lt;5<sup>th</sup></b>	11 (19.3%)	3 (5.3%)	0.022
<b>5<sup>th</sup> -85<sup>th</sup></b>	44 (77.2%)	50 (87.7%)	
<b>85<sup>th</sup>-95<sup>th</sup></b>	1 (1.8%)	0 (0 %)	
<b>&gt;95<sup>th</sup></b>	1 (1.8 %)	4 (7%)	

Table 4 showing mean Z scores of weight for age, height for age, BMI for age in children with functional constipation and without constipation. Here BMI Z scores in children with functional constipation  $-0.98 \pm 1.26$  and without constipation  $-0.48 \pm 1.16$  and p was significant.

Table 4: Z scores weight for age, height for age, BMI for age in children with functional constipation and without constipation

Z scores	With Functional constipation (n=57)	Without constipation (n=57)	P value
<b>Wt for age Z (mean)</b>	-1.52±1.20	-0.98±1.19	0.225
<b>Ht for age Z (mean)</b>	-0.98±1.35	-1.15±1.06	0.473
<b>BMI Z(mean)</b>	-0.98±1.26	-0.48±1.16	0.028

## DISCUSSION

Constipation has both physical and psychological effect on children. Current study demonstrated that children with symptoms of functional constipation had much less average weight than children without constipation. Z scores of BMI for age were considerably different in two groups. Chao et al. demonstrated the functional constipation of children as the cause of their growth retardation.<sup>17</sup> Yousefi A et al. also had similar findings.<sup>11</sup>

Pawlowska et al, demonstrated that pediatric patients with functional gastrointestinal disorders present various growth abnormalities. They found that fat deficiency was more frequent in children with functional constipation; also short stature and stunting was common in patients with functional constipation.<sup>18</sup>

In contrast, some studies have shown a high prevalence of obesity in children with functional constipation. In a study by Ilan et al. most of the children with constipation were obese or overweight.<sup>19</sup> In a similar study by Dehghani et al, conducted on 100 Iranian children younger than 18 years old with functional constipation, found a higher obesity rate and higher BMI and weight Z scores in constipated patients compared to healthy control group.<sup>20</sup> But in our study there was no significant findings regarding overweight and obesity.

Current study also found that anorexia, nausea and abdominal pain were significantly higher in functional constipation group. NASPGHAN, 2006 have emphasized the significant effects of constipation on the children's alimentary habits and on their developmental parameters, which can return to normal growth by treatment of anorexia or the elimination of organic causes associated with constipation.<sup>4,11</sup> Our study recognizes poor intake due to anorexia-nausea, emotional disorders caused by abdominal pain, painful defecation and other diagnostic criteria for functional constipation as the likely causes of delay in children's weight gain.

## CONCLUSION

Children with functional constipation may have retarded growth (weight for age and BMI) and poor intake due to anorexia, nausea, and abdominal pain may play contributory role.

## LIMITATIONS

Small sample size and samples were taken from one specific region.

## RECOMMENDATION

Larger sample size and multicenter study.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## FUNDING

This study was funded by the authors. No external sources of funding were used.

## REFERENCES

1. Van den Berg MM, Benninga MA, Di Lorenzo C. Epidemiology of childhood constipation: a systematic review. *Am J Gastroenterol.* 2006;101:2401–2409.
2. Tabbers MM, Di Lorenzo C, Berger MY, Faure C, Langendam MW, Nurko S, et al. Evaluation and treatment of functional constipation in infants and children: evidence-based recommendations from ESPGHAN and NASPGHAN. *J Pediatr Gastroenterol Nutr.* 2014;58:258-74.
3. Liem O, Harman J, Benninga M, Kelleher K, Mousa H, Di LC. Health utilization and cost impact of childhood constipation in the United States. *J Pediatr* 2009, 154:258-262.
4. 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. *JPGN.* 2006 Sep. 43:405-7.

5. Rukunuzzaman M, Sonia ZF, Yasmin A, B Karim ASM, Nahid KL. Approach to child with constipation and management update. *Bangladesh J child health*. 2017; vol 41 (3) : 170-180.
6. Hyams JS, Lorenzo CD, Saps M, Shulman MJ, Staiano A, Tilburg MV. Childhood Functional Gastrointestinal Disorders: child/Adolescent. *Gastroenterology*. 2016 ;150:1456-1468.
7. Loening-Baucke, V. Chronic constipation in children. *Gastroenterology*. 1993;105(5): 1557 – 1564.
8. Khanna V, Poddar U, Yachha SK. Constipation in Indian children: need for knowledge not the knife. *Indian Pediatr*. 2010; 47:1025-30.
9. Partin JC, Hamill SK, Fischel JE, Partin JS. Painful defecation and fecal soiling in children. *Pediatrics*. 1992;89:1007-9.
10. Benzamin M, Rukunuzzaman M, Mazumder MW, Karim ASM. Constipation in children: Evaluation and Management. *Paed. Neph. J. Bang.*2018;3(2):83-89.
11. Yousefi A, Mohamadian S, Sharifabadi PM, Nakhaei S, Norouzi E. How Does Functional Constipation Affect Growth Status in Children?. *Iran J Pediatr*. In Press(In Press):e85700.
12. Walter AW, Hovenkamp A, Devanarayana NM, Solanga R, Rajindrajith S and Benninga MA. Functional constipation in infancy and early childhood: epidemiology, risk factors, and healthcare consultation. *BMC Pediatrics*. 2019;19:285-294.
13. Costa ML, Oliveira JN, Tahan S and Morais MB. Overweight and constipation in adolescents. *BMC Gastroenterology*. 2011; 11:40-44.
14. Yuwanita N, Sinuhaji AB, Sembiring T, Supriatmo, Yudianto AR. Obesity and functional constipation in children. *Paediatr Indones*. 2018; 58( 1): 1-3
15. Pourhoseingholi MA, Kaboli SA, Pourhoseingholi A, Moghimi-Dehkordi B, Safaei A, Mansoori BK, et al. Obesity and Functional Constipation; a Community-Based Study in Iran. *J Gastrointest Liver Dis* . 2009;18 (2): 151-155.
16. Kuczmarski RJ, Ogden CL, Grummer- Strawn LM. “CDC growth charts: United State.” *Advanced Data*. 2000;314:1-27.
17. Chao HC, Chen SY, Chen CC, Chang KW, Kong MS, Lai MW, et al. The impact of constipation on growth in children. *Pediatr Res*. 2008;64(3):308–11.
18. Pawlowska K, Umlawska W, Iwanczak B. A link between nutritional and growth states in pediatric patients with functional gastrointestinal disorders. *J Pediatr*. 2018;199:171–7.
19. Koppen IJN, Velasco-Benítez CA, Benninga MA, Di Lorenzo C, Saps M. Is there an association between functional constipation and excessive bodyweight in children? *J Pediatr*. 2016;171:178–1820.
20. Dehghani SM, Karamifar H, Imanieh MH, Mohebbi E, Malekpour A, Haghighat M. Evaluation of the growth parameters in children with chronic functional constipation. *Ann Colorectal Res*. 2013;1(2):55–9.