



## Original Article

## Effectiveness of Bowel Management Program for Functional Constipation in Children

Sana Aslam<sup>1</sup>, Fatima Majid<sup>2</sup>, Nitu Kumari<sup>2</sup>, Adnan Ali Khahro<sup>4</sup>, Naima Zamir<sup>3</sup> and Muhammad Anwar<sup>3</sup><sup>1</sup>Bilawal Medical College, Liaquat University of Medical & Health Sciences, Jamshoro, Pakistan<sup>2</sup>National Institute of Child Health, Karachi, Pakistan<sup>3</sup>Department of Paediatric Surgery, National Institute of Child Health, Karachi, Pakistan<sup>4</sup>Shaheed Mohtarma Benazir Bhutto Medical College Lyari Karachi, Pakistan

## ARTICLE INFO

## Key Words:

Bowel Management Program, Children, Fecal Incontinence, Functional Constipation

## How to Cite:

Aslam, S., Majid, F., Kumari, N., Khahro, A. A., Zamir, N., & Anwar, M. . (2023). Effectiveness of Bowel Management Program for Functional Constipation in Children: Bowel Management Program. Pakistan Journal of Health Sciences, 4(05).  
<https://doi.org/10.54393/pjhs.v4i05.771>

## \*Corresponding Author:

Sana Aslam  
 Bilawal Medical College, Liaquat University of Medical & Health Sciences, Jamshoro, Pakistan  
[sana.m.aslam@live.com](mailto:sana.m.aslam@live.com)

Received Date: 9<sup>th</sup> May, 2023Acceptance Date: 28<sup>th</sup> May, 2023Published Date: 31<sup>st</sup> May, 2023

## ABSTRACT

Functional constipation (FC) is a common problem in childhood, with an estimated prevalence of 3% worldwide. **Objective:** To determine the effectiveness of bowel management program in children with functional constipation. **Methods:** This quasi-experimental study was conducted at Department of Pediatric Surgery, NICH, Karachi, from September 2019 to November 2021. 91 children were included in the study. Informed consent was taken. A plain X-ray abdomen prior to the start of bowel management program was done to assess the fecal loading in the colon. Effectiveness of program was assessed in terms of stool frequency of 1, 2 per day and non-loading of rectum radiologically after one month of treatment. High dose laxatives were started after the patient had recovered from the first impact in older kids who had previously completed toilet training but now suffer soiling from faux incontinence or severe constipation without soiling. Daily big volume enemas were used in children who had never been toilet trained, had a history of soiling, or had a megarectum. **Results:** The mean age was  $5.26 \pm 2.20$  years (95% confidence interval [CI]: 4.80-5.72), the mean weight was  $17.49 \pm 3.24$  kg (95% CI: 16.82-18.17), the mean height was  $107.27 \pm 19.32$  cm (95% CI: 103.24-111.29). The average duration of functional constipation was  $88.11 \pm 68.79$  days (95% CI: 73.78-102.44). In terms of gender distribution, 63 (69.2%) patients were male, while 28 (30.8%) were female. **Conclusions:** The results of this study provide evidence that a bowel management programme is successful in treating functional constipation in young children.

## INTRODUCTION

Constipation is defined as "functional constipation when no other organic cause like Hirschsprung disease, anorectal malformations, neuromuscular disease; metabolic to endocrine disorders can be identified [1]. In 95% of children the constipation is functional constipation. From minor constipation that can be treated with dietary changes to severe, incurable condition that requires hospitalisation, the severity might vary [2]. These symptoms may have significant impact on child's physical and psychological wellbeing and quality of life. Early identification of the problem and therapeutic intervention is required for the effective management of childhood FC.

Different studies have been conducted to develop a systemic approach and practical guidelines for the management of functional constipation [2-6]. In one study of Koppen *et al.*, they divided the management in nonpharmacological (education, dietary modification, toilet training) and pharmacological interventions (disimpaction of impacted stool in rectum by per rectal enemas or oral laxative, maintenance treatment, and weaning) [3]. The Drs. Pena and Levitt programme is the inspiration for our bowel management programme [7-9]. They have shown that this method is also successful in treating young patients with idiopathic constipation (89%

success rate). They have claimed a 95% success rate in treating children with fecal incontinence due to underlying diseases or anatomical defects [2]. Another study found that 78% of kids with functional constipation benefited from bowel management programmes [10]. Laxatives, enemas, dietary changes, behavioural adjustments, psychosocial interventions, and patient and family education have all been used to treat functional constipation, sometimes with a focus on one of these components [11]. Though functional constipation affects nearly 95% of all children with constipation, it has received much less attention than other types of constipation. In Pakistan, there isn't a single institution that is dedicated just to treating functional constipation in children. Therefore, the purpose of the current study is to determine if a bowel management programme is useful for treating functional constipation in young patients.

## METHODS

From September 2019 to November 2021, this quasi-experimental study was carried out at the National Institute of Child Health's Department of Pediatric Surgery in Karachi, Pakistan. 91 children, aged 3 to 12 years, of either gender, who met the Rome IV criteria for idiopathic constipation were classified as having functional constipation; children with a history of anorectal malformation, Hirschsprung's disease, spina bifida, spinal cord injury, or sacrococcygeal teratoma, as well as those with neurological or other organic causes of constipation, were excluded from the study, as were children whose parents did not consent. The sample size was calculated by Openepi sample size calculator with 9% margin of error and 95% confidence level and taking the efficacy of Bowel management program in children with functional constipation as 78% [10], the sample size came to be 82. An additional 10% sample was taken to compensate for lost to follow up. The total sample size thus become 91. The data regarding age, gender, height and weight of patients was noted. BMI was calculated using the CDC growth charts [12]. First, the child's height was measured using a measuring tape, and it was recorded in centimeters. Next, the child's weight was measured using a scale, and it was recorded in kilograms. The exact age of the child in years and months was determined. The measurements were then plotted on the appropriate CDC growth chart for the child's age and sex. The intersection point of the height and weight on the chart was found, which corresponded to a specific BMI value. The BMI percentile was interpreted to classify the child's weight status. Less than the 5<sup>th</sup> percentile indicated underweight, 5<sup>th</sup> to less than the 85<sup>th</sup> percentile indicated normal weight, 85<sup>th</sup> to less than the 95<sup>th</sup> percentile indicated overweight, and equal to or greater than the 95<sup>th</sup> percentile indicated obesity. It was

recommended to consult with a healthcare professional for a comprehensive interpretation of the child's BMI using the CDC growth charts. All the patients underwent "bowel management program. A plain X-ray abdomen prior to the start of bowel management program was done to assess the fecal loading in the colon. At first follow-up visit after two week a Plain x-ray abdomen was done to see the response radiologically. Effectiveness of program was defined as having stool frequency of 1, 2 per day and non-loading of rectum and left colon (evident by Plain X-Ray Abdomen), after one month of treatment. Bowel management programs was designed in a structured course of medical treatment for pediatric constipation including dietary modification with greater, toilet training and stool dis-impaction by per rectal enema or oral laxatives. It is designed as per following age groups.

Components	Age Groups		
	3-5 Years	6-8 Years	9-12 Years
Fiber Intake	20 grams/day	25 grams/day	30 grams/day
Fluid Intake	1-1.3 liters/day	1.2-1.7 liters/day	1.5-2.1 liters/day
Toilet Routine	Scheduled toilet visits after meals	Scheduled toilet visits after meals	Scheduled toilet visits after meals
Physical Activity	Encourage active play	Encourage Structured Activities	Encourage Regular Exercise
Stool Softener / Laxatives Usage	Children with history of soiling or in those children with a megarectum, daily large volume enemas (saline/ Phosphate or Soap enema, 15-20ml/kg/day) were used.	In older children who have been toilet trained in the past but have soiling from pseudo incontinence or severe constipation without soiling, high dose laxatives (Lactulose 1.5-3ml/kg/day) were initiated once the patient had been dis-impacted	

**Table 1:** Distribution of components and age groups

Data were analyzed by using SPSS version-23.0, Mean  $\pm$  SD was calculated for age, weight, height, BMI and duration of functional constipation. Frequency and percentage were calculated for gender and efficacy. Effect modifiers were controlled through stratification of age, gender, BMI and duration of functional constipation to see the impact of these on efficacy.

## RESULTS

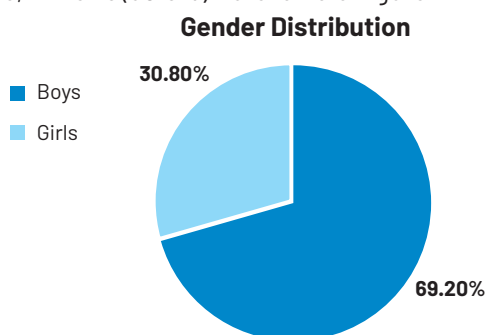
The results showed that the mean age was  $5.26 \pm 2.20$  years (95% confidence interval [CI]: 4.80-5.72), the mean weight was  $17.49 \pm 3.24$  kg (95% CI: 16.82-18.17), the mean height was  $107.27 \pm 19.32$  cm (95% CI: 103.24-111.29). The average duration of functional constipation was  $88.11 \pm 68.79$  days (95% CI: 73.78-102.44) as shown in Table 2.

**Table 2:** Descriptive Statistics for Variables of Functional Constipation (N=91)

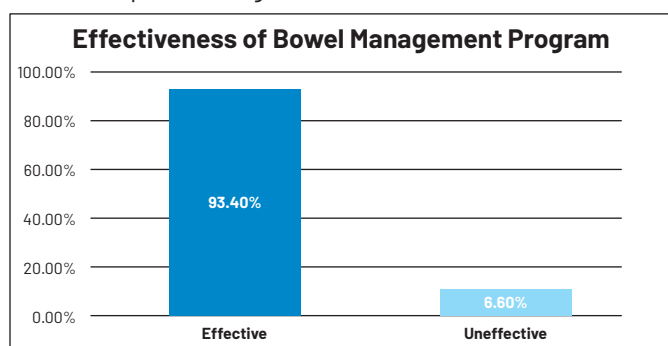
Variables	Mean $\pm$ SD	Std. Error
Age (Years)	$5.26 \pm 2.205$	0.231
Weight (Kg)	$17.49 \pm 3.243$	0.340

Height (Cm)	107.274 ± 19.3298	2.0263
Duration (Days)	88.11 ± 68.794	7.212

In terms of gender distribution, 63 (69.2%) patients were male, while 28 (30.8%) were female Figure 1.



**Figure 1:** Gender Distribution Among Participants (N=91)  
The bowel management program demonstrated efficacy in 85 (93.4%) patients Figure 2.



**Figure 2:** Effectiveness of Bowel Management Program (N=91)  
Stratification analysis was conducted to assess the impact of age group, gender, body mass index, and duration of functional constipation on efficacy as shown in Table 3.

Variables		Effectiveness of Bowel Management Program		p-value
		Yes	No	
BMI	7-16	46 (50.5%)	6 (6.6%)	0.31
	>16	39 (42.9%)	0 (0.0%)	
Gender	Male	58 (63.7%)	5 (5.5%)	0.397
	Female	27 (29.7%)	1 (1.1%)	
Duration	15 - 90	60 (65.9%)	1 (1.1%)	0.14
	>90	25 (27.5%)	5 (5.5%)	

Applied Chi-square Test

## DISCUSSION

A "common complaint in childhood is constipation" [9, 10]. It remains a challenging condition for paediatric patients, their families, and medical professionals despite its high frequency. The aetiology of paediatric constipation is probably complicated, and an organic condition rarely causes it. According to study, children's constipation is not properly treated [11]. Children who suffer from constipation may have severe abdominal pain, decreased appetite, faecal incontinence, low self-esteem, social

isolation, and family disturbance if the condition is not recognised or treated properly. Prompt and extensive treatment interventions are beneficial for children with constipation. It has been observed that functional constipation (FC) affects between 0.7 and 29.6% of children worldwide, with a mean female-to-male ratio of 2.1:1 [13]. Faecal incontinence, painful defecation, hard and/or big stools, and infrequent bowel motions are all symptoms of FC. Abdominal pain is frequently present as well [14]. These signs and symptoms may significantly affect a child's quality of life and general health [15]. According to estimates, in the USA, children's constipation accounts for up to 25% of visits to a paediatric gastroenterologist and 3% of visits to a general paediatrician [16]. Additionally, ambulatory care expenses and, to a lesser extent, costs associated with hospitalisations and ER visits are the main reasons why healthcare costs for children with constipation are higher than those for control individuals [17]. Around the world, the prevalence of constipation in children ranges from 0.3% to 8% [18]. Most kids have infrequent, painful defecation and uncontrollable loss of faeces when they first show up. 40% of people struggle with depression, social isolation, and family-related emotional issues [19]. Functional constipation (FC) is the term for cases of constipation in children where no organic cause has been identified (around 90% of cases) [20]. Retentive posture following a hard, painful, or terrifying bowel movement is the most frequently suggested theory for the aetiology of FC [21]. Dyssynergic defecation, inadequate faecal evacuation, faecal impaction, (overflow) faecal incontinence, reduced rectal feeling, and loss of the natural urge to urinate are all side effects of withholding [22]. Dyssynergic defecation is the term used to describe malfunctioning of the PFM during a bowel movement [23]. One of the most frequent gastrointestinal problems in children is constipation, which has an estimated incidence of at least 3% [24, 25]. 10% to 25% of paediatric gastroenterologists' referrals are for constipation [25], however only 5% of these kids have a known underlying reason [26]. When no anatomical, physiological, or histologic cause of constipation can be found, idiopathic or functional constipation is a diagnosis of exclusion. The Rome IV criteria were developed to help define functional constipation consistently. According to this definition, children must experience at least two of the following symptoms less than three times per week: straining more than 25% of the time, lumpy or hard stools more than 25% of the time, anorectal obstruction more than 25% of the time, incomplete evacuation more than 25% of the time, and manual defecation aids more than 25% of the time [27]. Constipation has a wide range, from moderate cases

that can be managed with dietary changes to severe, incurable conditions that need hospitalisation for treatment. In the most severe cases, primary care physicians and gastroenterologists' nutritional and drug therapies for constipation in children frequently fail. We reasoned that these kids' symptoms would be improved and their need for hospital stays for obstructive symptoms would be reduced by an organised approach to bowel management, comparable to our programme used for patients with anorectal anomalies. The mean age in our study was 5.262.20 years. 7 years was found to be the mean age by Kilpatrick *et al.* [7]. Another study noted as  $11.2 \pm 3.8$  years [28]. 63 (69.2%) were male while 28 (30.8%) were female. There were 24 (55%) male patients noted in the findings of Russell, *et al.*, [2]. Another study documented as 175 (61.40%) male and 110 (38.60%) female [7]. 55% male cases were reported in the study of Koppen *et al.*, [28]. Effectiveness of bowel management program was found to be in 85 (93.4%) patients. Kilpatrick *et al.*, reported efficacy as 233 (87%) [7]. Efficacy of 72% was found in Koppen *et al.*, [28]. Efficacy was found in 92.3% of patients in the study of van Engelenburg-van Lonkhuyzen *et al.*, [29]. In present study, stratification of confounders/effect modifiers with respect to efficacy, significant difference was reported in age group ( $p=0.040$ ), body mass index ( $p=0.031$ ), duration of functional constipation ( $p=0.014$ ), whereas insignificant difference was recorded in gender ( $p=0.397$ ).

## CONCLUSIONS

The findings of this study provide evidence supporting the effectiveness of a bowel management program in children with functional constipation. However, further clinical trials are required to assess the efficacy of this program and validate the current study's results.

## Authors Contribution

Conceptualization: SA

Methodology: FM, NK, MA

Formal Analysis: AAK

Writing-review and editing: SA, NZ, MA

All authors have read and agreed to the published version of the manuscript

## Conflicts of Interest

The authors declare no conflict of interest.

## Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

## REFERENCES

[1] Levy EI, Lemmens R, Vandenplas Y, Devreker T. Functional constipation in children: challenges and

solutions. *Pediatric Health, Medicine and Therapeutics*. 2017 Mar; 2017: 19-27. doi: 10.2147/PHMT.S110940.

- [2] Russell KW, Barnhart DC, Zobell S, Scaife ER, Rollins MD. Effectiveness of an organized bowel management program in the management of severe chronic constipation in children. *Journal of Pediatric Surgery*. 2015 Mar; 50(3): 444-7. doi: 10.1016/j.jpedsurg.2014.08.006.
- [3] Koppen IJ, Lammers LA, Benninga MA, Tabbers MM. Management of functional constipation in children: therapy in practice. *Pediatric Drugs*. 2015 Oct; 17: 349-60. doi: 10.1007/s40272-015-0142-4.
- [4] Bekkali NL, van den Berg MM, Dijkgraaf MG, van Wijk MP, Bongers ME, Liem O, *et al.* Rectal fecal impaction treatment in childhood constipation: enemas versus high doses oral PEG. *Pediatrics*. 2009 Dec; 124(6): e1108-15. doi: 10.1542/peds.2009-0022.
- [5] Levitt MA and Pena A. Pediatric fecal incontinence: a surgeon's perspective. *Pediatrics in Review*. 2010 Mar; 31(3): 91. doi: 10.1542/pir.31-3-91.
- [6] Bischoff A, Levitt MA, Bauer C, Jackson L, Holder M, Peña A. Treatment of fecal incontinence with a comprehensive bowel management program. *Journal of Pediatric Surgery*. 2009 Jun; 44(6): 1278-84. doi: 10.1016/j.jpedsurg.2009.02.047.
- [7] Kilpatrick JA, Zobell S, Leeflang EJ, Cao D, Mammen L, Rollins MD. Intermediate and long-term outcomes of a bowel management program for children with severe constipation or fecal incontinence. *Journal of Pediatric Surgery*. 2020 Mar; 55(3): 545-8. doi: 10.1016/j.jpedsurg.2019.10.062.
- [8] Rowan-Legg A, Canadian Paediatric Society, Community Paediatrics Committee. Managing functional constipation in children. *Paediatrics & Child Health*. 2011 Dec; 16(10): 661-5. doi: 10.1093/pch/16.10.661.
- [9] Van Den Berg MM, Benninga MA, Di Lorenzo C. Epidemiology of childhood constipation: a systematic review. *Official journal of the American College of Gastroenterology| ACG*. 2006 Oct; 101(10): 2401-9. doi: 10.1111/j.1572-0241.2006.00771.x.
- [10] Shah ND, Chitkara DK, Locke GR, Meek PD, Talley NJ. Ambulatory care for constipation in the United States, 1993-2004. *Official journal of the American College of Gastroenterology| ACG*. 2008 Jul; 103(7): 1746-53. doi: 10.1111/j.1572-0241.2008.01910.x.
- [11] Borowitz SM, Cox DJ, Kovatchev B, Ritterband LM, Sheen J, Sutphen J. Treatment of childhood constipation by primary care physicians: efficacy and predictors of outcome. *Pediatrics*. 2005 Apr; 115(4): 873-7. doi: 10.1542/peds.2004-0537.

- [12] Centers for Disease Control and Prevention. Clinical Growth Charts. [Internet]. [Last Cited: 3<sup>rd</sup> March 2023]. Available at: [https://www.cdc.gov/growthcharts/clinical\\_charts.htm](https://www.cdc.gov/growthcharts/clinical_charts.htm).
- [13] Mugie SM, Benninga MA, Di Lorenzo C. Epidemiology of constipation in children and adults: a systematic review. *Best practice & research Clinical gastroenterology*. 2011 Feb; 25(1): 3-18. doi: 10.1016/j.bpg.2010.12.010.
- [14] Dehghani SM, Kulouee N, Honar N, Imanieh MH, Haghghat M, Javaherizadeh H. Clinical manifestations among children with chronic functional constipation. *Middle East Journal of Digestive Diseases*. 2015 Jan; 7(1): 31.
- [15] Faleiros FT and Machado NC. Assessment of health-related quality of life in children with functional defecation disorders. *Jornal de Pediatria*. 2006 Dec; 82: 421-5. doi: 10.2223/JPED.1530.
- [16] Baker SS, Liptak GS, Colletti RB, Croffie JM, Di Lorenzo C, Ector W, et al. Constipation in infants and children: evaluation and treatment. *Journal of Pediatric Gastroenterology and Nutrition*. 1999 Nov; 29(5): 612-26. doi: 10.1097/00005176-199911000-00029.
- [17] Shah ND, Chitkara D, Branda ME, Van Tilburg MA, Whitehead WE, Katusic SK, et al. Direct medical costs of constipation from childhood to early adulthood: a population-based birth cohort study. *Journal of Pediatric Gastroenterology and Nutrition*. 2011 Jan; 52(1): 47-54. doi: 10.1097/MPG.0b013e3181e67058.
- [18] Tabbers MM, Benninga MA. Constipation in children: fibre and probiotics. *BMJ Clinical Evidence*. 2015 Mar; 2015: 0303.
- [19] Benninga MA. Quality of life is impaired in children with functional defecation disorders. *Jornal de Pediatria*. 2006 Dec; 82(6): 403-5. doi: 10.2223/JPED.1570.
- [20] Rajindrajith S and Devanarayana NM. Constipation in children: novel insight into epidemiology, pathophysiology and management. *Journal of Neuro-gastroenterology and Motility*. 2011 Jan; 17(1): 35. doi: 10.5056/jnm.2011.17.1.35.
- [21] Pijpers MA, Bongers ME, Benninga MA, Berger MY. Functional constipation in children: a systematic review on prognosis and predictive factors. *Journal of Pediatric Gastroenterology and Nutrition*. 2010 Mar; 50(3): 256-68. doi: 10.1097/MPG.0b013e3181afcdc3.
- [22] Burgers R, de Jong TP, Visser M, Di Lorenzo C, Dijkgraaf MG, Benninga MA. Functional defecation disorders in children with lower urinary tract symptoms. *The Journal of Urology*. 2013 May; 189(5): 1886-91. doi: 10.1016/j.juro.2012.10.064.
- [23] Chiarioni G, Heymen S, Whitehead WE. Biofeedback therapy for dyssynergic defecation. *World Journal of Gastroenterology: WJG*. 2006 Nov; 12(44): 7069. doi: 10.3748/wjg.v12.i44.7069.
- [24] Häberle J. Clinical practice: the management of hyperammonemia. *European Journal of Pediatrics*. 2011 Jan; 170(1): 21-34. doi: 10.1007/s00431-010-1369-2.
- [25] van Ginkel R, Reitsma JB, Büller HA, Taminiau JA, Benninga MA. Childhood constipation: longitudinal follow-up beyond puberty. *Gastroenterology*. 2003 Aug; 125(2): 357-63. doi: 10.1016/S0016-5085(03)00888-6.
- [26] Southwell BR. Treatment of childhood constipation: a synthesis of systematic reviews and meta-analyses. *Expert Review of Gastroenterology & Hepatology*. 2020 Mar; 14(3): 163-74. doi: 10.1080/17474124.2020.1733974.
- [27] Rasquin A, Di Lorenzo C, Forbes D, Guiraldes E, Hyams JS, Staiano A, et al. Childhood functional gastrointestinal disorders: child/adolescent. *Gastroenterology*. 2006 Apr; 130(5): 1527-37. doi: 10.1053/j.gastro.2005.08.063.
- [28] Koppen IJ, Kuizenga-Wessel S, Voogt HW, Voskeuil ME, Benninga MA. Transanal irrigation in the treatment of children with intractable functional constipation. *Journal of Pediatric Gastroenterology and Nutrition*. 2017 Feb; 64(2): 225-9. doi: 10.1097/MPG.0000000000001236.
- [29] van Engelenburg-van Lonkhuyzen ML, Bols EM, Benninga MA, Verwijs WA, de Bie RA. Effectiveness of pelvic physiotherapy in children with functional constipation compared with standard medical care. *Gastroenterology*. 2017 Jan; 152(1): 82-91. doi: 10.1053/j.gastro.2016.09.015.