

Efficacy of bowel management program for improving quality of life in children with postoperative fecal incontinence

Kamrul Hasan^{1*}, Abdullah Al Mahmud², A H M Abu Sufian³, Sakhawat Hossain⁴, Tumpa Das⁵, Anowrul Azim⁶, Mahmuda Shah Sultana⁷

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*Corresponding author



ABSTRACT

Background: Fecal incontinence is still a severe consequence of surgical repair of anorectal abnormalities and Hirschsprung disease in young patients, significantly reducing quality of life. The purpose of this study was to assess the efficacy of a systematic bowel management program in enhancing the quality of life for children with postoperative fecal incontinence. **Methods & Material:** This quasi-experimental study was carried out at Mymensingh Medical College Hospital in Bangladesh from July 2023 to December 2024. A purposive sample was used to enroll 50 children aged 3 to 12 years old who had postoperative fecal incontinence after surgical repair of anorectal deformity or Hirschsprung disease. A seven-day bowel control treatment involving saline enemas with or without glycerin was implemented. At baseline and 12-week follow-up, quality of life was assessed using the Pediatric Quality of Life Inventory (PedsQL 4.0), which included domains such as physical, emotional, social, and school functioning. Data were entered and analyzed using SPSS version 26. **Results:** The bowel management treatment resulted in considerable improvements in all quality-of-life dimensions. Physical function ratings improved from 72.0±24.2 to 96.8±3.1 ($p<0.001$), emotional function from 68.2±28.2 to 88.3±9.7 ($p<0.001$), social function from 74.2±25.0 to 98.2±6.1 ($p<0.001$), and school function from 76.0±12.5 to 92.1±7.5 ($p<0.001$). 96% of patients had their stool consistency restored. Compliance was acceptable for 88% of individuals. Age and educational level were found to have a strong link with enema requirements. **Conclusion:** Structured bowel management programs increase quality of life in children with postoperative fecal incontinence by providing a non-invasive therapeutic strategy with high compliance and considerable functional improvements.

Keywords: Bowel management program, Fecal incontinence, Hirschsprung disease, Quality of life.

1. Medical Officer, Tanore Upozella Health complex, Rajshahi, Bangladesh (ORCID: 0009-0006-0924-3676)
2. Associate Professor, Department of Paediatric Surgery, Mymensingh Medical College, Mymensingh, Bangladesh
3. Assistant Professor, Department of Paediatric Surgery, Mymensingh Medical College, Mymensingh, Bangladesh
4. Assistant Professor, Department of Paediatric Surgery, Mymensingh Medical College, Mymensingh, Bangladesh
5. Indoor Medical Officer, Department of Paediatric Surgery, Mymensingh Medical College, Mymensingh, Bangladesh
6. Assistant Registrar, Department of Paediatric Surgery, Rajshahi Medical College Hospital, Rajshahi, Bangladesh
7. MS Resident, Department of Gynecology & Obstetrics, Rajshahi Medical College, Rajshahi, Bangladesh

INTRODUCTION

Faecal incontinence (FI) is an unfortunate chronic complication in children after surgery for congenital or acquired conditions involving congenital anorectal conditions, Hirschsprung's disease, or spinal dysraphisms. Despite improvements in current standard operating procedures for improving anorectal function, most patients remain with suboptimal bowel function, resulting in considerable pain, depression, or problematic perspectives affecting quality of life (QoL). In an article, it is stressed that FI following curative repair is most probably associated not only with anatomical factors but, more often, with complex interrelated issues involving neurologic function [1]. FI has been hard for many kids, causing embarrassment, absenteeism, worry, and low self-confidence. Based upon clinical assessment with specific tools, FI caused by diseases related to continence has a seriously negative influence upon kids' perspectives about their quality of life, related to emotional, social, or academic performance [2]. Traditional approaches to faecal incontinence, such as dietary modification,

laxatives, stool softeners, and behaviour modifications, yield variable and often incomplete symptom control in pediatric patients. In response to these limitations, BMPs were developed as an intensive therapy aimed at predictable bowel emptying and social continence. BMPs were described as individualised regimens consisting of enemas, laxatives, transanal irrigation, and extensive education of the patient and their caregivers, tailored according to the child's anatomy and colonic motility [3]. A prospective cohort study reported significant reductions in soiling episodes and improved continence outcomes in children with ARM and Hirschsprung disease following participation in a structured BMP [4]. Another study reveals the effect of multidisciplinary bowel management in improving the rates of continence in children with complex colorectal problems [5]. Apart from the assessment of continence, the beneficial effects of BMPs in the improvement of quality of life have been established. There is documentation of marked improvements in the Pediatric Quality of Life Inventory (PedsQL),

including the dimensions of physical, emotional, social, and school functioning, after bowel management programs [6]. The potential for the beneficial effects of effective bowel management in improving quality of life, both in the child and the parent, is pertinent in the already established psychosocial toll being suffered by the former. The above is further established in another study, showing the manifestation of increased psychosocial distress in the parents of children with anorectal malformations [7]. Based on a different study, personalised bowel care approaches influenced by anatomical factors, as well as the dynamics of the bowel, are related to good continence results in the long run [8]. Successful follow-through with BMP requires a multidisciplinary team—surgeons, gastroenterologists, nurses, and parents—and regular monitoring to maintain its effectiveness. Challenges still being faced, despite the effectiveness of the BMP, are related to long-term compliance and the availability of specialised care. A report underlines the importance of providing the patient with psychosocial support throughout, apart from regular follow-

through, in preserving improvements in functionality over time [9]. This study aims to assess the effectiveness of a structured approach in improving the quality of life in terms of faecal incontinence in pediatric patients due to postoperative complications.

METHODS & MATERIALS

This quasi-experiment study took place at the Department of Paediatric Surgery, Mymensingh Medical College Hospital, Bangladesh, from July 2023 to December 2024. The study included patients with fecal incontinence among postoperative pediatric patients after the definitive surgical correction of anorectal malformation or Hirschsprung disease. Inclusion criteria include children aged 3-12 years with documented postoperative fecal incontinence persisting for more than six months after definitive surgical repair, with the ability to comply with follow-up care, and written informed consent from parents or authorized guardian. Exclusion criteria were active intestinal infection or inflammatory bowel disease, significant

intellectual impairment precluding cooperation with bowel management plan, significant renal or hepatic failure making patients poor candidates for enema installation, prior entry in other bowel management programs, or anatomical complications requiring urgent surgical intervention. The baseline assessment consisted of a structured parental interview, a comprehensive clinical examination, and plain abdominal radiography in a standardized case record form. The bowel management program was initiated on the day of admission with a seven-day trial-and-error program with saline enemas, with or without glycerin, administered once daily. The initial volume of enema used was 10 ml/kg body weight, subsequently titrated based on the clinical response, radiographic distribution of stool, and Bristol Stool Chart. Parents were given standardized training regarding enema administration techniques. Treatment success was defined as no soiling with accompanying radiological clearing of the left colon and rectum. Quality of life was measured using

the validated Pediatric Quality of Life Inventory (PedsQL 4.0) at admission and at 12-week follow-up. Data analysis was performed using SPSS version 26.0, using paired t-tests for continuous variables, chi-square testing for categorical data, and correlation analyses as needed. P-values < 0.05 were considered significant. Before participating, we received institutional review board approval and written informed consent.

RESULTS

Table I represents postoperative fecal incontinence in 28 men (56%) and 22 women (44%). Parental educational status varied significantly, with 40% having completed primary school, 16% completing SSC, 18% completing HSC, 12% holding graduate degrees or higher, and 14% having no formal schooling. The primary underlying diagnosis was predominantly anorectal malformation in 34 patients (68%), followed by Hirschsprung disease in 16 patients (32%).

Table I
Baseline demographic and clinical characteristics of the study participants (n=50).

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	28	56
	Female	22	44
Educational level	No formal education	7	14
	Completed primary education	20	40
	Completed SSC	8	16
	Completed HSC	9	18
	Graduate or above	6	12
Primary disease	ARM	34	68
	HD	16	32

According to Table II, the pre-intervention assessment revealed constipation in 76%, diarrhea in 24%, and no patients had normal stool consistency. Following the 12-week treatments, constipation decreased

substantially to only one patient (2%), whereas 48 patients (96%) achieved normal stool consistency, and one patient (2%) continued to have diarrhea. The results showed significant improvements in bowel

management, with 74% less constipation, 96% normal consistency, and 22% less diarrhea (p<0.001).

Table II
Effect of bowel management program on stool consistency (paired categorical analysis, n = 50).

Stool consistency	Pre-BMP n (%)	Post-BMP n (%)	Absolute change (%)	p-value
Constipation	38 (76.0)	1 (2.0)	-74.0	<0.001
Normal stool	0 (0.0)	48 (96.0)	+96.0	<0.001
Diarrhea	12 (24.0)	1 (2.0)	-22.0	<0.001

Table III showed statistically significant improvements in all four PedsQL domains. Physical functioning ratings significantly rose from 72.0±24.2 to 96.8±3.1 (p<0.001). Emotional functioning improved from

68.2±28.2 to 88.3±9.7 (p<0.001), indicating less anxiety and better psychological well-being. Social functioning significantly improved from 74.2±25.0 to 98.2±6.1 (p<0.001), indicating better peer

relationships and social participation. School functioning improved from 76.0±12.5 to 92.1±7.5 (p<0.001), indicating more academic engagement and concentration.

Table III
Quality of life outcomes and procedural compliance following the Bowel Management Program.

Outcome measure	Pre-BMP, mean ± SD	Post-BMP, mean ± SD	p value*
Physical function	72.0 ± 24.2	96.8 ± 3.1	< 0.001
Emotional function	68.2 ± 28.2	88.3 ± 9.7	< 0.001
Social function	74.2 ± 25.0	98.2 ± 6.1	< 0.001
School function	76.0 ± 12.5	92.1 ± 7.5	< 0.001

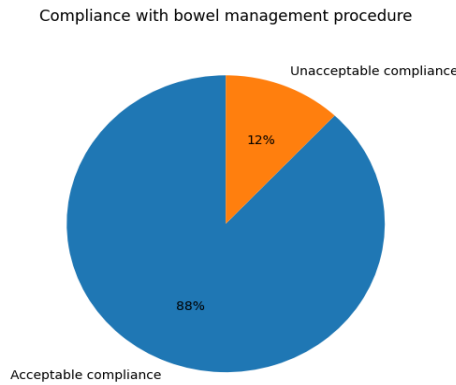


Figure 1 Compliance with the procedure among patients/guardians.

Figure 1 illustrates 88% participants adhered to the bowel management protocol, effectively completing the stipulated enema

delivery schedules and follow-up obligations. Only 12% participants showed unsatisfactory compliance, which was

explained by problems such as difficulty with enema delivery technique, scheduling conflicts, or psychosocial impediments.

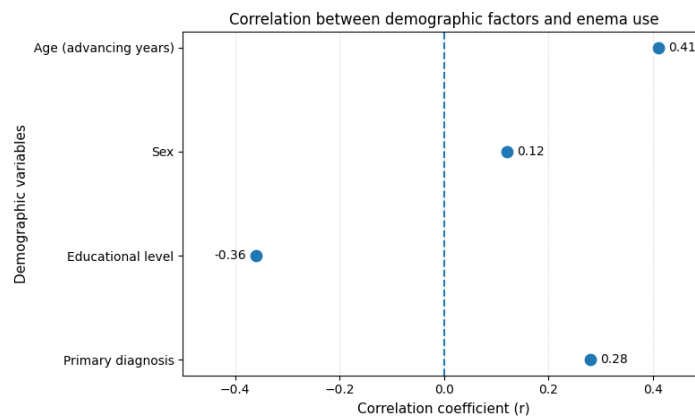


Figure 2 Correlation between demographic factors and enema use during bowel management.

Figure 2 depicts significant connections between demographic factors and enema requirements. Age showed a moderate positive connection ($r=0.41$), indicating that older children required larger or more frequent enema dosages. Parental educational level demonstrated a moderate negative correlation ($r=-0.36$), showing that higher parental education was related to fewer enema requirements. The primary diagnosis showed a weak positive connection ($r=0.28$), with anorectal malformation and Hirschsprung disease patients having differing enema needs. Gender had no significant link ($r = 0.12, p = 0.39$).

DISCUSSION

This study demonstrated that organized programs in bowel care can greatly affect the quality-of-life levels in pediatric patients in relation to fecal incontinence that occurred after surgeries performed to treat anorectal malformations and Hirschsprung disease. The great improvements that occurred in physical, emotional, social, and school functions advocate the importance of conservative bowel care approaches in treating patients with defects in the constitution and functions of the bowel. The marked improvement in stool texture, with 96% of patients exhibiting normal stooling patterns, is consistent with results from Pakarinen et al., who proved the

effectiveness of structured bowel management programmes based on enemas [10]. Similar results were documented in children with anorectal malformations using structured bowel management programmes by Versteegh et al., who stressed the need for individualization of bowel management schemes and parental training [11]. The program's effectiveness in completely overcoming constipation and diarrhea, irrespective of the original functional disorder, underscores its potential for bowel homeostasis. These reported improvements in quality of life are in keeping with Witvliet et al., who highlight the massive effects experienced by fecal incontinence on affected well-being in pediatrics [12]. Social

functioning reported the largest increase in values from 74.2 to 98.2. This corresponds closely to the observations made by Pelizzo et al., that there was a considerable increase in social participation in affected individuals following successful intervention for their bowel management needs [13]. These values for emotional functioning noted in our observations highlight the psychological toll that fecal incontinence takes on affected individuals, in that affected pediatric patients become anxious and embarrassed about their condition and suffer from poor self-esteem that is effectively made better through incontinence management [14]. The compliance rate of 88% recorded in our study can be said to be quite good compared to the rate of adherence observed in other pediatric treatment programs, which generally varies between 70-85% [15]. On the other hand, the 12% rate of non-compliance points to certain challenges that need to be addressed. It has been found by Cairo et al. that factors such as time constraints, family problems, and psychosocial issues are some common causes for non-adherence [16]. The observation that an increase in age is associated with an increase in enema use is suggestive of a possible modification in functional or capacity changes in the colon, hence the need for adjustment in dosing. This could be related to physiological evidence, which shows an increase in colonic volume or characteristics with increasing age, among other factors [17]. On the other hand, a negative relationship between parental education levels and usage rates is an indicator that better chronic management practice could help decrease reliance solely on enema administration [18]. The preponderance of anorectal malformation cases (68%), observed in the population, represents the distribution of such defects, being a risk factor for persistent fecal incontinence greater than Hirschsprung disease [19]. The association observed between the primary diagnosis and the need for an enema relates primarily to the fact that the pathophysiology affects the management strategies, according to the defects being anatomical or neurosensory. Our findings lend strong support to the inclusion of structured Bowel Management Programs within standard postoperative care regimens for children with colorectal anomalies. The marked improvements attained within all measured endpoints, together with high levels of compliance, clearly establish both efficacy and feasibility [20]. The program's dependence on straightforward and easily accessible interventions renders it especially applicable within low-resource environments, having been successfully implemented within our institution to great effect [21]. The application of the validated

PedsQL 4.0 measure allows us to enhance the reliability of our data on quality-of-life measurements, facilitating comparisons with other international studies on this topic [22]. This broad-based strategy for assessing change also acknowledges that effectively managing the disorder requires much more than just symptom control, but involves broad-based improvements in all aspects of the children's function.

LIMITATIONS

This study's limitations include the quasi-experimental design without a control group, which limits causal inference, and the relatively small sample size from a single center, which may affect generalizability. The 12-week follow-up period, while demonstrating short-term efficacy, does not assess long-term sustainability of improvements or potential need for ongoing intervention modifications.

CONCLUSION

This study concludes that systematic bowel management regimens greatly improve quality of life in children with postoperative fecal incontinence caused by anorectal abnormalities or Hirschsprung disease. The intervention normalized stool consistency in 96% of participants and resulted in statistically significant improvements across all quality-of-life dimensions, with especially substantial changes in social functioning. The 88% compliance rate implies that the program is very acceptable and feasible in ordinary clinical practice, establishing bowel control as a key component of complete postoperative care for these fragile children.

RECOMMENDATIONS

Future studies should incorporate randomized controlled trial designs with longer follow-up periods to establish sustained efficacy and optimal duration of bowel management interventions. Multicenter studies with larger, diverse populations are needed to enhance generalizability and identify predictors of treatment success that can guide personalized management protocols.

FUNDING

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CONFLICT OF INTEREST

None declared.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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