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# A Retrospective Study Assessing Outcome of Daily Anal Stimulation for Intractable Functional Constipation in Infants

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**ABSTRACT**
The aim of the present study was to evaluate the effectiveness of daily anal stimulation in infants with intractable functional constipation. This retrospective analysis includes infants who had IFC treatment. The treatment protocol included administering daily rectal stimulation to babies and providing psychological counselling to parents. All 200 patients who underwent toilet training intervention shown a favourable reaction. Each patient completed a comprehensive therapeutic programme and was assessed for symptom improvement and changes in anorectal manometry within a year of follow-up. In the current investigation, 52% of the participants were male, while 48% were female. The average period of toilet training was 1.5. This research aimed to assess the manometric parameters in newborns in order to identify any alterations in defecation dynamics and anorectal neuromuscular functioning before and after intervention. All children had an intact Rectoanal Inhibitory Reflex (RAIR), which is crucial for ruling out Hirschsprung's disease (HSCR) and internal anal sphincter achalasia (IASA). The frequency of peristalsis in the lower part of the rectum remained unchanged before and after the intervention. Prior to surgery, the peristaltic wave of the distal rectum exhibited disorganization, characterized by a sluggish and uneven waveform with a low amplitude. Following the intervention, there was a substantial increase in the amplitude of peristalsis, accompanied by a considerable improvement in the rhythm. During the first procedure, one baby had an anal fissure, which was successfully treated by adjusting the size of the bougie. There were no instances of faecal incontinence or intestinal rupture seen in any of the patients. This research discovered that including daily anal stimulation into the early toilet training programme, starting as early as 3 months of age, might potentially be a beneficial approach for managing babies with Infant Functional Constipation (IFC). It consistently stimulates bowel movements and successfully promotes the development of appropriate toilet habits.

## INTRODUCTION

An unremarkable pattern of defecation is considered indicative of good health in children of all age groups. Parents particularly focus on the frequency and qualities of their children's bowel movements, especially in the early months of life. Any departure from what is seen as the standard behaviour for children by any member of the family may prompt a phone call to the nurse or a visit to the paediatrician. Hence, it is unsurprising that about 3% of overall paediatric outpatient visits and 25% of paediatric gastroenterology consultations are attributed to a perceived defecation issue[1]. Parents experience anxiety due to chronic constipation since they are concerned about the possibility of an underlying medical illness causing this symptom.

Typically, parents express concern when their child's stools are very big, hard, unpleasant and infrequent. During the first week of life, infants typically have an average of 4 bowel movements every day. The frequency of stools decreases steadily to an average of 1.7 per day at 2 years of age and 1.2 per day at 4 years of age[2,3]. Certain breast-fed infants may have a lack of bowel movements for many days or an extended period of time[4]. The frequency of bowel motions has been constant over a period of 4 years. Functional constipation (FC) is a prevalent issue in children, with a global estimated incidence rate of 9.5%[5]. The diagnosis of functional constipation (FC) in children is made by a clinical evaluation, relying on the paediatric diagnostic Rome IV criteria[6,7].

The Rome criteria were developed by synthesizing existing information and reaching an agreement among experts in the fields of paediatric gastroenterology and paediatric psychology. These criteria facilitate the identification and diagnosis of functional gastrointestinal disorders (FGIDs) by healthcare professionals[6,7]. Food insecurity (FC) imposes a substantial hardship on both children and their caregivers[8] and is linked to a decline in quality of life[9], decreased scholastic achievements and psychological issues such as aggressiveness, anxiety, sadness and heightened emotional reactivity[10,11]. The aetiology of infantile constipation is believed to be multifaceted. Genetic susceptibility, poor socioeconomic level, inadequate daily fibre intake, insufficient hydration intake and immobility are suggested as variables that contribute to functional constipation (FC). Children most often experience with holding behaviour as a result of a painful or scary bowel movement[12]. Engaging in with-holding behaviour may result in dyssynergic defecation, which is characterized by an Inability to coordinate the muscles involved in bowel movements. This can lead to inadequate evacuation of feces, fecal impaction, overflow faucal incontinence and diminished rectal feeling. The standard approach to treating children with functional constipation (FC) comprises a mix of non-pharmacological measures (such as education, toilet training, keeping a defecation diary and using a reward system) together with pharmacological interventions. The preferred medication for this condition is polyethylene glycol (PEG), which is taken orally and is considered the first-line therapy option[13]. The available alternative treatments for children with severe constipation that does not respond to conventional methods are limited. These choices include injecting botulinum toxin into the anal sphincter, using transanal irrigation, administering antegrade continent enemas (ACE) and in rare instances, resorting to sacral nerve stimulation (SNS) or surgical removal of part or all of the colon[14]. The objective of the current investigation was to assess the efficacy of daily anal stimulation in babies suffering from persistent functional constipation.

## MATERIALS AND METHODS

This retrospective analysis includes infants who had IFC treatment. The treatment protocol included daily rectal stimulation for newborns and psychological counseling for parents. All 200 patients who underwent toilet training intervention shown a favorable reaction. Every patient completed a comprehensive therapeutic programed and was assessed for symptom improvement and anorectal manometer alterations during a one-year follow-up period.

**Inclusion criteria were as follows:**

- Age <1 year with the diagnosis of FC based on Rome IV criteria, according to these criteria, at least two of the following problems had to have been reported, two or fewer defecations per week, a history of excessive stool retention, painful bowel movements or hard bowel movements and large-diameter stools and the presence of a large fecal mass in the rectum[15]
- Received or were receiving medication treatment (lactulose and probiotics and others) by their primary gastroenterologist, but were dependent on the medications or unresponsive to medication treatment with persistence of constipation for at least 1 month

**Exclusion criteria were as follows:**

- Constipation due to organic causes diagnosed by histopathology or anorectal manometer (ARM) examination, such as Hirsch sprung disease (HSCR) or internal anal sphincter achalasia (IASA) and so on

- Personal history of anorectal malformation; (3) family history of inflammatory bowel disease, HIV infection, neurologic or psychiatric disorder and so on

**Treatment protocol:** All the treatments were conducted on an outpatient basis. All the parents were educated about the study protocol after which written informed consent was collected from all participating parents. The intervention program included daily anal stimulation for infants and psychological counseling for parents. Anal stimulation For IFC infants, anal stimulation with specific bougie was used to promote regular defecation. The bougies were made of plexiglass, which were approximately 21 cm in length and of various diameters ranging from 11-22 mm (F11-F22). Before therapy, the bougies were selected based on the anal size of the patient determined by digital rectal examination. In the beginning, the appropriate bougie was covered with paraffin and inserted into the anus gently for approximately 3-5 cm in depth. Usually, obvious bowel movement patterns of infants could be observed, including passing of gas, groaning, crying, or other sounds related to distress and an attempt to push out the bougies from the anus. Meanwhile, the caregiver gave vocal signals to promote his bowel movement, specifically a baby music sound and a clockwise abdominal massage, which promoted intestinal peristalsis and assisted defecation smoothly[16].

Patients underwent regular daily intervention for at least 1 month, up to a maximum of 3 months. Each intervention lasted about 5-10 minutes. At the same time, as a part of the training program and to enhance compliance, all the participating patients were called for monthly clinical visits until 1 year of follow-up. Psychological counseling Health education and the relevant materials were provided to the parents or caregivers, to help them fully understand the pathophysiology of FC. The entire intervention process was explained with the help of diagrams. The parents and caregivers were given opportunity to discuss any queries related to the nursing process. The importance of compliance was also explained to the parents.

**ARM procedure:** ARM (Medical Measurement Systems, Netherlands) was performed before the treatment courses, with the patient in the lying position, using an 8-channel water perfusion catheter. The catheter was inserted in the anal canal and manometric parameters, including rectoanal inhibitory re ex (RAIR) threshold, peristaltic frequency and amplitude of distal rectum and anal canal pressure at rest, were measured.

ARM was performed in all children at the time of presentation and was compared with follow-up manometry results that were performed within 1 month after intervention. All procedures were performed by the same operator.

**Outcomes measured:** The primary outcome was the change in the frequency of stool passage. The secondary outcomes included changes in the stool form, incidence of defecatory pain and improvement of parameters in ARM.

**Statistical analysis:** All results of pretreatment versus post-treatment comparisons were analyzed statistically. Continuous data were reported as the mean±SD. ?2 test was used to analyze categorical variables (large-diameter stools or painful defecation). Differences in the ARM parameters between the groups were assessed by the student's paired t-test for continuous data, such as resting pressure, RAIR threshold and peristaltic frequency and amplitude of the distal rectum. A $p<0.05$ was considered to be statistically significant. Data were analyzed using SPSS software (V.14.0 for Windows, IBM).

## RESULTS

In the present study, there were 52% were male and 48% were females. The mean duration of toilet training was 1.5.

In this study, we evaluated the manometric parameters in infants to detect possible changes in the defecation dynamics and anorectal neuromuscular functions before and after intervention. All children had intact RAIR, which is important to exclude HSCR and IASA. The frequency of peristalsis in the distal rectum was similar before and after intervention. However, the peristaltic wave of distal rectum was disorganized, with slow, irregular waveform and low amplitude before intervention. After intervention, the amplitude of peristalsis became significantly greater and the rhythm also significantly improved. On examining the anal sphincter relaxation, we found all children to have RAIR. The RAIR was present at the mean threshold volume required to elicit RAIR which was similar before and after the treatment (12.38±7.33 mL vs 12.64±5.07 mL, p = 0.155). The mean anal resting pressure was 64.47±21.3 and 66.61±20.3 mm Hg before and after the treatment, respectively. No difference was found in the peristaltic frequency of distal rectum between before and after treatment.

Table 1: Baseline characteristics of the patients

| Variable | Value |
|---|---|
| Male, n (%) | 104 (52) |
| Female | 96 (48) |
| Age at the beginning of toilet training intervention (months), mean (range) | 5.4 (3-11) |
| Mean duration of toilet training intervention (months), mean (range) | 1.5 (1-3) |
| Age at the end of follow-up (months), mean (range) | 13.7 (11-15) |

Table 2: The comparison of severity of symptoms and manometric results preintervention and postintervention

| Variable | Toilet training intervention | | p-value |
|---|---|---|---|
| | Pretreatment | Post-treatment | |
| Frequency of defecation per week, mean±SD | 2.8±1.6 | 9.2±2.4 | 0.028 |
| Large-diameter stools, n (%) | 156 (78) | 14 (7) | 0.007 |
| Painful defecation, n (%) | 128 (64) | 28 (14) | 0.016 |
| Manometry parameters, mean±SD | | | |
| Resting pressure (mm Hg) | 65.45±22.4 | 67.63±20.4 | 0.450 |
| RAIR threshold (mm Hg) | 12.38±7.33 | 12.64±5.07 | 0.155 |
| Peristaltic frequency of distal rectum (min) | 9.932±2.24 | 10.548±2.12 | 1.108 |
| Peristalsis amplitude of distal rectum (mm Hg) | 7.613±4.26 | 15.725±7.13 | 0.002 |

Table 3: Side effects of toilet training intervention

| Variable | Value |
|---|---|
| Anal fissure, n (%) | 1 (0.5) |
| Bowel perforation, n (%) | 0 |
| Soiling, n (%) | 0 |

There was significantly positive response in the peristaltic amplitude of distal rectum. The mean peristalsis amplitude increased from 7.613±4.26 to 15.725±7.13 mm Hg and the rhythm improved significantly after intervention. One infant developed anal fissure at the first intervention which resolved after read justment of bougie size. No patient developed soiling or bowel perforation.

## DISCUSSIONS

Childhood functional constipation (FC) is a prevalent clinical issue that often occurs during the first year of life[17]. The symptoms of functional constipation in children include infrequent and painful bowel movements, as well as the passage of hard stools. The Rome IV criteria are widely recognised as the standard diagnostic method for identifying functional constipation in paediatric patients[3]. Managing FC in newborns remains a difficult task. The treatment options encompass oral probiotics and laxatives to ensure painless bowel movements, which are crucial components of the treatment regimen[15]. Nevertheless, certain infants endure intense symptoms for extended periods that exhibit limited improvement with traditional dietary and pharmacological approaches. These infants are classified as having intractable functional constipation (IFC)[18,19].

In the current investigation, 52% of the participants were male, while 48% were female. The average period of toilet training was 1.5. Pharmacological treatment with laxatives is recommended when non-pharmacological interventions are unsuccessful in improving symptoms of paediatric functional constipation[13,20]. Initially, the treatment focuses on disimpaction, which involves the removal of any faecal masses. This is achieved through either rectally administered enemas or temporary high-dose oral polyethylene glycol (PEG). Subsequently, maintenance therapy with PEG should be initiated to prevent re-accumulation of feces. Lastly, after at least a 2-month period of symptom relief, maintenance therapy should be gradually weaned to prevent a relapse. To date, PEG is the laxative of the first choice for both disimpaction (high dose 1-1.5 g kg day) and maintenance treatment (0.2-0.8 g kg day)[21].

The toilet training programme was initiated at the age of 3 months in the present study. During the follow-up period we found that most infants benefited from promoting intestinal peristalsis and stimulating defecation and they were trained to control stool activities spontaneously, including the muscles involved in defecation and to establish a defecation reflex[22,23]. The ability to control the defecation and to achieve coordinated rectal muscle contraction with sphincter relaxation matures over time. Undoubtedly, toilet training accelerated this process. In this work, we analyzed the manometric parameters in newborns to identify probable changes in the defecation dynamics and anorectal neuromuscular functioning before and after intervention. All children have intact RAIR, which is necessary to eliminate HSCR and IASA. The frequency of peristalsis in the distal rectum was comparable before and after intervention. However, the peristaltic wave of distal rectum was chaotic, with sluggish, uneven pattern and low amplitude before surgery. After intervention, the amplitude of peristalsis got much higher and the rhythm also greatly improved.

On analyzing the anal sphincter relaxation, we discovered all children to have RAIR. The RAIR was present at the mean threshold volume necessary to elicit RAIR which was comparable before and after the therapy (12.38±7.33 mL vs 12.64±5.07 mL, p=0.155). The mean anal resting pressure was 64.47±21.3 and 66.61±20.3 mm Hg before and after the therapy, respectively. No variation was noticed in the peristaltic frequency of distal rectum between before and after therapy. There was considerable favourable response in the peristaltic amplitude of distal rectum. The mean peristalsis amplitude rose from 7.613±4.26 to 15.725±7.13 mm Hg and the rhythm improved markedly following intervention. One infant developed anal fissure at the first intervention which resolved after readjustment of bougie size. No patient had soiling or bowel perforation. These data revealed that with intervention the intestinal peristalsis improved and the coordination function of defecation was definitely reinforced. The mean resting pressure

measured in a calm condition mostly reflects the tightness of the internal sphincter. A functional sphincter apparatus enables patients to exert voluntary control over the muscles involved in defecation. While there is existing literature on the normal values of anorectal manometer (ARM) in adults, there is limited research available on the manometric data of both normal and constipated infants. No statistically significant disparity in anal resting pressure was seen between the pre-intervention and post-intervention stages in this investigation. Consequently, the intervention, which involved anal stimulation, did not have any negative effects on the structure and function of the internal sphincter.

## CONCLUSION

This research discovered that including daily anal stimulation into the early toilet training programme, starting as early as 3 months of age, might potentially be a successful approach for managing newborns with infant functional constipation (IFC). It consistently stimulates bowel movements and helps establish appropriate toilet routines.

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