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DISCOVERY SCIENTIFIC SOCIETY

Functional constipation in children and adolescents - etiology, treatment and management in clinical practice

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ABSTRACT

Background: Functional constipation (FC) is the most prevalent functional gastrointestinal disease in children, affecting approximately 14.4% of the pediatric population worldwide. While FC is not harmful itself, it can cause serious medical problems, such as fecal incontinence, dysfunction of the urinary tract, and psychological distress, which can occur when children receive delayed diagnosis and treatment. Objective: This review aims to summarize existing evidence on functional constipation in children, including its definition, diagnosis, prevalence, clinical presentation, and treatment. Methods: The review employed Rome IV diagnostic criteria, ESPGHAN/NASPGHAN guidelines, WHO guidelines, PubMed, and Google Scholar databases, along with academic literature published between 1991 and 2025. Results: The diagnosis of FC depends on a clinical evaluation that includes symptom assessment and ruling out physical causes. The development of FC results from painful defecation and inappropriate toilet training as well as poor dietary choices, psychosocial stressors, and reduced physical activity levels. The treatment of FC begins with disimpaction, followed by pharmacological maintenance and behavior modification, before considering biofeedback or surgery for selected patients. Conclusion: The complex nature of childhood constipation requires individualized treatment approaches, which should involve multiple disciplines. The early identification of constipation combined with extended treatment reduces complications, which leads to a better quality of life for patients and their families.

Keywords: functional constipation, pediatric gastroenterology, polyethylene glycol, stool withholding

1. INTRODUCTION

Functional constipation (FC) is a widespread and clinically significant condition in children: it accounts for 25% of pediatric gastroenterology clinic visits. The Rome IV

diagnostic criteria establish FC as a condition that includes infrequent, painful, or hard defecation and hard stools, as well as stool withholding behaviors, without any detectable organic cause. The diagnostic thresholds are age-specific and based on a composite of clinical symptoms lasting at least one month (Kawalec et al., 2018).

Globally, the childhood FC burden is high, with an estimated prevalence of 14.4%. There is considerable geographical variability, with the highest prevalence rates observed in Africa and the lowest in Asia. The median age of onset is approximately 2.3 years, which also happens to be the age of toilet training- a very significant developmental milestone often implicated in the causation of constipation. While the disorder is equally prevalent among both genders, persistence into adolescence and adulthood is being observed in up to one-quarter of individuals (Inan et al., 2007).

The functional classification of this condition does not prevent severe clinical outcomes from occurring when constipation remains untreated. The prolonged retention of stool inside the body causes abdominal pain, anorexia, urinary tract infections, and fecal incontinence. These psychosocial consequences affect children and their families, causing an extreme level of emotional distress, thus deteriorating their quality of life (Loening-Baucke, 2007). A functional constipation has a pathogenesis due to a complex of many factors, which include habits of behavior, food intake, psychosocial stress, and certain neurodevelopmental disorders (Edan and Yahya, 2022).

The high prevalence of functional constipation in children requires immediate evidence-based treatment because it creates significant healthcare expenses and potential complications. This paper is an analysis of pediatric FC, which will discuss its diagnosis, epidemiology, pathophysiology, and treatment modalities from the perspective of patient-centered holistic care.

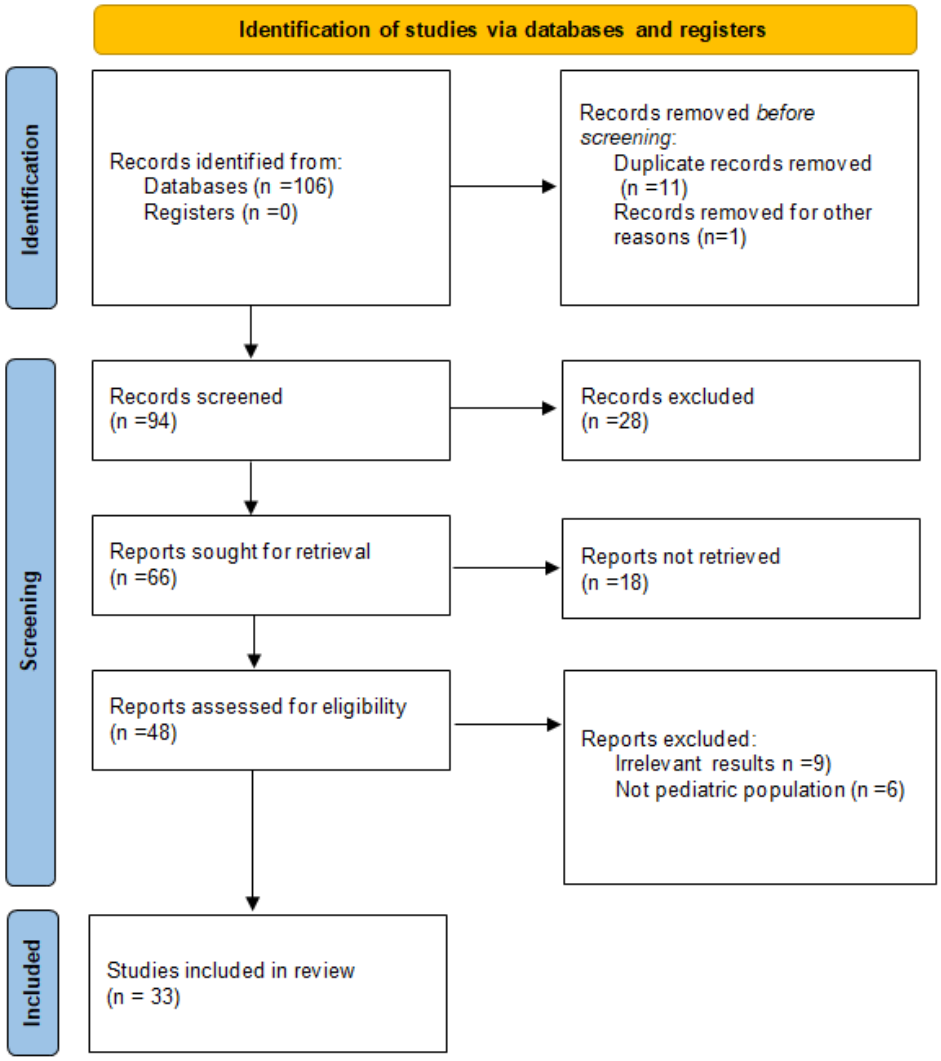

Figure 1. PRISMA flow chart

2. REVIEW METHODS

Scientists researched by assembling scholarly sources, PubMed, and Google Scholar articles published within the past 35 years (1991-2025). Newest guidelines from ESPGHAN (European Society for Paediatric Gastroenterology Hepatology and Nutrition), NASPGHAN (North American Society for Pediatric Gastroenterology, Hepatology and Nutrition), WHO (World Health Organisation), and Rome IV Diagnostic Criteria for Functional Gastrointestinal Disorders (published in 2016 by Rome Foundation) are included. The collected sources were filtered based on their relevance to the topic of the current studies. We used the PRISMA guidelines to screen and exclude the articles (Figure 1); 33 sources were used in the writing of this review.

3. RESULTS & DISCUSSION

3.1. Definition

The definition of constipation includes the passage of hard, desiccated stools and/or difficult, effort-requiring defecation, as well as bowel movements occurring at intervals longer than three days for two or more consecutive weeks (Kawalec et al., 2018).

3.2. Diagnostic Criteria

By Rome IV, functional constipation is a clinical diagnosis. After red flags are excluded, it requires two or more age-appropriate features persisting for at least one month. In both age groups, the core features include infrequent defecation (≤2 per week), painful or hard stools, retentive posturing or other stool-withholding behavior, large-caliber stools that may block the toilet, and a palpable fecal mass in the rectum. Fecal incontinence is age-linked: after toilet training, it supports the diagnosis in younger children, and in those ≥4 years, there need to be at least one soiling episode per week to be considered diagnostic when present with other features. Children who meet diagnostic criteria for irritable bowel syndrome should not be classified as having functional constipation (Tran and Sintusek, 2023; Rasquin et al., 2006).

3.3. Epidemiology and Clinical Significance

Functional constipation is the most common functional gastrointestinal disorder. It represents 25% of pediatric gastroenterology visits. Based on the Rome IV criteria, the prevalence of FC is 14.4%. The lowest in Asia, 7.0%) and the regional distribution of functional constipation incidence is highest in Africa, 31.4%. For comparison Europe and Asia have approval ratings of 8.3 and 6.2 respectively (Tran and Sintusek, 2023). FC first manifests itself at an average age of 2.3 years, and boys and girls are equally vulnerable to the condition (Mulhem et al., 2022).

The high prevalence of functional constipation (FC) is further compounded by an increasing incidence rate, which scientists attribute to several factors, including inadequate dietary fiber consumption, physical inactivity, rapid socio-cultural changes, rising stress, and inappropriate parental practices. Approximately 25% of conditions continues into adulthood (Kwiatkowska and Krogulska, 2021).

3.4. Clinical Manifestations and Consequences

The primary symptom of FC is painful or infrequent defecation. It is responsible for stool-withholding behavior. This voluntary stool retention leads to prolonged stool retention, which causes the colon to absorb more water, making the stools more difficult to pass and more painful to eliminate. To avoid passing painful stools, children will either tighten the gluteal muscles or the anal sphincter. Parents routinely report characteristic behaviors of hiding, rocking, or squirming in an attempt to control the urge to defecate.

Long-term chronic retention of stool leads to dilatation of the rectum, reducing the sensation of the urge to defecate. The rectum's fecal loading causes delayed gastric emptying, resulting in nausea, abdominal pain, and decreased appetite (Mulhem et al., 2022). Symptoms of this condition lie in a continuum between mild and severe, and they can lead to serious complications, including abdominal pain, bloating, extremely painful defecation, anorexia, fecal soiling and vomiting, bowel obstruction, or intestinal perforation. Patients are at a higher risk of developing urinary tract infections and bedwetting; furthermore, untreated FC exposes children to the risk of developing emotional disorders like anxiety and irritability. Generally, this condition harms children's growth and development (Kwiatkowska and Krogulska, 2021). Functional constipation accounts for up to half of pediatric consultations for abdominal pain (Fedele et al., 2024).

3.5. Fecal Incontinence and Associated Conditions

Fecal incontinence leading to the undergarment soiling after successful toilet training is typically caused by the overflow of feces surrounding the impacted masses stuck in the rectum. According to studies, among children aged 4-7 years, 4.4% experienced fecal incontinence, and 95% of these cases were associated with functional constipation (Loening-Baucke, 2007).

The rectum and the urinary tract are closely anatomically connected. Children with FC often exhibit urinary dysfunction. The obstruction of the urethra may occur because an extended rectum presses against the back wall of the bladder (Fedele et al., 2024).

3.6 Diagnostic Approach

The physical examination should include growth monitoring and abdominal palpation (tone, distension, fecal masses), perianal inspection (position, erythema, skin tags, fissures), and lumbosacral area examination (tuft of hair, sacral dimples, gluteal cleft asymmetry, flat buttocks). Digital rectal examination may be helpful to exclude organic etiologies. It should be performed in children with a record of delayed initiation of meconium, intractable constipation, or incomplete fulfillment of Rome IV criteria. T

Neurological abnormalities in the lumbosacral region, along with lower limb weakness and bladder control issues, and absent spinal reflexes (anal wink, cremasteric reflex, and deep tendon reflexes), require spinal magnetic resonance imaging. Routine MRI of the spine in children presenting with chronic constipation is not advised, as there is not enough supporting evidence. (Fedele et al., 2024).

3.7 Alarm Signs and Symptoms

Before diagnosing functional constipation, clinicians should screen for red flags that indicate a possible organic disorder. Any of the items below demands further evaluation and referral to a specialist (Tran and Sintusek, 2023; Fedele et al., 2024; Edan and Yahya, 2022; Rasquin et al., 2006). The summaries are presented in Table 1.

Table 1. Red flags in children with suspected functional constipation

Category	Indicator	Rationale
Neonatal history	Meconium passed >48 h after birth; onset in the first month of life; family history of Hirschsprung disease	Suggests congenital motility or anatomic disorder
Growth and systemic	Failure to thrive; weight loss; fever or systemic symptoms	Points to malabsorption, endocrine or systemic disease
Gastrointestinal	Severe abdominal distension; bilious vomiting; rectal bleeding not explained by fissure	Raises concern for obstruction or inflammatory disease
Anorectal findings	Abnormal anal position; fistulae or scars; severe fissures; empty rectum with tight sphincter	Suggests anatomic abnormality or Hirschsprung disease
Neurologic and lumbosacral	Lower-limb weakness; abnormal tone or reflexes; absent anal or cremasteric reflex; sacral dimple; hair tuft; deviated gluteal cleft	Consistent with spinal dysraphism or neurogenic bowel
Urinary tract	Recurrent urinary tract infections; retention; new or persistent enuresis with constipation	Indicates bladder–bowel dysfunction from fecal loading
Course and response	Rapid onset of severe constipation; refractory symptoms despite guideline-directed therapy	Signals misdiagnosis or underlying organic disease

3.8. Causes

Numerous reasons lead to functional constipation. Two or more factors occur in most children. Etiology falls into the following categories.

Behaviors related to stool withholding and toilet training

Children may withhold defecation as the act is painful (Kovacic et al., 2015). Stool that has built up in the rectum hardens and adds more pain to the problem, which leads to a vicious cycle where avoiding pain leads to more pain with evacuation in the end (Partin et al., 1992). The retentive position is observed in the affected children when there is a voluntary stool refusal, deliberate withholding, and

avoidance of the bathroom. Toilet training is a developmental milestone that is usually attained at the age of twenty-four to thirty-six months (Schum et al., 2002). Discouragement and resistance may follow when the training starts at a level of development that the child has not yet mastered, especially when the child is forced to sit on the potty repeatedly. Children with hyperactivity or sensory disorders require particular attention during this process. In those with autism spectrum disorder, toilet training is frequently difficult (Peeters et al., 2013), and episodes of FC last longer than in typically developing peers.

Psychosocial and cultural factors

Stress is a common determinant in FC. Loose pelvic diaphragm muscles and the anal sphincter are the responsibility of the gut-brain axis (Vriesman et al., 2020). A correct clinical history should be able to relate the onset to significant events in life. The sources of stressors can be family life, school environment, and personality (Inan et al., 2007). Extreme distress can occur as a result of structural family changes, which include illness or death of a family member, birth of a sibling, divorce, or a new partner of a parent. Another milestone of concern is school entry; many children perceive the new setting and peer interactions as stressful (Edan et al., 2022). Children who are more anxious and less independent are at a higher risk of developing FC (Sangari et al., 2022). Maternal anxiety, especially motherhood and child health-related worries (Sawyer et al., 2023), is linked with the more frequent occurrence of FC in the child.

Diet

Regular bowel habits require a well-balanced diet. Children with FC receive less dietary fibre in their diet than is desirable for their age (Williams et al., 1995). The approximate daily fibre intake in grams is determined by adding five to ten grams to the child's age in years and should not exceed thirty grams. ESPGHAN guidelines do not suggest higher fibre supplementation as there is no evidence of benefit (Tabbers et al., 2014). Vegetarian, fruit, and whole meal foods in the diet will raise the stool frequency and consistency. Another reason is poor water intake; dehydration leads to the absorption of more water by the colon, which makes the stool harder. Excess intake of fluids above the child's normal requirement does not provide additional value in the management of FC, unless the child is dehydrated (Young et al., 1998).

The role of cow's milk in the pathophysiology of FC remains unresolved (Heine et al., 2002). In a study of 69 children, 50% of them had an increase in the frequency of defecation following the elimination of cow milk and the use of plant-based products instead (Irastorza et al., 2010).

Physical Activity

Physical activity, tailored to an individual's age and needs, has a profoundly positive impact on development. It is recommended that children aged five to seventeen participate in moderate-to-vigorous intensity exercise of at least 60 minutes per day, but this can be divided into shorter sessions. Children with FC are less active than healthy children; however, existing data do not support the notion that physical activity is beneficial in the treatment of FC.

3.9. Treatment

Functional constipation should be treated through a close partnership between patients, parents, and healthcare providers. Counseling takes several months, and it is critical to determine and address the underlying causes. Pharmacological treatment aims to empty accumulated stool and achieve normal, painless, and regular bowel movements.

Non-pharmacologic Interventions

Non-pharmacologic interventions are the first line of treatment. ESPGHAN/NASPGHAN recommends age-appropriate intakes of fiber and fluids. The literature provides no evidence that intake above these levels brings greater benefit. The use of probiotics and prebiotics is not supported by evidence (Wegh et al., 2022). Psychological distress must be measured and managed, since it can strengthen constipation (Edan and Yahya, 2022).

Acute Clearance of Retained Stool

Disimpaction is required when large, hard stools rectally accumulate (de Geus et al., 2023). Oral polyethylene glycol (PEG) and sodium docusate enemas are the standard treatment methods. In a randomised trial involving ninety children, both techniques were effective;

however, PEG caused more transient fecal incontinence (Bekkali et al., 2009). ESPGHAN/NASPGHAN recommend PEG because the non-invasive oral route improves cooperation (Edan and Yahya, 2022). Enemas may be used as an alternative if PEG is not available. When high-dose oral PEG fails, clinicians may prescribe additional oral laxatives such as lactulose, but these are not the first-line treatment for disimpaction (Shatnawi et al., 2019). The usual PEG dose is 1-1.5 g/kg/day for up to six days.

Pharmacologic Maintenance

After clearing impacted stool, clinicians initiate maintenance therapy, most notably with osmotic agents. PEG remains the first-line drug of choice due to increased efficacy in stool frequency improvement compared with alternatives (Gordon et al., 2016). In this phase, clinicians prescribe PEG at a dose of 0.2–0.8 g/kg/day, administered in one or two doses. Lactulose can also be used at a dose of 0.7-2 g/kg/day and is safe even in infants. When PEG is not available, clinicians may use magnesium hydroxide as an alternative, although its taste is less palatable and its efficacy is lower. Clinicians must avoid this agent in infants and in children with renal failure because of the risk of hypermagnesaemia (Mofenson and Caraccio, 1991). Poor response to osmotic agents can be an indication for the use of stimulant laxatives like senna or bisacodyl (Bonilla et al., 2020). These medications increase colonic motility and secretion by stimulating the enteric nervous system and are effective in children who continue to withhold even soft stools (Hoekman and Benninga, 2013). Clinicians should not substitute stimulant laxatives for osmotic agents. Instead, they must individualize the dosage to achieve regular, soft stools. Once constipation resolves and children maintain regular bowel movements for several months, clinicians should gradually taper the medication.

Specialised Therapies and Biofeedback

Biofeedback therapy is helpful in patients with dyssynergic defecation. With the help of an anal probe that measures sphincter tension, the child receives visual feedback during practice of coordinated relaxation and contraction. The treatment consists of several sessions and exercises at home (van der Plas et al., 1996). The technique requires motivation and is less practical in very young children. In refractory cases, internal anal sphincter injection of botulinum toxin can produce temporary relaxation for several months and thereby facilitate defecation (Halleran et al., 2019). The summaries are presented in Table 2.

Table 2. Summary of evidence on pediatric functional constipation (FC): study types, populations, and principal findings.

Topic area	Study designs	Populations / setting	Principal findings (condensed)
Epidemiology and burden	Systematic reviews; cross-sectional surveys; clinic-based cohorts	Community and specialty clinics; children across regions	FC is common (≈14.4% worldwide) with regional variation; onset often around toilet training; ~25% persist into adolescence/adulthood
Pathophysiology and contributors	Narrative /systematic reviews; observational studies	General pediatric and specialty clinic cohorts	Painful defecation, stool withholding, suboptimal toilet training, diet, psychosocial stressors, and low activity commonly co-occur
Clinical presentation and consequences	Prospective/retrospective cohorts	Primary and tertiary care	Spectrum from infrequent, painful stools to fecal soiling; complications include abdominal pain, UTI, enuresis, growth/quality-of-life impact
Diagnosis (Rome IV) and red flags	Guideline statements; diagnostic reviews	Primary/secondary care	Diagnosis is clinical: ≥2 age-appropriate criteria for ≥1 month; structured screening for alarm signs is essential
Disimpaction	Randomized controlled trials, guideline-based reviews	Outpatient and emergency department settings	PEG (1–1.5 g/kg/day up to 6 days) effective and preferred; enemas as alternative when PEG unavailable

Maintenance pharmacotherapy	Randomized controlled trials; comparative effectiveness	Outpatient	PEG superior for frequency/consistency; lactulose is a safe option; magnesium hydroxide as alternative (avoid in infants/renal failure)
Behavioral and supporting care	Trials and reviews	Outpatient	Education, toilet routine, psychosocial support are core; limited evidence for probiotics/prebiotics; fluids/fiber to age-appropriate targets
Refractory care	Case series; small trials	Tertiary care	Biofeedback for dyssynergia; botulinum toxin may temporarily relieve internal sphincter hypertonia in select cases
Outcomes and follow-up	Cohorts; health-related quality of life studies	Clinic follow-up	Early identification plus prolonged maintenance improves continence and quality of life; relapse is common if therapy is tapered too early.

This review synthesizes evidence on childhood functional constipation (FC) across study designs and care settings. The available data support a practical, clinic-based diagnosis using Rome IV with systematic screening for red flags. FC is common, multifactorial, and sustained by a cycle of painful defecation, stool withholding, and rectal fecal loading. As summarized in Table 2, early identification and structured maintenance reduce complications and improve daily functioning (Tran and Sintusek, 2023; Loening-Baucke, 2007; Edan and Yahya, 2022).

Out of the trials and guideline reviews, PEG comes out as the agent of choice for both disimpaction and maintenance. High-dose PEG clears the majority of patients and is well-tolerated by families; enemas are saved for PEG inaccessibility or special indications (Bekkali et al., 2009; de Geus et al., 2023; Edan and Yahya, 2022). For maintenance, PEG beats alternatives on stool frequency and consistency, with lactulose still safe. Magnesium hydroxide may be used where PEG is unavailable, but should be avoided in infants and in renal impairment (Gordon et al., 2016; Mofenson and Caraccio, 1991). Stimulant laxatives help selected non-responders who continue to withhold despite soft stools and should complement rather than replace osmotic therapy (Hoekman and Benninga, 2013; Bonilla et al., 2020).

Behavioral measures are essential to durable control. Education, a fixed toilet routine, and caregiver support address the drivers of withholding and relapse. Age-appropriate fiber and fluids are recommended, but intakes above guideline targets have not shown added benefit. Evidence for probiotics or prebiotics remains inconsistent, and routine use is not supported (Williams et al., 1995; Young et al., 1998; Wegh et al., 2022; Edan and Yahya, 2022). Physical activity is often reduced in FC, yet current data do not demonstrate treatment benefit from increasing activity alone. In refractory cases, biofeedback can help dyssynergic defecation, and botulinum toxin may provide short-term internal sphincter relaxation in carefully selected patients (van der Plas et al., 1996; Halleran et al., 2019).

Clinical consequences are substantial. Fecal incontinence with soiling, abdominal pain, and UTI symptoms are common and are the driving factors of health-care use, including emergency care in severe manifestations. The impact on quality of life also spreads to family and school engagement, which promotes the idea of long-term maintenance instead of a brief rotation that can easily trigger a relapse.

The evidence base has limitations. Many studies are small, short studies and prone to selection and recall bias. Outcome measures vary across trials, and long-term follow-up is not a common feature. Additionally, head-to-head comparisons between maintenance strategies are not very common. The cohorts of subspecialty clinics might not be representative of populations within the community.

Implications for practice are clear. A stepwise protocol—red-flag screening, Rome IV confirmation, prompt disimpaction, PEG-based maintenance, and structured behavioral care—offers the highest likelihood of symptom control. Education and follow-up by the caregiver are of great importance at the early stages. Recurrent, inconsistent red flags, neurological manifestations, or inaccurate

response to guideline-directed treatment should lead to further assessment or referral (Tran and Sintusek, 2023; Rasquin et al., 2006; Edan and Yahya, 2022).

Priorities for research include longer randomized trials with standardized outcomes (including QOL and relapse), comparative studies of maintenance regimens, and pragmatic evaluations of adherence tools and caregiver training. High-risk groups—such as children with neurodevelopmental disorders or bladder–bowel dysfunction—require targeted strategies and implementation studies.

In summary, FC in children is largely diagnosable in routine practice and responds to a combined pharmacologic and behavioral approach. PEG remains first-line for disimpaction and maintenance, while adjuncts should be individualized. Consistent application of Rome IV criteria and sustained maintenance, as outlined in Table 2, offer the best path to durable continence and improved quality of life (Tran and Sintusek, 2023; Edan and Yahya, 2022; Gordon et al., 2016; Bekkali et al., 2009).

4. CONCLUSION

Children experience functional constipation as a widespread condition that doctors often fail to detect properly because it produces significant medical, psychological, and social effects. The functional nature of this disorder does not prevent it from causing serious complications unless healthcare providers identify and treat it right away. The therapy must be comprehensive and multidisciplinary. It should involve not only the clinical assessment but also individualized non-pharmacological and pharmacological interventions, and continuous follow-up. Treatment is successful if caught early, and caregivers and health care providers are educated to reduce complications and improve the quality of life of these children.

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Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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