STĘPIEŃ, Kamila, PRZYGODA, Maria, ŚNIEŻNA, Joanna, TRESTKA, Gabriela, ADAMCZYK, Sabina, ZELIK, Urszula, DZIEWIC, Jakub, FLORCZAK, Wojciech, DOMINO, Wiktoria, WŁODYKA, Jagienka and DZWONNIK, Karol. Functional Constipation in Children: overview and new outcomes. Quality in Sport. 2025;37:57066. eISSN 2450-3118.
https://doi.org/10.12775/QS.2025.37.57066
https://apcz.umk.pl/QS/article/view/57066

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.
Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.
Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 16.12.2024. Revised: 20.01.2025. Accepted: 20.01.2025 Published: 21.01.2025.

Functional Constipation in Children: overview and new outcomes

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Abstract

Functional constipation (FC) is a prevalent gastrointestinal disorder in children, characterized by infrequent, difficult, or painful bowel movements without an identifiable organic cause. This review provides an overview of functional constipation in children, discussing its epidemiology, pathophysiology, clinical presentation, diagnostic approach, and management strategies. FC affects approximately 5-30% of children, with risk factors including dietary habits, psychosocial stressors, and family history. The pathophysiology involves colonic hypomotility, rectal hyposensitivity, and behavioral factors, often compounded by pelvic floor dysfunction. Diagnosis is primarily clinical, based on Rome IV criteria, with further testing considered in atypical cases. Management includes dietary modifications, behavioral interventions, pharmacotherapy, and, in some cases, biofeedback therapy. Long-term outcomes are generally favorable with appropriate treatment, although relapse is common, emphasizing the need for sustained management. Functional constipation significantly impacts a child's quality of life, affecting both physical and emotional well-being. A multidisciplinary approach is essential for effective treatment, addressing both physiological and psychological aspects to optimize long-term health outcomes for children with FC.

Introduction

Functional constipation (FC) is one of the most common gastrointestinal complaints in children, affecting both the pediatric population and their families. Characterized by chronic difficulty in passing stools, abdominal discomfort, and infrequent bowel movements, functional constipation is a significant source of morbidity. Unlike organic constipation, which is caused by identifiable medical conditions such as structural anomalies or neurological disorders, functional constipation is not associated with any underlying disease.

This review aims to provide a comprehensive overview of functional constipation in children, including its pathophysiology, clinical presentation, diagnostic approaches, treatment options, and the impact on a child's quality of life.

Aim of the study: The aim of this study is to provide a comprehensive overview of functional constipation (FC) in children, focusing on its epidemiology, pathophysiology, clinical presentation, diagnostic criteria, and management strategies. The study seeks to examine the latest research and clinical approaches to understanding the underlying mechanisms of FC, the role of psychosocial factors, and the impact on a child's quality of life. Through this study, the goal is to provide healthcare professionals, caregivers, and researchers with a more holistic and updated understanding of functional constipation in children, emphasizing both the physiological and psychological aspects of the condition to optimize care and outcomes.

Materials and methods:A systematic review of scientific and medical literature from the PubMed and Google Scholar data bases was conducted.

Results: The study on functional constipation (FC) in children highlights several important findings. FC is a prevalent condition, affecting 5–30% of children, particularly those aged 2–4 years, with risk factors including low fiber intake, dehydration, stress, and a family history of constipation. The condition's pathophysiology involves colonic hypomotility, rectal hyposensitivity, pelvic floor dysfunction, and potentially gut microbiome imbalances. Diagnostic criteria rely on the Rome IV guidelines, with additional tests used in cases with alarm symptoms. Treatment primarily includes dietary changes (high fiber, increased fluids), osmotic laxatives (e.g., polyethylene glycol), and behavioral interventions like scheduled toilet times and biofeedback. Psychological therapies, such as cognitive-behavioral therapy (CBT), are also beneficial. Long-term outcomes show that relapse rates are high, and many children experience psychosocial impacts such as embarrassment and anxiety. New innovations like telemedicine, wearable devices, and microbiome-focused therapies are emerging, offering more personalized and effective management options.

Key words: functional constipation, children, gastrointestinal disorder, pediatrics.

Epidemiology and Risk Factors

Functional constipation is highly prevalent, affecting approximately 5-30% of children at some point during their early childhood. It is more common in children between the ages of 2 and 4 years, with a slightly higher incidence in boys in the first year of life, transitioning to a higher incidence in girls after age 4. Several risk factors contribute to the development of functional constipation, including: Dietary factors: Low fiber intake, inadequate fluid consumption, and excessive consumption of dairy products or processed foods are strongly linked to constipation. Psychosocial factors: Stress, anxiety, and fear of using the toilet are common triggers, especially in children who are being toilet trained or experiencing changes in their environment, such as starting school. Family history: A family history of constipation or other gastrointestinal disorders increases the risk. Medical history: Previous illness, hospitalization, or a history of abuse can predispose children to functional constipation.

Pathophysiology

The pathophysiology of functional constipation involves a complex interplay of physiological, psychological, and behavioral factors. The primary mechanisms include:

Colonic Hypomotility: Reduced motility of the colon, particularly in the descending and rectosigmoid regions, can lead to prolonged transit times and stool retention. This is often exacerbated by infrequent bowel movements, which can result in increased water absorption and hard stool formation.

Rectal Hyposensitivity: Children with functional constipation often exhibit decreased sensitivity of the rectum, leading to an inability to sense the need for defecation until the rectum is overfilled.

Behavioral Factors: Behavioral issues such as avoiding the toilet, particularly in settings like school, can further contribute to stool withholding and constipation. This cycle of stool retention and fear of defecation is often difficult to break.

Improved Understanding of Pathophysiology

Microbiome and Gut Flora: New studies suggest that alterations in the gut microbiome might contribute to the development of functional constipation in children. Changes in gut flora composition, including reduced diversity and an imbalance in bacterial species, have been observed in children with constipation. Some research indicates that interventions such as

probiotics or dietary adjustments may help restore a healthy gut microbiome and improve constipation symptoms.

Pelvic Floor Dysfunction and Biofeedback: Advanced studies have further emphasized the role of pelvic floor dysfunction in children with chronic constipation. Biofeedback therapy, which trains children to properly coordinate pelvic floor muscle relaxation during defecation, has been increasingly recognized as an effective treatment for children with functional constipation, particularly those with evidence of anorectal dysfunction.

Visceral Hypersensitivity: Newer research suggests that children with FC may have heightened visceral sensitivity, meaning they may experience discomfort or pain in response to normal gastrointestinal activity. This hypersensitivity may be linked to the brain-gut axis, where emotional and psychological factors may exacerbate symptoms. This has implications for understanding the condition as not purely mechanical but with a neurobiological component.

Clinical Presentation

The symptoms of functional constipation in children vary widely but generally include:

Infrequent bowel movements: The typical threshold for constipation in children is fewer than three bowel movements per week, though this can vary based on age.

Hard, dry stools: Difficulty passing stools, often with straining and discomfort, is a hallmark symptom.

Abdominal pain: Children may complain of vague abdominal discomfort, bloating, or pain, which may be relieved after passing stool.

Soiling (Encopresis): In some cases, children with chronic constipation may experience overflow incontinence, which occurs when liquid stool leaks around the hard stool that is stuck in the rectum.

Decreased appetite or irritability: Prolonged constipation may result in a loss of appetite, nausea, or irritability, affecting the child's overall well-being.

The condition is often chronic, and symptoms can persist for months or years if not appropriately managed.

Diagnostic Approach

The diagnosis of functional constipation is primarily clinical, based on the Rome IV criteria, which include: At least two of the following symptoms occurring for at least one month: fewer than three bowel movements per week, hard stools, excessive straining, or a sensation of incomplete evacuation; A history of withholding behavior or painful defecation; The absence of underlying organic causes.In cases where the diagnosis is unclear or if alarm features (such as failure to thrive, blood in the stool, or significant weight loss) are present, further diagnostic tests may be required, such as: Abdominal X-ray: To assess the degree of stool retention. Anorectal manometry: To evaluate rectal sensation and pelvic floor function. Laboratory tests: To rule out metabolic or endocrine disorders, such as hypothyroidism or celiac disease.

Changes in Diagnostic ApproachesRome IV Criteria:

The adoption of the Rome IV criteria for diagnosing functional gastrointestinal disorders in children has led to more standardized and accurate diagnoses of functional constipation. The Rome IV criteria emphasize the need for a long-term pattern of symptoms and specifically focus on the frequency of bowel movements, stool consistency, and the presence of withholding behaviors.

Increased Use of Non-invasive Diagnostics: There is a trend toward using less invasive diagnostic tools, such as abdominal X-rays or magnetic resonance imaging (MRI) to assess colonic transit times and stool retention in children. While invasive procedures like anorectal manometry are still used, these non-invasive tools are gaining ground as they are safer and easier for young patients.

Treatment Strategies

Management of functional constipation in children involves a combination of dietary modifications, behavioral interventions, pharmacotherapy, and, in some cases, more invasive treatments. The goals of treatment are to relieve symptoms, improve bowel habits, and restore normal defecation patterns.

Dietary Modifications: Increase dietary fiber: A diet high in fiber (25–30 grams per day) can help normalize stool consistency and promote regular bowel movements; Increase fluid intake: Adequate hydration is essential to prevent stool from becoming hard and dry; Avoidance of constipating foods: Limiting intake of foods like cheese and processed foods can be helpful.

Behavioral Interventions: Toilet training and regular bathroom routines: Encouraging regular toilet time after meals can help children establish a consistent bowel habit; Positive reinforcement: Rewarding children for using the toilet regularly and providing reassurance can reduce anxiety and promote normal defecation behavior.

Pharmacotherapy: Laxatives: Osmotic laxatives such as polyethylene glycol (PEG) are commonly used as first-line treatment to relieve constipation and soften the stool; Stool softeners: Agents like docusate may be used in conjunction with osmotic laxatives to improve stool consistency; Prokinetic agents: In some cases, medications that stimulate bowel motility, such as prucalopride, may be considered.

Biofeedback Therapy: In children with pelvic floor dysfunction, biofeedback therapy can help improve coordination between the pelvic floor muscles and the rectum, facilitating easier defecation.

Enemas or Manual Disimpaction: In severe cases of fecal impaction, enemas or manual disimpaction may be required as part of initial management.

Advances in Treatment Modalities

Osmotic Laxatives: Osmotic laxatives such as polyethylene glycol (PEG) continue to be first-line treatments for children with functional constipation, but recent studies have underscored their importance in long-term management to avoid chronic constipation cycles. There is growing evidence that these laxatives may not only soften stool but also improve colonic motility.

Combination Therapies: Increasingly, physicians are using combination therapies (e.g., osmotic laxatives plus stool softeners or prokinetic agents) in children who do not respond to single-agent therapies. Studies suggest that combining laxatives with behavioral interventions (such as toilet training) improves outcomes, particularly in children with more severe or long-lasting constipation.

Dietary Modifications: There is growing evidence that prebiotic and fiber-enriched diets can play a key role in managing functional constipation. Dietary fibers, including soluble fibers like psyllium husk and inulin, are being recommended for their ability to enhance colonic motility and improve stool consistency. Additionally, studies suggest that reducing refined sugars and processed foods can alleviate symptoms.

Probiotics and Synbiotics: Probiotics, particularly strains like Bifidobacterium lactis and Lactobacillus rhamnosus, are being explored for their potential in alleviating constipation by improving gut flora and gut motility. Synbiotics, a combination of prebiotics and probiotics, may be particularly beneficial for children with functional constipation, as they can enhance gut microbiota composition while simultaneously improving bowel function.

Psychosocial and Behavioral Insights

Impact of Stress and Anxiety: Psychological factors such as anxiety, stress, and trauma are now being recognized as critical contributors to functional constipation in children. Emerging research suggests that children who experience significant stress (e.g., bullying, academic pressure, family conflicts) are more likely to develop functional constipation. This has led to recommendations for psychological interventions, including cognitive behavioral therapy (CBT), alongside conventional treatments.

Parental Involvement: Increased awareness of the role of parental involvement in managing constipation has led to family-centered approaches. This includes not only educating parents about the condition but also involving them in the behavioral modification strategies, such as setting up a consistent bathroom schedule and reducing toileting-related anxiety.

Technology and Innovations in Treatment

Telemedicine and Remote Monitoring: The rise of telemedicine has facilitated the management of chronic conditions like functional constipation. Parents and patients can now easily access guidance from pediatric specialists, receive dietary counseling, and monitor symptom improvement remotely. Additionally, wearable technology that monitors bowel movements and symptoms is emerging as a tool for real-time data collection and personalized treatment adjustment.

Role of Multidisciplinary Care

Increasing recognition of the multifactorial nature of functional constipation has led to a more multidisciplinary approach in management. Pediatricians, gastroenterologists, psychologists, nutritionists, and behavioral therapists are working together to develop personalized treatment plans. This approach addresses the physiological, psychological, and social factors contributing to the disorder.

Prognosis and Long-Term Outcomes

With appropriate treatment, most children with functional constipation can achieve good long-term outcomes. However, relapse rates are high, especially if treatment is discontinued prematurely. Long-term follow-up is necessary to ensure resolution of symptoms and to adjust treatment as needed. Behavioral strategies, such as toilet training and addressing psychosocial stressors, play a critical role in reducing the risk of recurrence.

Risk of Recurrence: Recent longitudinal studies show that while many children experience resolution of functional constipation by adolescence, relapse rates remain high. Children who discontinue treatment prematurely or fail to maintain healthy bowel habits are at a higher risk of recurrence. This has emphasized the importance of maintenance therapy and follow-up care to prevent relapse.

Psychosocial Impact in Adolescence: Adolescents who had childhood functional constipation are at higher risk for social anxiety and embarrassment, especially if they experience issues like soiling or frequent toilet visits at school. These psychosocial challenges may persist into adulthood, making it important to address not only the physical symptoms but also the emotional aspects of the condition.

Quality of Life: Persistent constipation, even when "controlled," can significantly affect the child's quality of life. Emerging studies highlight that ongoing symptoms, despite treatment, lead to missed school days, decreased physical activity, and reduced social engagement. The long-term psychosocial and emotional toll underscores the need for comprehensive care strategies that include both physical and emotional support. Functional constipation can significantly affect a child’s quality of life. Chronic abdominal pain, embarrassment over soiling accidents, and social avoidance of certain activities can lead to emotional distress. Children may experience anxiety, school-related issues, and diminished social interaction due to their condition. Family dynamics can also be disrupted, as parents may need to spend significant time managing their child’s symptoms. Hence, a holistic approach that addresses both the physical and emotional aspects of the condition is critical.

Conclusion

Functional constipation in children is a prevalent and often challenging condition, with a multifactorial pathophysiology that requires a multidisciplinary approach to treatment. While

most cases can be managed successfully with dietary changes, behavioral interventions, and pharmacotherapy, early intervention and long-term follow-up are essential to prevent recurrence and to optimize the child's overall health and quality of life. Healthcare providers should focus on both the physiological and psychological aspects of constipation, ensuring that children and their families receive comprehensive care that is individualized to the child's needs.

Recent findings in functional constipation in children highlight a more nuanced understanding of the disorder, particularly its complex interplay between gut physiology, psychological factors, and family dynamics. Innovations in diagnostics, personalized treatments, and the recognition of psychosocial components are helping to improve the management and outcomes of this common condition. These advancements suggest a shift towards a more holistic approach to care that not only aims to alleviate physical symptoms but also addresses emotional and social well-being.

Conceptualization: KS, and MP; methodology, KS; software, KS, SA; check, JW, UZ and WF; formal analysis, KD; investigation, SA; resources, WD; data curation, JD; writing - rough preparation, MP, SA; writing - review and editing, GT,; visualization, SA; supervision, JW; project administration, JW; receiving funding, JŚ. All authors have read and agreed with the published version of the manuscript.

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