Saudi Journal of Medicine and Public Health

https://saudijmph.com/index.php/pub

https://doi.org/10.64483/202522684

Multidisciplinary Diagnostic Challenges in Pediatric Functional Abdominal Pain: An Integrated Approach Across Diagnostic Radiology, Family Medicine, Nursing Practice, Public Health, Epidemiology, Clinical Pharmacy, Clinical Nutrition, and Surgical Special

Abdullah Mastour Alamar [(1)] , Raneem Khalid Altuwayrish [(2)] , Rawan Ayidh Alqahtani [(3)] , Amwaj Qassem Alqahtani [(4)] , Abduljalil Salah Alahmadi [(5)] , Saeed Ali Yahya Najmi [(6)] , Muath Ali Aqeel Halawi [(7)] , Saud Ahmad Sultan Turkistani [(8)] , Mohammed Abdullah Mathkur [(9)] , Rawan Hussein Ali Khawaji [(10)] , Fares Zaban Alrowiliy [(11)]

(1) Diriyah Hospital,Ministry of Health, Saudi Arabia,
(2) Al-Mithnab, Al-Qassim,Ministry of Health, Saudi Arabia,
(3) Riyadh Health Cluster 3, Western Hay Al-Laban Primary Health Center,Ministry of Health, Saudi Arabia,
(4) Ministry Of Health, Saudi Arabia,
(5) Medical Waste Management Department,Ministry of Health, Saudi Arabia,
(6) Samtah General Hospital,Ministry of Health, Saudi Arabia,
(7) Al-Khawalf Health Center, Jazan,Ministry of Health, Saudi Arabia,
(8) King Salman Medical City, Madinah,Ministry Ministry of Health, Saudi Arabia,
(9) King Fahad Central Hospital, Jazan,Ministry of Health, Saudi Arabia,
(10) Sabya Hospital, Ministry of Health, Saudi Arabia,
(11) Al-Jouf – Al-Isawiyah Center,Ministry of Health, Saudi Arabia

Abstract

Background: Functional abdominal pain (FAP) is a prevalent pediatric condition characterized by recurrent or persistent abdominal discomfort without identifiable structural or biochemical abnormalities. Diagnosis relies on the Rome IV symptom-based criteria, emphasizing the gut–brain axis dysregulation and minimizing unnecessary investigations.

Aim: To summarize multidisciplinary perspectives on the etiology, epidemiology, clinical presentation, diagnostic evaluation, and management of pediatric FAP.

Methods: A comprehensive narrative review of current evidence addressing biological, psychosocial, and environmental contributors to FAP, along with clinical guidelines for assessment and therapeutic approaches.

Results: FAP arises from a multifactorial interplay involving visceral hypersensitivity, altered gut microbiota, motility disturbances, and psychosocial stressors. The global prevalence is approximately 11.7%, with higher rates in females. Evaluation prioritizes history, physical examination, and identification of alarm features, whereas excessive testing offers limited diagnostic value. Effective management requires education, psychosocial interventions, lifestyle modifications, and selective dietary or pharmacological therapies.

Conclusion: FAP is a chronic, multifaceted disorder requiring a biopsychosocial, multidisciplinary management strategy to restore function and improve quality of life.

Keywords: Functional abdominal pain, pediatrics, visceral hypersensitivity, Rome IV criteria, gut–brain axis, diagnosis, management, epidemiology.

Introduction

Functional abdominal pain represents one of the most frequently encountered clinical conditions in pediatric practice and is defined by the presence of recurrent or persistent abdominal discomfort in the absence of any identifiable structural or biochemical abnormality. This condition poses a diagnostic challenge due to its reliance on symptom-based criteria rather than objective pathological findings. The Rome IV criteria, established following the fourth international consensus conference on functional gastrointestinal disorders in Rome in 2016, provide a standardized framework for diagnosis. According to these criteria, functional abdominal pain is characterized by either episodic or continuous abdominal pain occurring at least four times per month over a minimum duration of two months. The pain must not be exclusively associated with physiological processes such as food intake or menstruation, and it must remain unexplained after an appropriate and thorough medical evaluation [1]. A critical component of the diagnostic process involves ensuring that the presenting symptoms do not fulfill the criteria for other functional gastrointestinal disorders. These include conditions such as functional nausea and vomiting disorders and functional defecation

*Corresponding author e-mail: MMA220@hotmail.com (Abdullah Mastour Alamar).
Receive Date: 07 December 2025, Revise Date: 29 December 2025, Accept Date: 31 December 2025

disorders, which may share overlapping clinical features but differ in their diagnostic thresholds and management strategies [2]. The Rome IV classification further refines functional abdominal pain disorders into four distinct subtypes, namely irritable bowel syndrome, functional dyspepsia, abdominal migraine, and functional abdominal pain not otherwise specified (NOS) [3]. The present discussion emphasizes functional abdominal pain–NOS, which is diagnosed when a pediatric patient exhibits chronic or recurrent abdominal pain yet does not meet the established criteria for the other defined subcategories [1]. This subtype often represents a residual diagnostic category and highlights the heterogeneity and complexity inherent in functional gastrointestinal conditions.

A notable advancement introduced by the Rome IV criteria compared with the earlier Rome III framework is the shift away from requiring explicit evidence demonstrating the absence of organic disease. Instead, the diagnostic emphasis is placed on the identification of characteristic symptom patterns following an appropriate clinical assessment [2]. This paradigm shift reflects an evolving understanding of functional gastrointestinal disorders as conditions rooted in dysregulation of the gut–brain axis rather than solely as diagnoses of exclusion. Consequently, the reliance on extensive diagnostic testing to rule out organic pathology has been reduced, provided that the clinical evaluation does not reveal alarming features or red flags that would warrant further investigation. The symptom-based nature of the Rome IV criteria underscores the importance of careful clinical judgment in the evaluation of pediatric patients presenting with abdominal pain. While history taking and physical examination remain essential components of patient assessment, the criteria themselves do not mandate specific findings from these domains for diagnosis. This approach aims to minimize unnecessary investigations, reduce healthcare costs, and avoid subjecting children to potentially invasive procedures when not clinically indicated. At the same time, clinicians must maintain vigilance to ensure that serious underlying conditions are not overlooked [2][3].

Understanding functional abdominal pain requires a comprehensive approach that integrates knowledge of its multifactorial etiology, variable epidemiological patterns, and diverse clinical presentations. The condition often involves complex interactions between biological, psychological, and social factors, which collectively influence symptom perception and severity. As such, effective management extends beyond symptom control and necessitates a coordinated effort among healthcare professionals from multiple disciplines. This includes physicians, nurses, pharmacists, and specialists in nutrition and public health, all of whom contribute to optimizing patient outcomes through collaborative care. This discussion provides an in-depth examination of the etiology, epidemiology, clinical features, diagnostic evaluation, and therapeutic strategies associated with functional abdominal pain in children. In addition, it highlights the critical role of an interprofessional team in delivering comprehensive and patient-centered care, which is essential for addressing both the physical and psychosocial dimensions of this condition [1][2].

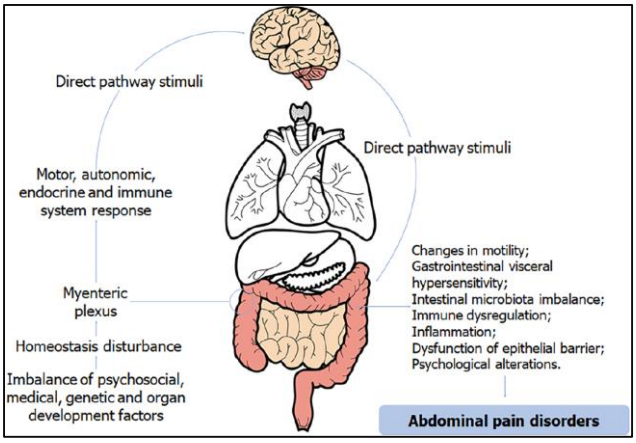

Fig. 1: Abdominal pain disorders in pediatrics.

Etiology

The etiology of functional abdominal pain in children is complex and cannot be attributed to a single causative factor. Current evidence supports a multifactorial origin in which biological, psychological, and environmental influences interact to produce the clinical manifestation of pain. A central mechanism underlying this condition is visceral hypersensitivity, a phenomenon in which affected children demonstrate an exaggerated perception of normal gastrointestinal sensations. Stimuli that are typically nonpainful, such as intestinal gas, mild distension, or routine digestive activity, may be interpreted as painful due to altered sensory processing within the gut–brain axis. As a result, common experiences such as bloating or indigestion can produce discomfort of greater intensity than that observed in unaffected individuals. In many cases, the development of visceral hypersensitivity is preceded by an identifiable triggering event that alters normal gastrointestinal function. These sensitizing factors may include prior gastrointestinal infections, food-related immune responses, disruptions in the gut microbiome, or abnormalities in intestinal motility. Such events may initiate changes at both peripheral and central levels of the nervous system, leading to sustained amplification of pain signaling pathways. Over time, this process results in a lowered threshold for pain perception and increased responsiveness to visceral stimuli, even in the absence of ongoing pathology. This progression from an acute insult to chronic hypersensitivity highlights the dynamic and evolving nature of functional abdominal pain. Alterations in the gut microbiota have also been implicated in the pathogenesis of this condition. Changes in microbial composition may influence

intestinal permeability, immune activation, and neural signaling, all of which contribute to abnormal sensory processing. Similarly, motility disturbances can lead to irregular patterns of intestinal contraction, further enhancing the perception of discomfort. These physiological disruptions often coexist and reinforce one another, creating a cycle that perpetuates symptom persistence [4][5].

Psychosocial factors play a significant role in modulating both the onset and severity of functional abdominal pain. Stressful life events, emotional distress, and comorbid psychological conditions such as anxiety and depression are strongly associated with the development and maintenance of visceral hypersensitivity [2][4]. These factors may influence central pain processing mechanisms, increasing the child's awareness of bodily sensations and amplifying the perceived intensity of pain. In addition, children with heightened stress responses may exhibit altered autonomic nervous system activity, which can further disrupt gastrointestinal function and exacerbate symptoms. Emerging evidence also suggests that functional abdominal pain may occur in children with underlying organic gastrointestinal diseases, such as Crohn disease, even when inflammatory activity is controlled. In such cases, persistent pain may not reflect ongoing tissue damage but rather the development of secondary visceral hypersensitivity. This is particularly evident in patients who also experience psychological comorbidities, where anxiety appears to amplify pain perception and contribute to symptom chronicity [5]. The coexistence of functional and organic mechanisms underscores the importance of a comprehensive and integrative approach to understanding this condition. Overall, the etiology of functional abdominal pain involves a complex interplay between gastrointestinal physiology, neural processing, and psychosocial influences. Recognition of these interacting factors is essential for accurate diagnosis and effective management, as it shifts the focus from identifying a single pathological cause to addressing the broader mechanisms that sustain the patient's symptoms [2][4][5].

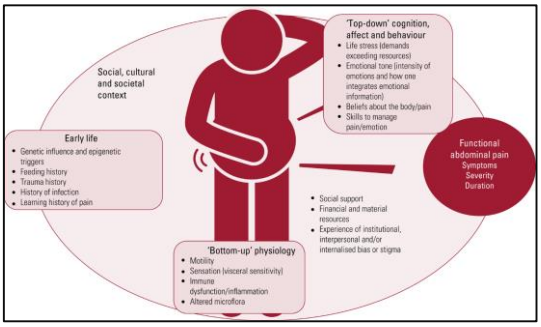

Fig. 2: Functional Abdominal Pain.

Epidemiology

Functional abdominal pain represents a significant clinical concern within pediatric populations and is recognized as one of the most prevalent functional gastrointestinal disorders worldwide. Epidemiological evidence indicates that this condition affects a substantial proportion of children, with recent estimates suggesting a global prevalence of approximately 11.7%. This figure highlights the widespread nature of the disorder and underscores its importance as a common cause of recurrent abdominal complaints in clinical practice. Despite variations in study design, population characteristics, and diagnostic criteria, the overall burden of functional abdominal pain remains consistently high across different regions and healthcare settings [6]. A notable pattern within epidemiological data is the higher prevalence observed among female children compared with males. Reported rates indicate that approximately 14.5% of girls are affected, in contrast to 9.4% of boys. This gender disparity suggests the potential influence of biological, hormonal, or psychosocial factors that may predispose females to heightened pain perception or increased vulnerability to functional gastrointestinal disorders. Although the exact mechanisms underlying this difference are not fully understood, it is likely that interactions between neurobiological sensitivity and psychosocial influences contribute to this observed trend. In addition to gender-related differences, functional abdominal pain demonstrates a strong association with psychological and social factors. Children who experience comorbid affective disorders, including anxiety and depression, show a higher likelihood of developing persistent abdominal symptoms. Similarly, exposure to psychosocial stressors such as family conflict, academic pressure, or adverse life events has been linked to increased prevalence. These associations reinforce the concept that functional abdominal pain is not solely a gastrointestinal condition but rather a disorder influenced by the interaction between emotional and physiological processes [6]. Although the prevalence appears relatively consistent on a global scale, some variability exists among individual studies. These differences may reflect variations in diagnostic approaches, cultural perceptions of pain, healthcare access, and reporting practices. Nevertheless, the overall consistency in prevalence rates across diverse populations supports the recognition of functional abdominal pain as a universal pediatric health issue. Understanding its epidemiological patterns is essential for guiding healthcare planning, resource allocation, and the development of targeted interventions aimed at early identification and effective management of affected children [6].

Pathophysiology

The pathophysiological basis of functional abdominal pain in children is closely linked to the concept of visceral hypersensitivity, which is considered a central mechanism underlying symptom generation. This phenomenon refers to an increased

responsiveness of the gastrointestinal sensory pathways to stimuli that would normally be perceived as nonpainful or only mildly uncomfortable. Although the exact biological processes responsible for this heightened sensitivity remain incompletely understood, current evidence indicates that both peripheral and central mechanisms contribute to the amplification of pain signals. At the peripheral level, alterations in gut sensory receptors and neural pathways may lower the threshold for activation, while at the central level, enhanced processing within the spinal cord and brain further intensifies the perception of pain. The role of central sensitization has gained particular attention in explaining the persistence and severity of symptoms. Central sensitization involves changes in the central nervous system that increase neuronal excitability and reduce inhibitory control, leading to exaggerated responses to visceral input. The strong association between functional abdominal pain and psychosocial factors, including stress, anxiety, and depression, supports the involvement of this mechanism [7]. Emotional and psychological states can influence neural circuits involved in pain modulation, particularly those linking the brain and the gastrointestinal tract through the gut–brain axis. This interaction may result in increased attention to bodily sensations and amplification of normal physiological signals, thereby contributing to chronic pain perception. Experimental methods have been developed to objectively assess visceral sensitivity and provide insight into the underlying mechanisms. One such method involves the use of a barostat, a device that measures pain thresholds by gradually inflating a balloon catheter within the rectum to produce controlled distension. Findings from these studies demonstrate that children with functional abdominal pain experience discomfort at significantly lower volumes of distension compared to those with abdominal pain caused by identifiable organic pathology [8]. This observation provides objective evidence supporting the presence of altered sensory processing in affected individuals. It also reinforces the concept that functional abdominal pain is not merely subjective but reflects measurable differences in physiological response to visceral stimuli [7][8]. Overall, the pathophysiology of functional abdominal pain involves a complex interplay between altered peripheral sensory input and enhanced central processing of pain signals. These mechanisms are further influenced by psychological factors that modulate pain perception and contribute to symptom chronicity. Understanding these processes is essential for developing targeted therapeutic strategies aimed at both physiological and psychosocial components of the disorder [7][8].

Histopathology

Histopathological evaluation in children with functional abdominal pain has generally failed to reveal consistent or definitive structural abnormalities, which aligns with the classification of this condition as a functional rather than an organic disorder. In most cases, routine tissue examination of the gastrointestinal tract does not demonstrate significant pathological changes that could explain the severity or persistence of symptoms. This absence of clear histological findings supports the concept that functional abdominal pain arises primarily from disordered sensory processing rather than overt tissue injury or inflammation. Despite the overall lack of consistent abnormalities, some limited studies have reported subtle histopathological changes in a subset of affected children. These findings include mild inflammatory changes within the gastric or intestinal mucosa, as well as the presence of increased eosinophilic infiltration when compared with asymptomatic individuals [4]. Such observations have raised questions regarding whether a proportion of patients may have underlying low-grade inflammatory processes that contribute to symptom development. However, these findings have not been consistently replicated across larger studies, and their clinical significance remains uncertain. One possible interpretation of these minor histological alterations is that they represent a form of subclinical inflammation that may interact with neural pathways to enhance pain perception. Even minimal inflammatory activity could sensitize local nerve endings, thereby lowering the threshold for pain and contributing to visceral hypersensitivity. Alternatively, these findings may not indicate a distinct pathological condition but instead reflect normal physiological variation or incidental changes that are not directly responsible for the patient's symptoms. In this context, the presence of mild inflammation or eosinophilia may amplify the perception of discomfort without serving as a primary cause of the disorder. Another perspective suggests that these histopathological findings may identify a specific subgroup of patients within the broader spectrum of functional abdominal pain. This subgroup could represent individuals with overlapping features of functional and organic disease, where minor mucosal abnormalities coexist with altered neural processing. However, further research is required to clarify whether such distinctions have diagnostic or therapeutic implications. In summary, histopathological studies in functional abdominal pain have not established a consistent structural basis for the condition. While minor mucosal changes have been observed in some cases, their role in the pathogenesis of the disorder remains unclear. These findings reinforce the understanding that functional abdominal pain is primarily a disorder of sensory and neural regulation rather than one driven by identifiable tissue pathology [5].

History and Physical

A detailed clinical history and thorough physical examination remain central to the evaluation of children presenting with abdominal pain, as these components guide the diagnosis of functional abdominal pain while assisting in the exclusion of

organic causes. The diagnostic process relies heavily on careful characterization of the pain, including its duration, frequency, and pattern over time. Functional abdominal pain is typically chronic or recurrent in nature, often persisting for weeks to months. The temporal pattern of symptoms provides important diagnostic insight, as certain subtypes demonstrate distinct clinical courses. For example, irritable bowel syndrome is commonly associated with daily or near-daily discomfort, whereas abdominal migraine is characterized by episodic, severe attacks separated by symptom-free intervals that may extend for weeks or even months. In contrast, the sudden onset of intense abdominal pain raises concern for alternative, potentially acute pathologies that require prompt investigation. Assessment of the relationship between pain and gastrointestinal function is essential. Clinicians should explore any association between abdominal pain and bowel habits, including the presence of constipation, diarrhea, or alternating patterns of both. Symptoms that improve following the resolution of constipation suggest functional constipation rather than a primary functional pain disorder. Additional historical features, such as prolonged time spent attempting defecation, avoidance of using school toilets, or episodes of fecal incontinence or soiling, further support this diagnosis. Inquiry into associated gastrointestinal symptoms, including nausea, vomiting, or reflux, helps to identify overlapping conditions and refine the differential diagnosis. Dietary history also plays a significant role in the evaluation process. The timing of pain in relation to food intake may provide valuable clues regarding underlying mechanisms. Symptoms that occur shortly after meals or are triggered by specific foods may suggest conditions such as lactose intolerance, other forms of carbohydrate malabsorption, or sensitivity to fermentable carbohydrates, including fermentable oligosaccharides, disaccharides, monosaccharides, and polyols. These substances are known to increase intestinal gas production and luminal distension, which may exacerbate symptoms in susceptible individuals. Consideration should also be given to celiac disease, particularly when symptoms are persistent or accompanied by systemic manifestations [3][4][5].

A comprehensive review of systems is critical to identify features that may indicate an organic etiology. The presence of alarm symptoms, often referred to as red flags, necessitates further diagnostic evaluation. These include gastrointestinal bleeding, persistent or bilious vomiting, difficulty swallowing, painful swallowing, nocturnal diarrhea, unexplained weight loss, impaired growth, or unexplained fever. Additional concerns include signs suggestive of systemic disease, such as joint pain, dermatological manifestations, or jaundice. A history of trauma or potential abuse must also be considered in appropriate clinical contexts. Family history provides further diagnostic context, particularly when there is a known history of inflammatory bowel disease, which increases the likelihood of an underlying inflammatory process. Previous abdominal surgery may also predispose the patient to complications such as adhesions, which can contribute to abdominal pain. The localization and character of pain offer further diagnostic value. Younger children often lack the ability to precisely localize discomfort and may describe generalized or periumbilical pain. In contrast, older children and adolescents typically provide more specific descriptions, including localization to particular abdominal regions and characterization of pain as cramping or associated with bloating. Persistent, well-localized pain, particularly when described as sharp or severe and confined to a specific quadrant, increases suspicion for an underlying organic pathology affecting a defined anatomical structure. Physical examination findings in functional abdominal pain are generally minimal or nonspecific. Diffuse abdominal tenderness may be present; however, patients often tolerate palpation without signs of significant distress, even during deeper examination. In cases of constipation, a palpable abdominal mass corresponding to retained stool may be detected. The absence of significant physical findings is consistent with a functional disorder, although it does not eliminate the need for careful assessment [5][6][7].

Evaluation of the child's overall growth and nutritional status provides important diagnostic information. Evidence of poor weight gain, weight loss, or delayed growth may indicate chronic disease processes such as malabsorption or inflammatory conditions. Signs of malnutrition or delayed pubertal development further support the possibility of an organic etiology. Additional physical findings may include pallor, suggesting anemia due to chronic gastrointestinal blood loss, or jaundice, indicating possible hepatobiliary disease. Cutaneous manifestations can also provide valuable clues, such as erythema nodosum associated with inflammatory bowel disease or dermatitis herpetiformis linked to celiac disease. Examination of other organ systems contributes to a comprehensive assessment. Ocular findings such as scleral icterus and oral findings such as aphthous ulcers may indicate systemic involvement. Abdominal examination may reveal organ enlargement, masses, localized tenderness, or signs of peritoneal irritation, all of which warrant further investigation. Distension accompanied by visible peristaltic movements may suggest intestinal obstruction. Inspection of the perianal region is particularly important, as the presence of fissures, fistulas, skin tags, or abscesses is more consistent with inflammatory conditions such as Crohn disease. Detection of gross or occult blood further supports the need for additional evaluation. Systemic features,

including joint swelling, tenderness, or digital clubbing, may indicate chronic inflammatory or hepatic disease and should not be overlooked. In contrast, children with functional abdominal pain typically exhibit a normal physical examination without significant abnormalities. When abnormal findings are present, clinicians must pursue further diagnostic investigations to identify or exclude underlying organic causes. This careful integration of historical and physical examination findings allows for accurate diagnosis while minimizing unnecessary testing and ensuring appropriate management [7][8].

Evaluation

The evaluation of functional abdominal pain in children is guided by established clinical recommendations that emphasize a conservative and symptom-based approach. According to the American Academy of Pediatrics and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition, children between the ages of 4 and 18 years who present with chronic abdominal pain may be diagnosed with functional abdominal pain when specific clinical criteria are met. These include the absence of alarming features, a normal physical examination, and negative findings on stool testing for occult blood. Under these circumstances, further extensive diagnostic testing is not required, as the likelihood of an underlying organic pathology is low [9]. This approach reflects an effort to reduce unnecessary investigations and limit the burden of medical procedures on pediatric patients. A critical aspect of evaluation involves identifying features that may suggest an alternative diagnosis. The presence of alarm signs necessitates a more thorough and targeted diagnostic approach. Such features include persistent fever, recurrent or severe vomiting, visible blood in the stool, unintentional weight loss, or impaired linear growth. These findings raise concern for organic disease processes such as infection, inflammation, or malignancy and warrant further investigation. In such cases, clinicians must tailor diagnostic testing to the individual patient's presentation, ensuring that investigations are both clinically appropriate and evidence-based [3]. This targeted strategy helps avoid excessive use of invasive procedures while maintaining diagnostic accuracy. When clinical suspicion for an alternative etiology exists, initial laboratory evaluation may include a range of commonly used tests. A complete blood count can identify anemia or signs of infection, while inflammatory markers such as erythrocyte sedimentation rate and C-reactive protein help detect underlying inflammatory conditions. Urinalysis is useful in identifying urinary tract infections or renal pathology that may present with abdominal pain. Stool studies, including examination for ova and parasites, are indicated when parasitic infection is suspected, particularly in relevant epidemiological contexts. Testing for occult blood in stool remains an important screening tool for gastrointestinal bleeding. In addition, serological testing for celiac disease may be appropriate in children with compatible symptoms or risk factors. Abdominal ultrasonography may also be considered as a noninvasive imaging modality when clinically indicated [3][9].

Despite its widespread use, evidence suggests that abdominal ultrasonography has limited diagnostic value in the context of functional abdominal pain. Studies have demonstrated that this imaging modality does not significantly contribute to identifying a specific cause in the majority of cases [9]. Nonetheless, clinicians may still request such investigations in certain situations, particularly when addressing parental concerns or anxiety regarding the possibility of serious underlying disease. While this practice may provide reassurance, it is important to balance these considerations against the need to avoid unnecessary testing and healthcare costs. Overall, the evaluation of functional abdominal pain should prioritize careful clinical assessment and judicious use of diagnostic tools. By adhering to established guidelines and focusing on the presence or absence of alarm features, clinicians can make accurate diagnoses while minimizing unnecessary interventions. This approach supports efficient patient care and reduces the potential physical and psychological impact of excessive medical evaluation on children and their families [9].

Treatment and Management

The management of functional abdominal pain in children is grounded in a comprehensive approach that prioritizes education and addresses the complex interaction between physiological, psychological, and social factors. The initial and most essential step involves clear communication with both the child and family. Clinicians must explain that the pain experienced is genuine, even in the absence of identifiable structural disease, while also emphasizing that it does not indicate a dangerous or life-threatening condition. This distinction is critical in reducing anxiety and promoting adaptive coping behaviors. Families are encouraged to support the child in maintaining normal daily activities, including school attendance and social engagement, rather than allowing the pain to result in functional withdrawal. Reinforcement of illness behavior, such as excessive attention to symptoms or avoidance of routine responsibilities, should be minimized to prevent perpetuation of the condition. The biopsychosocial model serves as the foundation for management, recognizing that functional abdominal pain arises from the interaction of biological mechanisms, emotional states, and environmental influences. This model guides interventions that extend beyond symptom relief to address underlying contributors. Psychological therapies play a central role, particularly in cases where symptoms persist or interfere with daily functioning. Cognitive behavioral therapy has demonstrated effectiveness in modifying maladaptive thought patterns and behaviors associated

with pain perception. Through structured techniques, children learn to reinterpret pain signals, reduce anxiety, and develop coping strategies that improve overall functioning. Other psychological interventions, including hypnotherapy and biofeedback, aim to regulate autonomic responses and enhance control over physiological processes associated with pain [10][11][12][13].

Nonpharmacological strategies also include lifestyle modifications that target stress reduction and overall well-being. Regular physical activity, adequate sleep, and structured daily routines contribute to improved symptom control. Mind–body interventions such as yoga and meditation have been associated with reductions in stress and improvements in pain perception, likely through modulation of the central nervous system. Additional approaches, including osteopathic manipulation, may provide benefit in selected cases by addressing musculoskeletal contributors to discomfort. Emerging evidence also supports the use of open-label placebo, in which patients are informed that they are receiving a placebo treatment, yet still experience meaningful reductions in pain intensity and decreased reliance on analgesic medications [14]. This finding highlights the influence of cognitive and expectation-related mechanisms in symptom modulation. Dietary and pharmacological interventions are generally considered secondary options and are typically reserved for patients who do not respond adequately to initial management or when specific triggers are identified. Dietary modification focuses on reducing stimuli that may exacerbate visceral hypersensitivity. Identification and management of carbohydrate malabsorption, including lactose or fructose intolerance, can lead to symptom improvement in susceptible individuals. For patients who report significant bloating or discomfort related to food intake, implementation of a low-fermentable carbohydrate diet may be beneficial. This approach involves reducing intake of fermentable oligosaccharides, disaccharides, monosaccharides, and polyols, which are known to increase intestinal gas production and luminal distension [12][13][14].

The use of probiotics has also been explored as a therapeutic option. Specific strains, including Lactobacillus reuteri and Lactobacillus rhamnosus, have shown potential in reducing abdominal pain in some pediatric patients. These agents are typically administered for a defined period, such as six to eight weeks, with the option to resume therapy if symptoms recur [15]. In cases where constipation contributes to abdominal pain, treatment with nonstimulant laxatives such as polyethylene glycol-3350 or dietary fiber supplementation may result in symptom resolution [4]. Addressing these contributing factors is essential, as improvement in bowel function often leads to a reduction in pain frequency and severity. Pharmacological therapy may be considered in selected cases, particularly when symptoms are severe or associated with significant psychological comorbidity. Antidepressant medications, including selective serotonin reuptake inhibitors and tricyclic antidepressants, are sometimes used due to their effects on both mood and pain modulation. Although the precise mechanisms remain unclear, these medications are thought to influence gastrointestinal motility and alter central pain processing pathways. Tricyclic antidepressants may reduce pain sensitivity through modulation of norepinephrine pathways, while also exerting anticholinergic effects on the gastrointestinal tract. In patients with coexisting anxiety or depression, these medications may provide additional benefit by addressing underlying psychological factors that exacerbate symptoms. Despite their potential utility, evidence supporting the effectiveness of antidepressants in pediatric functional abdominal pain remains inconclusive [16]. Therefore, treatment decisions must be individualized, taking into account the severity of symptoms, patient preferences, and potential adverse effects. Antispasmodic agents, such as hyoscyamine and dicyclomine, may provide symptomatic relief by reducing intestinal smooth muscle contraction. These medications can be used either for ongoing symptom control or during acute episodes, depending on the clinical presentation. Additionally, natural remedies such as peppermint oil or menthol have been used due to their antispasmodic properties and may offer benefit in selected patients [4]. Overall, the management of functional abdominal pain requires a patient-centered and multidisciplinary approach that integrates education, psychological support, lifestyle modification, and selective use of dietary and pharmacological interventions. Emphasis on restoring normal function, reducing symptom-related anxiety, and addressing contributing factors is essential for achieving optimal outcomes [4][14][15][16].

Differential Diagnosis

Functional abdominal pain should be approached as a valid and commonly encountered clinical condition rather than a diagnosis reached only after exclusion of all other possibilities. Early communication with patients and families regarding this concept is essential, as it helps establish trust and reduces unnecessary anxiety associated with prolonged diagnostic uncertainty. Despite this, a careful and systematic evaluation remains necessary for every child presenting with abdominal pain to ensure that alternative or potentially serious conditions are not overlooked. The differential diagnosis is broad and must be guided by specific clinical features, including the duration of symptoms, anatomical location of pain, patient age, and identifiable triggering or aggravating factors. Recognition of alarm features plays a central role in distinguishing functional abdominal pain from organic disease. Symptoms such as persistent fever, gastrointestinal bleeding, unintentional weight loss, anemia, or

impaired growth raise concern for underlying pathology and require further investigation. Nocturnal pain that disrupts sleep and a sudden change in symptom pattern also warrant closer evaluation. In younger children, the threshold for investigation is often lower due to the higher likelihood of organic etiologies. Additionally, clinicians must remain vigilant for signs of acute or surgical abdomen, which necessitate immediate intervention. These include abrupt onset of severe pain, absence of bowel sounds, involuntary guarding, rebound tenderness, and a patient who remains still due to discomfort, all of which suggest peritoneal irritation or intra-abdominal emergency. The range of possible diagnoses includes inflammatory, infectious, metabolic, and functional conditions. Inflammatory bowel diseases such as Crohn disease and ulcerative colitis should be considered, particularly in the presence of chronic diarrhea, weight loss, or systemic symptoms. Other conditions, including lactose intolerance and celiac disease, may present with abdominal discomfort related to dietary triggers and require appropriate evaluation. Urinary, gynecological, and hepatobiliary causes should also be considered based on the clinical context. Classification of functional abdominal pain into specific subtypes provides additional diagnostic clarity and guides management strategies. Irritable bowel syndrome is characterized by abdominal pain associated with altered bowel habits, including constipation, diarrhea, or both. Functional dyspepsia typically presents with upper abdominal discomfort that is temporally related to food intake. Abdominal migraine is identified by episodic, severe pain accompanied by features commonly associated with migraine, such as nausea, photophobia, or phonophobia. In some cases, patients do not meet the criteria for any defined subtype, and the condition is categorized as functional abdominal pain not otherwise specified [2]. This classification reflects the heterogeneity of functional gastrointestinal disorders and emphasizes the importance of individualized assessment [2][3][14].

Prognosis

Functional abdominal pain in children is generally characterized by a prolonged and recurrent clinical course. Although the condition does not involve identifiable structural or biochemical abnormalities, its impact on the child's daily life can be substantial. Persistent abdominal pain may interfere with school attendance, academic performance, and participation in social activities, leading to reduced quality of life and increased psychological distress. The chronic nature of symptoms often results in repeated healthcare visits and ongoing concern for both patients and their families. Longitudinal studies have demonstrated that symptoms frequently persist over extended periods, with many children continuing to experience abdominal pain into adolescence and adulthood. This persistence highlights the need for early recognition and appropriate management strategies aimed at reducing symptom burden and preventing long-term functional impairment. Evidence also suggests a continuity between pediatric functional abdominal pain and adult functional gastrointestinal disorders. For example, individuals diagnosed with irritable bowel syndrome in adulthood often report a history of similar gastrointestinal symptoms during childhood, indicating a potential developmental trajectory of these conditions. The long-term outcome of functional abdominal pain appears to be influenced more by associated factors than by the specific diagnostic subtype. Psychological comorbidities, particularly anxiety and depression, play a significant role in determining symptom persistence and severity. Children who exhibit higher levels of emotional distress are more likely to experience ongoing symptoms and functional limitations. Similarly, the presence of extraintestinal manifestations, such as recurrent headaches or generalized pain syndromes, has been associated with a less favorable prognosis [4][18]. These findings support the concept that functional abdominal pain is part of a broader pattern of altered pain perception and central sensitization. Early intervention that addresses both physical and psychological aspects of the condition can improve outcomes and reduce the risk of chronicity. Emphasis on maintaining normal activities, developing effective coping strategies, and managing comorbid conditions contributes to better long-term adaptation. While complete resolution of symptoms may not occur in all cases, many children achieve significant improvement with appropriate support and multidisciplinary care. Overall, the prognosis of functional abdominal pain is variable, but a comprehensive and individualized management approach can substantially enhance quality of life and functional outcomes [4][17][18].

Patient Education:

Patient education is a central component in the management of functional abdominal pain and should begin at the first clinical encounter. Families should be informed that functional abdominal pain is a legitimate and common condition in children and that it does not reflect underlying organ damage or a life-threatening disease. By reviewing the history and physical examination findings and performing additional testing only when clinically indicated, clinicians can reassure families that extensive diagnostic procedures are often unnecessary. It is important to convey that the pain experienced by the child is real, validating their symptoms while clarifying that the condition is not harmful. Clinicians might communicate this in practical terms, for example: "Your child's stomach pain is real, and while it can be uncomfortable, it does not indicate serious disease. Together, we can manage it so your child can continue normal daily activities." Healthcare providers should guide parents and caregivers on how to respond to episodes of pain, emphasizing consistent, calm, and supportive reactions rather than excessive attention or reinforcement, which can inadvertently

heighten anxiety and prolong symptoms. Education should also cover the influence of psychological factors, including stress, anxiety, or depressive symptoms, which can exacerbate abdominal discomfort. Encouraging children to maintain regular routines, including attending school and participating in typical social and recreational activities, is critical, as avoidance behaviors can reinforce pain and functional disability. By combining reassurance, symptom validation, and practical behavioral guidance, families are empowered to support effective coping and long-term management of functional abdominal pain [4].

Conclusion:

Functional abdominal pain in children represents a complex interplay of physiological, psychological, and environmental factors rather than a single identifiable pathology. Its chronic and recurrent nature significantly affects daily functioning, school performance, and overall quality of life. Evidence shows that symptoms often persist into adolescence and adulthood, reflecting continuity with adult functional gastrointestinal disorders. The presence of psychological comorbidities—particularly anxiety and depression—strongly influences symptom severity and long-term outcomes. A patient-centered, multidisciplinary approach is therefore critical. Education and reassurance form the foundation of management, emphasizing that the pain is real yet not indicative of life-threatening disease. Integrating cognitive-behavioral therapy, lifestyle adjustments, and targeted dietary interventions helps reduce symptom burden and promote resilience. Although complete resolution may not occur in all cases, early recognition and comprehensive management substantially improve long-term adaptation and functional well-being.

References:

1. Baaleman DF, Di Lorenzo C, Benninga MA, Saps M. The Effects of the Rome IV Criteria on Pediatric Gastrointestinal Practice. Current gastroenterology reports. 2020 Mar 19:22(5):21. doi: 10.1007/s11894-020-00760-8. Epub 2020 Mar 19
2. Hyams JS, Di Lorenzo C, Saps M, Shulman RJ, Staiano A, van Tilburg M. Functional Disorders: Children and Adolescents. Gastroenterology. 2016 Feb 15:():. pii: S0016-5085(16)00181-5. doi: 10.1053/j.gastro.2016.02.015.
3. Thapar N, Benninga MA, Crowell MD, Di Lorenzo C, Mack I, Nurko S, Saps M, Shulman RJ, Szajewska H, van Tilburg MAL, Enck P. Paediatric functional abdominal pain disorders. Nature reviews. Disease primers. 2020 Nov 5:6(1):89. doi: 10.1038/s41572-020-00222-5.
4. Korterink J, Devanarayana NM, Rajindrajith S, Vlieger A, Benninga MA. Childhood functional abdominal pain: mechanisms and management. Nature reviews. Gastroenterology & hepatology. 2015 Mar:12(3):159-71. doi: 10.1038/nrgastro.2015.21.
5. Faure C, Giguère L. Functional gastrointestinal disorders and visceral hypersensitivity in children and adolescents suffering from Crohn's disease. Inflammatory bowel diseases. 2008 Nov:14(11):1569-74. doi: 10.1002/ibd.20506.
6. Vermeijden NK, de Silva L, Manathunga S, Spoolder D, Korterink J, Vlieger A, Rajindrajith S, Benninga M. Epidemiology of Pediatric Functional Abdominal Pain Disorders: A Meta-Analysis. Pediatrics. 2025 Feb 1:155(2):. pii: e2024067677. doi: 10.1542/peds.2024-067677.
7. Gordon M, Sinopoulou V, Tabbers M, Rexwinkel R, de Bruijn C, Dovey T, Gasparetto M, Vanker H, Benninga M. Psychosocial Interventions for the Treatment of Functional Abdominal Pain Disorders in Children: A Systematic Review and Meta-analysis. JAMA pediatrics. 2022 Jun 1:176(6):560-568. doi: 10.1001/jamapediatrics.2022.0313.
8. Halac U, Noble A, Faure C. Rectal sensory threshold for pain is a diagnostic marker of irritable bowel syndrome and functional abdominal pain in children. The Journal of pediatrics. 2010 Jan:156(1):60-65.e1. doi: 10.1016/j.jpeds.2009.06.062.
9. Llanos-Chea A, Saps M. Utility of Diagnostic Tests in Children With Functional Abdominal Pain Disorders. Gastroenterology & hepatology. 2019 Aug:15(8):414-422
10. Paul SP, Basude D. Non-pharmacological management of abdominal pain-related functional gastrointestinal disorders in children. World journal of pediatrics : WJP. 2016 Nov:12(4):389-398
11. Müller A, Franke H, Resch KL, Fryer G. Effectiveness of osteopathic manipulative therapy for managing symptoms of irritable bowel syndrome: a systematic review. The Journal of the American Osteopathic Association. 2014 Jun:114(6):470-9. doi: 10.7556/jaoa.2014.098.
12. Korterink JJ, Ockeloen LE, Hilbink M, Benninga MA, Deckers-Kocken JM. Yoga Therapy for Abdominal Pain-Related Functional Gastrointestinal Disorders in Children: A Randomized Controlled Trial. Journal of pediatric gastroenterology and nutrition. 2016 Nov:63(5):481-487
13. Keefer L, Blanchard EB. A one year follow-up of relaxation response meditation as a treatment for irritable bowel syndrome. Behaviour research and therapy. 2002 May:40(5):541-6
14. Nurko S, Saps M, Kossowsky J, Zion SR, Di Lorenzo C, Vaz K, Hawthorne K, Wu R, Ciciora S, Rosen JM, Kaptchuk TJ, Kelley JM. Effect of Open-label Placebo on Children and Adolescents With Functional Abdominal Pain or Irritable Bowel Syndrome: A Randomized Clinical Trial.

JAMA pediatrics. 2022 Apr 1:176(4):349-356. doi: 10.1001/jamapediatrics.2021.5750.

15. Vandenplas Y, Darma A, Indrio F, Aw M, Vieira MC, Vivatvakin B, Treepongkaruna S, Cruchet S, Acharyya BC, Vázquez R, Yeung CY, Gutiérrez P. Understanding functional abdominal pain disorders among children: a multidisciplinary expert consensus statement. Frontiers in pediatrics. 2025:13():1576698. doi: 10.3389/fped.2025.1576698.
16. Bonilla S, Nurko S. Focus on the use of antidepressants to treat pediatric functional abdominal pain: current perspectives. Clinical and experimental gastroenterology. 2018:11():365-372. doi: 10.2147/CEG.S146646.
17. Rexwinkel R, de Bruijn CMA, Gordon M, Benninga MA, Tabbers MM. Pharmacologic Treatment in Functional Abdominal Pain Disorders in Children: A Systematic Review. Pediatrics. 2021 Jun:147(6):. pii: e2020042101. doi: 10.1542/peds.2020-042101.

Horst S, Shelby G, Anderson J, Acra S, Polk DB, Saville BR, Garber J, Walker LS. Predicting persistence of functional abdominal pain from childhood into young adulthood. Clinical gastroenterology and hepatology : the official clinical practice journal of the American Gastroenterological Association. 2014 Dec:12(12):2026-32. doi: 10.1016/j.cgh.2014.03.034.