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Interdisciplinary Approaches to Understanding and Managing the Interrelationship Between Pediatric Obesity and Functional Gastrointestinal Disorders: A Comprehensive Review

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Abstract

Functional gastrointestinal disorders (FGIDs) are prevalent among children and adolescents, often linked to obesity and associated digestive issues. Understanding the interplay between obesity and FGIDs is critical for developing effective management strategies.This narrative review examines the correlation between obesity and functional bowel disorders (FBDs) in pediatric populations. A thorough literature search was conducted on the PubMed database, focusing on English-language studies published in recent years. The review highlights the epidemiology, pathophysiology, and management approaches for FGIDs in the context of pediatric obesity.The findings indicate a significant association between obesity and FGIDs, with studies reporting higher prevalence rates of conditions such as Irritable Bowel Syndrome (IBS) and Functional Constipation (FC) in overweight children. The review identifies several common risk factors, including dietary habits, gut microbiota alterations, and psychological distress. Interventions, such as dietary modifications and nutritional education, have shown promise in alleviating symptoms and improving health outcomes. However, variability in research methodologies and outcomes necessitates further investigation.The management of obesity-related FGIDs in pediatric patients requires a multidisciplinary approach that incorporates dietary strategies, psychological support, and lifestyle modifications. Future research should focus on elucidating the mechanisms linking obesity and FGIDs and developing targeted interventions tailored to individual patient needs. Addressing these comorbid conditions holistically can enhance the quality of life for affected children and adolescents.

Keywords: *Functional Gastrointestinal Disorders, Obesity, Pediatric Health, Dietary Interventions, Gut Microbiota.*

Introduction

A variety of persistent digestive symptoms that are frequently accompanied by discomfort, but lack a recognized medical cause are referred to as functional gastrointestinal disorders (FGIDs). Functional bowel disorders are a subset of functional gastrointestinal diseases, defined by symptoms arising from the middle or lower digestive system [1]. The primary Practical Bowel Diseases (FBDs) in kids and teenagers are IBS (irritable bowel syndrome) and Functional Dyspepsia (FD), classified under Practical Abdominal Pain

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Conditions according to the Rome IV criteria, as well as Functional Constipation (FC), categorized under Functional Defecation Conditions by the same criteria [2].

Currently, comprehensive epidemiological data about the incidence of FGIDs in pediatric patients remains insufficient. A thorough evaluation indicates that the incidence levels of FGIDs in kids and teenagers may vary from 9% to 29% [3]. IBS is significantly prevalent among functional gastrointestinal disorders (FGIDs). A meta-analysis indicated that the aggregated worldwide prevalence of IBS in children and adolescents aged 4 to 18 years is 8.8% [4]. The estimated prevalence of IBS in the European Mediterranean area is 4% among the same population [5]. Research indicated a worldwide incidence of FC in children at 14.4%, with a particular frequency of 8.3% in Europe [6]. The incidence of functional dyspepsia (FD) in children is estimated to be between 3% and 27%, presenting a considerable cost burden on healthcare systems. Children with FD who exhibit limited or no response to therapy often suffer elevated medical expenses, hence exacerbating healthcare expenditures [7]. Functional gastrointestinal disorders (FGIDs) in children result in significant healthcare expenses and decreased economic output for caregivers or parents [8,9]. Globally, functional constipation constitutes twenty-five percent of pediatric gastroenterologist consults and 3% among all general pediatric consultations [6].

The diagnosis of IBS is based on symptoms. The primary symptom is abdominal discomfort, which may be associated with feces, diarrhea, constipation, or a combination of these problems [2]. It is theorized that IBS may result from the disturbance of the brain-gut axis. A disagreement persists on whether the fundamental dysfunction originates in the gut (e.g., buildup of inflammatory cells in the intestinal mucosa) or in the central nervous system (e.g., heightened release of corticotrophin-releasing factor, CRF) [10]. The disturbance of the brain-gut axis results in many pathophysiological alterations, including visceral hypersensitivity, gastrointestinal dysmotility, heightened gut permeability, and low-grade intestinal inflammation associated with microbiota involvement [10,11]. Psychological discomfort in children may be linked to irritable bowel syndrome (IBS) [2,11]. Risk factors for IBS encompass excessive worry, anxiety, and depression, as well as gastrointestinal infections and dietary choices, particularly the consumption of spicy or fried foods. Patients suffering from FD report one or more of the following distressing symptoms: postprandial fullness, early satiation, and epigastric pain or burning, occurring independently of defecation, at least four days per month. Various pathophysiological mechanisms are postulated to contribute to the development of functional dyspepsia, including motor dysfunctions [2,12].

FC is a condition marked by infrequent bowel movements accompanied by painful and hard stools, retention behavior, the presence of a substantial fecal mass in the rectum or stools of considerable diameter capable of obstructing the toilet, or instances of overflow fecal incontinence [2]. The pathophysiological processes are numerous, including stool withholding, dietary practices, physical activity, and anorectal dysfunctions [6]. The primary trigger of the condition is a child's inclination to avoid defecation due to pain or social factors.

In 2022, the WHO reported that 160 million children and adolescents aged 5 to 19 years were affected by obesity globally. Presently, kid obesity constitutes a worldwide health crisis, displaying elements of a pandemic. Moreover, the causes of childhood obesity may include individual variables alongside social and environmental influences [13]. The "obesogenic environment" significantly contributes to the onset and continuation of obesity in children and adolescents. Two primary contributors to childhood obesity are a dietary pattern characterized by energy-dense, nutrient-poor foods, and a sedentary lifestyle. Childhood and teenage obesity, affecting individuals aged 4–18 years, is a critical public health concern, as it heightens the risk of cardiometabolic and psychosocial comorbidities throughout these developmental stages and correlates with early death in adulthood [14].

Furthermore, recent research indicates a correlation between obesity and functional gastrointestinal disorders (FGIDs) [15,16]. Childhood obesity and functional gastrointestinal disorders (FGIDs) exhibit several commonalities, including a high prevalence among the pediatric population, food and lifestyle-related risk factors, gut microbial dysbiosis, and psychological distress. Research on this topic is diverse, particularly on the diagnostic criteria for FGIDs and the cohorts examined [17].

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This review seeks to encapsulate the primary findings about functional gastrointestinal disorders (FGIDs) in pediatric obesity, particularly emphasizing the influence of nutrition on microbiota. This study may identify shared strategies for the prevention and treatment of both obesity and functional gastrointestinal disorders (FGIDs).

Methods

This review examines the correlation among childhood obesity and functional bowel disorders (FBDs). A thorough search of the PubMed database was performed, concentrating on English-language papers published in recent years.

Functional Bowel Disorders in Pediatric Obesity

Over the last two decades, childhood obesity has reached pandemic levels. In 2006, 16.6% of children and adolescents aged 2 to 19 were classified as weighting at or above the 95th percentile for their age. In 2016, over 7% of children and adolescents were classified as obese, in contrast to under 1% in 1975 [18]. In 2019, the World Health Organization (WHO) estimated that 38.2 million children under the age of 5 were overweight or obese. The growing incidence of childhood obesity is the foremost challenge confronting doctors today [19-21].

Besides the established link to cardiovascular disease and diabetes, new research has shown a correlation between obesity and functional gastrointestinal disorders (FGIDs) [15,16]. Teitelbaum et al. [22] identified a markedly elevated prevalence of obesity in children with functional gastrointestinal disorders (FGIDs) relative to the control group; in a retrospective study assessing the correlation between obesity and children and adolescents known to a pediatric gastroenterologist, 23 percent of patients with functional constipation (FC) were obese, while 24.8% of patients with irritable bowel syndrome (IBS) were similarly affected by obesity. The research also included current studies of gastrointestinal motility problems, delayed gastric emptying, alterations of the gastric antrum, and functional dyspepsia in children with Functional Abdominal Pain (FAP) [23]. Previous study has revealed a correlation between these illnesses and overweight. Increased gastric distension in overweight children may diminish the tone of the stomach muscular wall, affecting mechanoreceptor sensitivity and resulting in an altered experience of satiety [24]. This retrospective analysis also indicated a greater incidence of overweight/obesity in females, who are more susceptible to gastrointestinal motility issues than men. The reason may be attributed to the influence of ovarian hormones or gender disparities in the microbiome, while more research is ongoing [25].

Galai et al. [26] conducted a retrospective analysis indicating that adolescents with FAP had a greater incidence of obesity or overweight in comparison to controls. Tambucci et al. discovered a markedly elevated incidence of functional gastrointestinal disorders (FGIDs) among children and adolescents with obesity or overweight compared to their normal-weight counterparts [27]. The research included 103 children and 115 controls, with all participants assessed by an endocrinologist and a gastroenterologist, using Rome III questionnaires for the identification of functional gastrointestinal disorders. A statistically significant difference was seen between the two categories for operational constipation, operational dyspepsia, as well as irritable bowel syndrome; however, no statistically significant difference was identified for FAP. The prevalence of functional constipation (FC) and irritable bowel syndrome (IBS) in children with overweight or obesity was 18.44% and 10.67%, respectively.

Phatak et al. [28] discovered a greater incidence of functional bowel disorders (FBDs) in obese or overweight children (16.1%) than in those of normal weight (6.9%). The research was conducted on children aged 4 to 18 years at the Yale Pediatric Primary Care clinic, focusing on functional bowel disorders (FBDs) including functional constipation (FC), functional abdominal pain (FAP), and irritable bowel syndrome (IBS). A total of 450 children were recruited, and almost half of the children with obesity or overweight had at least one functional gastrointestinal issue.

A link between obesity and a heightened incidence of constipation has been observed for FC [29]. Retrospective research conducted in June 2004 included 719 children aged 4 to 18 years with persistent

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functional constipation, whereas the control group comprised 930 children from a pediatric clinic. The prevalence of obesity was much greater among constipated children (22.4%) than in control children (11.7%), particularly among boys. The increased incidence of obesity may stem from dietary habits, physical activity, or hormonal impacts and requires further assessment. A 2022 review by Zia et al. [30] emphasizes the necessity of conducting studies on the pediatric population to identify the risk factors for IBS and other functional disorders, while also noting the statistically significant link between obesity and functional digestive disorders.

Consequently, a correlation exists between obesity and functional gastrointestinal problems, however, findings regarding each specific condition remain inconsistent across various research. The variability in results across FBD subtypes, particularly the more pronounced correlation between obesity and constipation relative to IBS, may arise from disparities in gut motility, dietary habits, or hormonal factors. Future investigations need to categorize juvenile populations according to FBD subtype to elucidate these dynamics [29,31].

Obesity not only elevates the incidence of functional bowel disorders (FBDs) but also alters their prognosis. This refers to 2011 prospective cohort research [32] that included 188 children, of whom 20% exhibited obesity. The study's findings revealed a statistically significant difference in the frequency of stomach discomfort, severity, and limitations to daily activities between normal weight individuals and those with obesity. While obesity is recognized as a factor that elevates the risk of reflux esophagitis, pediatric research regarding the correlation between obesity and gastroesophageal reflux remains ambiguous: Elitsur et al. [31] demonstrated that, among a cohort of children with reflux, esophagitis was present in 65% of normal-weight individuals, and in 69% and 68% of those classified as overweight and obese, respectively, with no statistically significant difference among these groups. Patel et al. [33] similarly observed no significant difference in the prevalence of reflux esophagitis between normal weight individuals (23.9%) and overweight patients (24.5%). Conversely, among adults, the difference between the normal weight and overweight categories was statistically significant.

The pathophysiology of functional bowel disorders (FBDs) is ambiguous, characterized by numerous underlying causes. Evidence indicates a correlation among the microbiome, obesity, and functional bowel problems, which may be used to enhance the management of these gastrointestinal conditions. Improvements in dietary habits are strongly associated with changes in the microbiome, resulting in improved BMI outcomes and alleviation of functional problems [34,35]. Recent studies demonstrate that nutrition, exercise, stress, and drugs substantially affect changes in gut flora. Investigating this link offers a possible treatment strategy [36,37].

A diet rich in fat has several risks; some studies indicate it may contribute to accelerated malignant tumor growth by disrupting the gut flora. Excess weight not only modifies the intestinal microbiota but also induces inflammatory changes that affect hypothalamus gene expression, vagus nerve activity, and angiogenesis, so establishing a vicious cycle. Recent studies have compared the intestinal microbiome of individuals with normal weight to those with obesity, observing a significant reduction in biodiversity among the latter, which diminishes resistance to external infections and exacerbates inflammation and intestinal permeability [38-40].

The optimal operation of the intestinal barrier is crucial to avert bacterial invasion. Numerous illnesses, such as IBS and numerous functional intestinal disorders, are characterized by a compromised, more permeable intestinal barrier, resulting in heightened bacterial translocation. Individuals with inflammatory bowel disease (IBD) have markedly increased intestinal permeability relative to healthy controls, indicating that disruption to the structural barrier of the gastrointestinal tract may be a mechanism underlying the pathogenesis of IBD. Individuals with inflammatory bowel disease (IBD) have increased levels of circulating proinflammatory mediators, and this systemic inflammation is posited to result from microbial translocation (MT), as shown by detectable raised blood levels of lipopolysaccharides (LPS), bacterial DNA, and lipopolysaccharide-binding protein (LBP) [41-48]. In the pediatric domain, multifaceted techniques, including dietary modifications, nutritional education, use of biotics, and integrative support, are fundamental for enhancing symptom treatment.

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Pathogenic pathways associated with functional bowel disorders (FBDs) significantly include nutritional factors, including food type, eating habits, gastrointestinal function, movement, and intestinal inflammation [49,50]. The pathophysiology of functional bowel disorders (FBDs) is presently ambiguous, characterized by numerous underlying causes. Among these processes, nutritional aspects—including food type, eating patterns, gastrointestinal function, motility, and intestinal inflammation—are major factors [49,50]. Alongside traditional therapeutic modalities, some food regimens have shown significant advantages. This encompasses the low-FODMAP diet, together with diets that limit fructose, lactose, or gluten [4,51-54]. A recent meta-analysis and systematic review by Hua et al. [55] sought to evaluate the efficacy of several dietary interventions in kids and teens with functioning abdominal pain problems, however revealed no significant differences among the dietary therapies. The following paragraphs delineate the attributes and supporting proof for each dietary method.

Fermentable oligosaccharides, disaccharides, monosaccharides, and polyols (FODMAPs) are short-chain carbohydrates that exhibit poor absorption in the small intestine, potentially resulting in bloating and gas. FODMAPs are present in several food categories, especially in vegetables including Brussels sprouts, beets, cabbage, broccoli, fennel, onion, leek, garlic, shallot, pumpkin, squash, and courgette, as well as in cereals such as maize, rye, and wheat when ingested in substantial amounts [56]. Legumes with the greatest FODMAP content include beans, chickpeas, lentils, peas, red beans, and soybeans. FODMAPs are found in certain fruits, including apricots, bananas, blueberries, cranberries, currants, quinces, grapefruits, melons, persimmons, plums, pomegranates, and watermelons, as well as in dried fruits such as cashews, almonds, pistachios, and hazelnuts.

A low-FODMAP diet is often used to alleviate irritable bowel syndrome (IBS) in adults. Nonetheless, due to the extensive variety of foods to restrict, this diet may provide difficulties for juvenile patients [57]. In 2022, the European Society for Pediatric Gastroenterology Hepatology and Nutrition) released a Position Paper about the use of a low-FODMAP diet in children, noting that further research is required to substantiate its application in pediatrics, while some encouraging results for IBS were noted [58]. Recent data indicates that dietary treatments, including low-FODMAP diets, influence microbiome diversity and fermentation patterns, potentially alleviating symptoms such as bloating and stomach discomfort. Nonetheless, the enduring effects on microbiota composition and pediatric health are yet little investigated [59]. A recent systematic analysis [60] assessed the impact of a low-FODMAP diet on functional bowel disorders in children; nevertheless, the findings were inadequate to endorse particular therapy recommendations, with the exception of irritable bowel syndrome, in accordance with ESPGHAN's guidelines [59].

This year, a study assessed the effects of a low-FODMAP diet on health-related quality of life in a cohort of Egyptian children [61]. Researchers enlisted 84 children aged 5 to 15 years, who were randomly allocated to either a low-FODMAP diet group or a conventional diet group. Each participant was provided with a list of items to include and exclude (high-FODMAP foods) and adhered to dietary guidance for six weeks [61]. Weekly evaluations included a visual analogue scale (VAS) for pain intensity, the Pediatric Quality of Life Inventory (PedsQL), and the Gastrointestinal Symptoms Module Scale. The results demonstrated a significant decrease in abdominal pain intensity, better gastrointestinal symptoms, and an elevated health-related quality of life in children who followed the low-FODMAP diet [61]. Notably, none of the studies included in Katzagoni et al.'s comprehensive analysis indicated elevated health-related quality of life ratings [60].

Recent research by Tenenbaum et al. [62] in 2024 investigated the potential of quality of life as a predictor of adherence to the low-FODMAP diet in children with functional bowel disorders (FBDs). A favorable correlation was identified between quality of life and dietary adherence. Due to the intricacy of this dietary approach, meticulous nutritional monitoring is crucial to avert nutrient shortages and alleviate stress in the youngster by offering recipes or alternatives to provide dietary diversity, thereby enhancing adherence. Nonetheless, further research is required to elucidate the efficacy of the low-FODMAP diet in pediatric patients with functional bowel disorders.

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Fructose and lactose malabsorption may potentially contribute to symptoms related to functional bowel disorders, since both may induce bacterial fermentation in the intestinal lumen, although via distinct processes [63,64]. Lactose- and fructose-free diets have been recommended in clinical practice to alleviate symptoms of functional bowel disorders (FBDs). The referenced systematic review [60] compiled information about this method; nonetheless, there is now inadequate data to generally endorse lactose- or fructose-free diets. Although some individuals may get symptom alleviation with dietary limitations, further research is necessary to elucidate parameters such as individual tolerance levels and the threshold quantities that may be ingested without adverse effects. The ESPGHAN committee issued a position paper about the use of baby formulae for the treatment of functional gastrointestinal diseases in relation to lactose [65]. They determined that data supporting the use of customized formulae is scant and underscored that breastfeeding should not be abandoned in preference to formula feeding.

It is important to remember that lactose-free diets in children may result in decreased protein and calcium consumption, possibly leading to reduced height and worse bone mineral density [66]. This assertion is contentious, and further extensive research are required to elucidate the correlation between growth results and a lactose-free diet. The correlation between excessive fructose consumption and childhood obesity, as well as related illnesses including Nonalcoholic Fatty Liver Disease (NAFLD), is well-documented. Fructose is found in fruits and some vegetables (such as tomatoes), as well as being a prevalent sweetener in fruit juices, sodas, and processed confections [67-71]. Although current research does not support fructose restriction as a remedy for FBD symptoms, it is recommended that children substantially decrease their consumption of fructose-laden goods [72].

Intestinal Implication

The human gut microbiota constitutes a complex ecology of bacteria that are integral to several physiological activities, such as metabolism, immunological regulation, and gastrointestinal health [73]. There is growing evidence indicating a complicated and bidirectional link among gut microbiota, functional bowel disorders (FBDs), and obesity, especially in youngsters. Changes in gut microbiota composition are linked to the development and duration of functional bowel disorders and are recognized as a significant factor in the pathophysiology of obesity [74]. The coexistence of functional bowel disorders (FBDs) with obesity leads to an exacerbation of dysfunctions inherent to both conditions, hence intensifying gastrointestinal and metabolic symptoms. Systemic inflammation associated with obesity, together with gut dysbiosis, may increase gut permeability ('leaky gut') and visceral hypersensitivity, both characteristic features of functional bowel disorders (FBDs). These processes emphasize the need for therapies aimed at the microbiota to concurrently tackle obesity and FBD symptoms. The composition of gut microbiota in both functional bowel disorders and obesity is often altered, exhibiting less diversity and an excess of certain proinflammatory bacteria [75].

The equilibrium of bacterial communities, rather than their total numbers, frequently has a more significant influence on the functional effects of the gut microbiota. Alterations in the Firmicutes-to-Bacteroidetes ratio have been identified as significant factors in obesity and associated disorders [76]. The composition of dysbiotic microbiota remains contentious; however, certain studies indicate that obese children exhibit elevated levels of Firmicutes and diminished levels of beneficial bacteria, such as Bacteroidetes and Bifidobacteria, leading to an increased ability to extract energy from food due to a more efficient degradation of carbohydrate complexes [77]. The gut microbiota composition in functional bowel disorders (FBDs) remains contentious; yet patients seem to have a comparable dysbiosis condition [78]. The gut microbiota facilitates various mechanisms, including the fermentation of undigested proteins and carbohydrates, hydrogen utilization, and bile acid transformation. Dysbiosis can disrupt intestinal immune function, motility, and gut permeability, often termed "leaky gut," permitting bacterial components to enter the bloodstream. The activation of the immune system linked to this process exacerbates gastrointestinal symptoms and may lead to a chronic inflammatory condition, often seen in patients with functional bowel disorders (FBDs) [79]. These alterations result in exacerbated gastrointestinal symptoms, including bloating, abdominal discomfort, and constipation [27].

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Research conducted by Saulnier et al. [80] shown a correlation between microbiota composition and the intensity and frequency of stomach discomfort in pediatric patients with IBS. The symptoms may be exacerbated by alterations in microbiota-mediated synthesis of short-chain fatty acids (SCFAs) and gases such as methane, which have been shown to influence gut motility and sensitivity [18]. The link between gut microbiota and FC has been examined regarding its effect on gut transit time. This may result from microbial impact on gene expression influencing gut motility, pH-dependent stimulation of motility through fermentation, osmotic effects from microbial metabolites, and intestinal distension from heightened intraluminal gas production, which induces reflexive smooth muscle contractions. Various studies [81,82] shown the disparities in gut microbiota between children with functional constipation (FC) and the control group. Research demonstrated that children with obesity and functional constipation had substantially reduced levels of Bacteroidetes, particularly Prevotella, and elevated levels of certain Firmicutes groups, such as Lactobacillus, in comparison to healthy children [81]. Additional investigations also emphasized elevated amounts of Bifidobacteria [83].

The interplay between modified gut microbiota, obesity, and functional bowel disorders may influence the effectiveness of nutritional and pharmaceutical treatments. Dietary adjustments often advised for functional bowel disorders, such as the low-FODMAP diet, may influence microbiota composition by temporarily diminishing bacterial fermentation [22]. The effectiveness of certain probiotics, including Lactobacillus reuteri and Bifidobacterium species, differs according to strain-specific processes that influence motility and gut barrier integrity. For example, whereas *Lactobacillus reuteri* DSM 17,938 showed advantages in some trials, others had little effects on stool frequency, indicating that patient-specific variables such as baseline microbiota composition may affect results [84]. Tailored therapies concerning gut microbiota composition may be crucial for enhancing clinical outcomes in infants impacted by both illnesses.

Prebiotics are substrates used preferentially by the host microbiota. These compounds enhance intestinal barrier function by regulating tight junctions (TJs) via their interaction with the gut microbiota, yielding health benefits [31]. Molecules evaluated for the treatment of functional bowel disorders (FBDs) include galacto-oligosaccharides (GOS), inulin, fructo-oligosaccharides (FOS), psyllium, glucomannan, and other fiber combinations [31].

Recently, there has been an increasing interest in the use of inulin for the treatment of functional constipation (FC). Closa-Monasterolo et al. shown that a daily administration of 2g of inulin for six weeks significantly improved stool consistency [85]. Lohner et al. conducted a study involving children aged 3 to 7 years who were administered 6 g/day of inulin for 24 weeks. They found that the relative abundance of Bifidobacterium and Lactobacillus in the stool samples of children receiving fructans was 19.9% and 7.8% higher, respectively, than that of the control group at week 24. Additionally, children in the treatment group had much softer stools beginning at week 12 [86].

Recent research suggests that certain prebiotics may influence the regulation of mucus formation, composition, and breakdown. FOS has been investigated as a prebiotic in both animal and human subjects. These compounds may enhance glucose, lipid, and energy metabolism in the host by altering the makeup of the gut microbiota [87]. The injection of FOS has been shown to improve metabolic problems caused by a high-fat diet by enhancing the release of glucagon-like peptides 1 and 2 (GLP-1 and GLP-2) [88].

The study investigated the impact of fiber mixes at several doses in pediatric populations. Kokke et al. specifically examined the effects of a fiber blend in comparison to lactulose in a cohort of 97 children with functional constipation (FC) [89]. Nonetheless, no notable variations were seen in defecation frequency or stomach discomfort. In comparison to polyethylene glycol (PEG), a fiber blend of acacia fiber, psyllium fiber, and fructose had similar outcomes after 8 weeks regarding bowel movement frequency, stool consistency, and fecal incontinence [90]. A comprehensive review and meta-analysis of three randomized controlled trials examined the effectiveness of glucomannan in alleviating symptoms in children with functional constipation. Staiano and associates documented a statistically significant improvement in stool consistency after a 12-week therapy with 100 mg/kg of glucomannan in a group of 20 children [91].

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Supplementation of dietary fiber is a prevalent strategy for controlling IBS, albeit its efficacy may differ depending on the fiber type. Soluble fibers, present in some fruits and legumes, absorb water, decelerate intestinal transit, and diminish cholesterol absorption [85]. Conversely, insoluble fibers, present in fruit peels and bran, increase fecal volume and expedite intestinal transit, rendering them more appropriate for IBS patients suffering from constipation [41]. Baştürk et al. performed a study using a synbiotic formulation including the probiotic strains *Lactobacillus rhamnosus*, *Lactobacillus casei*, *Bifidobacterium lactis*, and *Lactobacillus plantarum*, alongside various prebiotics such as galactooligosaccharides (GOS), fiber, fructooligosaccharides (FOS), and polydextrose. Following four weeks of therapy, the overall advantages noted from the synbiotic intervention were markedly superior to those in the placebo group [92]. Probiotic supplements have shown significant enhancements in abdominal symptoms relative to placebo in individuals with IBS; nonetheless, there is a deficiency of long-term data about its use, especially in pediatric populations [41].

Conclusions

A link between obesity and functional gastrointestinal disorders (FGIDs) has been recognized since both problems exhibit shared traits such as high incidence in children, diet- and lifestyle-related risk factors, abnormalities in gut flora, and psychological difficulties. Managing this comorbid illness in pediatric patients has distinct problems, especially owing to inadequate adherence to standard therapies. This narrative review underscores the need for comprehensive and interdisciplinary strategies in symptom treatment. Nutrition education, physical exercise, and medical treatment should be supplemented with other measures, including psychosocial therapies and tailored dietary adjustments, such as low-FODMAP and fiber-enriched diets. These measures not only alleviate immediate signs but also provide a basis for enduring health advantages.

The interaction among abnormalities in gut microbiota, obesity, and functional gastrointestinal disorders suggests that modulating gut microbiota using prebiotics, probiotics, and integrative support has considerable potential. Despite existing data underscoring their promise in both prevention and therapy, the inconsistency in results necessitates rigorous, well-structured longitudinal research to formulate standardized methods and enhance their effectiveness. A comprehensive strategy that integrates these methodologies would promote scientific comprehension of the relationship among obesity, gut microbiota, and functional bowel disorders, while also elevating the standard of therapeutic and preventative treatment for juvenile patients. Future study should seek to clarify the reciprocal processes connecting these diseases, emphasizing targeted therapies customized to individual gut microbiota patterns. The uniformity of diagnostic requirements and intervention effectiveness measurements is essential for enhancing the repeatability and application of results.

Ultimately, closing the gaps in expertise and practice via a cohesive, evidence-based approach may enhance patient outcomes and enrich our understanding of the complex interplay among metabolic and gastrointestinal conditions in children.

References

Longstreth, G.F.; Thompson, W.G.; Chey, W.D.; Houghton, L.A.; Mearin, F.; Spiller, R.C. Functional Bowel Disorders. Gastroenterology 2006, 130, 1480–1491.
Hyams, J.S.; Di Lorenzo, C.; Saps, M.; Shulman, R.J.; Staiano, A.; van Tilburg, M. Childhood functional gastrointestinal disorders: Child/adolescent. Gastroenterology 2016, 150, 1456–1468.e2.
Boronat, A.C.; Ferreira-Maia, A.P.; Matijasevich, A.; Wang, Y.-P. Epidemiology of Functional Gastrointestinal Disorders in Children and Adolescents: A Systematic Review. World J. Gastroenterol. 2017, 23, 3915–3927.
Korterink, J.J.; Diederen, K.; Benninga, M.A.; Tabbers, M.M. Epidemiology of Pediatric Functional Abdominal Pain Disorders: A Meta-Analysis. PLoS ONE 2015, 10, e0126982.
Scarpato, E.; Kolacek, S.; Jojkic-Pavkov, D.; Konjik, V.; Živković, N.; Roman, E.; Kostovski, A.; Zdraveska, N.; Altamimi, E.; Papadopoulou, A.; et al. Prevalence of Functional Gastrointestinal Disorders in Children and Adolescents in the Mediterranean Region of Europe. Clin. Gastroenterol. Hepatol. 2018, 16, 870–876.
Tran, D.L.; Sintusek, P. Functional Constipation in Children: What Physicians Should Know. World J. Gastroenterol. 2023, 29, 1261–1288.
Mani, J.; Madani, S.; Thomas, R. Economic Impact and Prognostic Factors of Functional Dyspepsia in Children. J. Pediatr. Gastroenterol. Nutr. 2020, 70, E65–E70.

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Hoekman, D.R.; Rutten, J.M.T.M.; Vlieger, A.M.; Benninga, M.A.; Dijkgraaf, M.G.W. Annual Costs of Care for Pediatric Irritable Bowel Syndrome, Functional Abdominal Pain, and Functional Abdominal Pain Syndrome. J. Pediatr. 2015, 167, 1103–1108.e2.
Nurko, S.; Di Lorenzo, C. Functional Abdominal Pain: Time to Get Together and Move Forward. J. Pediatr. Gastroenterol. Nutr. 2008, 47, 679–680.
Devanarayana, N.M.; Rajindrajith, S. Irritable Bowel Syndrome in Children: Current Knowledge, Challenges and Opportunities. World J. Gastroenterol. 2018, 24, 2211–2235.
Nightingale, S.; Sharma, A. Functional Gastrointestinal Disorders in Children: What Is New? J. Paediatr. Child. Health 2020, 56, 1724–1730. [Google Scholar] [CrossRef]
Ganesh, M.; Nurko, S. Functional Dyspepsia in Children. Pediatr. Ann. 2014, 43, e101–e105.
Obesity and Overweight—World Health Organization (WHO).
Jebeile, H.; Kelly, A.S.; O'Malley, G.; Baur, L.A. Obesity in Children and Adolescents: Epidemiology, Causes, Assessment, and Management. Lancet Diabetes Endocrinol. 2022, 10, 351–365.
Phatak, U.P.; Pashankar, D.S. Obesity and Gastrointestinal Disorders in Children. J. Pediatr. Gastroenterol. Nutr. 2015, 60, 441–445.
Rajindrajith, S.; Devanarayana, N.M.; Benninga, M.A. Obesity and Functional Gastrointestinal Diseases in Children. J. Neurogastroenterol. Motil. 2014, 20, 414–416.
Pogodina, A.; Romanitsa, A.; Rychkova, L. Functional Bowel Disorders and Obesity in Children: State of the Problem. IJBM 2020, 10, 316–323.
NCD Risk Factor Collaboration (NCD-RisC). Worldwide Trends in Body-Mass Index, Underweight, Overweight, and Obesity from 1975 to 2016: A Pooled Analysis of 2416 Population-Based Measurement Studies in 128·9 Million Children, Adolescents, and Adults. Lancet 2017, 390, 2627–2642.
Smith, J.D.; Fu, E.; Kobayashi, M.A. Prevention and Management of Childhood Obesity and Its Psychological and Health Comorbidities. Annu. Rev. Clin. Psychol. 2020, 16, 351–378.
Leung, A.K.C.; Wong, A.H.C.; Hon, K.L. Childhood Obesity: An Updated Review. Curr. Pediatr. Rev. 2024, 20, 2–26.
Kumar, S.; Kelly, A.S. Review of Childhood Obesity: From Epidemiology, Etiology, and Comorbidities to Clinical Assessment and Treatment. Mayo Clin. Proc. 2017, 92, 251–265.
Teitelbaum, J.E.; Sinha, P.; Micale, M.; Yeung, S.; Jaeger, J. Obesity Is Related to Multiple Functional Abdominal Diseases. J. Pediatr. 2009, 154, 444–446.
Jackson, S.J.; Leahy, F.E.; McGowan, A.A.; Bluck, L.J.C.; Coward, W.A.; Jebb, S.A. Delayed Gastric Emptying in the Obese: An Assessment Using the Non-Invasive (13)C-Octanoic Acid Breath Test. Diabetes Obes. Metab. 2004, 6, 264–270.
Di Ciaula, A.; Wang, D.Q.-H.; Portincasa, P. Gallbladder and Gastric Motility in Obese Newborns, Pre-Adolescents and Adults. J. Gastroenterol. Hepatol. 2012, 27, 1298–1305.
Yoon, K.; Kim, N. Roles of Sex Hormones and Gender in the Gut Microbiota. J. Neurogastroenterol. Motil. 2021, 27, 314–325.
Galai, T.; Moran-Lev, H.; Cohen, S.; Ben-Tov, A.; Levy, D.; Weintraub, Y.; Amir, A.; Segev, O.; Yerushalmy-Feler, A. Higher Prevalence of Obesity among Children with Functional Abdominal Pain Disorders. BMC Pediatr. 2020, 20, 193.
Tambucci, R.; Quitadamo, P.; Ambrosi, M.; De Angelis, P.; Angelino, G.; Stagi, S.; Verrotti, A.; Staiano, A.; Farello, G. Association Between Obesity/Overweight and Functional Gastrointestinal Disorders in Children. J. Pediatr. Gastroenterol. Nutr. 2019, 68, 517–520.
Phatak, U.P.; Pashankar, D.S. Prevalence of Functional Gastrointestinal Disorders in Obese and Overweight Children. Int. J. Obes. 2014, 38, 1324–1327.
Pashankar, D.S.; Loening-Baucke, V. Increased Prevalence of Obesity in Children with Functional Constipation Evaluated in an Academic Medical Center. Pediatrics 2005, 116, e377–e380.
Zia, J.K.; Lenhart, A.; Yang, P.-L.; Heitkemper, M.M.; Baker, J.; Keefer, L.; Saps, M.; Cuff, C.; Hungria, G.; Videlock, E.J.; et al. Risk Factors for Abdominal Pain-Related Disorders of Gut-Brain Interaction in Adults and Children: A Systematic Review. Gastroenterology 2022, 163, 995–1023.e3.
Elitsur, Y.; Dementieva, Y.; Elitsur, R.; Rewalt, M. Obesity Is Not a Risk Factor in Children with Reflux Esophagitis: A Retrospective Analysis of 738 Children. Metab. Syndr. Relat. Disord. 2009, 7, 211–214.
Bonilla, S.; Wang, D.; Saps, M. Obesity Predicts Persistence of Pain in Children with Functional Gastrointestinal Disorders. Int. J. Obes. 2011, 35, 517–521.
Patel, N.R.; Ward, M.J.; Beneck, D.; Cunningham-Rundles, S.; Moon, A. The Association between Childhood Overweight and Reflux Esophagitis. J. Obes. 2010, 2010, 136909.
Meng, D.; Ai, S.; Spanos, M.; Shi, X.; Li, G.; Cretoiu, D.; Zhou, Q.; Xiao, J. Exercise and Microbiome: From Big Data to Therapy. Comput. Struct. Biotechnol. J. 2023, 21, 5434–5445.
Tan, S.; Santolaya, J.L.; Wright, T.F.; Liu, Q.; Fujikawa, T.; Chi, S.; Bergstrom, C.P.; Lopez, A.; Chen, Q.; Vale, G.; et al. Interaction between the Gut Microbiota and Colonic Enteroendocrine Cells Regulates Host Metabolism. Nat. Metab. 2024, 6, 1076–1091.
Kim, J.H.; Yi, D.Y.; Lee, Y.M.; Choi, Y.J.; Kim, J.Y.; Hong, Y.H.; Park, J.Y.; Kim, S.Y.; Lee, N.M.; Yun, S.W.; et al. Association between Body Mass Index and Fecal Calprotectin Levels in Children and Adolescents with Irritable Bowel Syndrome. Medicine 2022, 101, e29968.
Rainone, V.; Schneider, L.; Saulle, I.; Ricci, C.; Biasin, M.; Al-Daghri, N.M.; Giani, E.; Zuccotti, G.V.; Clerici, M.; Trabattoni, D. Upregulation of Inflammasome Activity and Increased Gut Permeability Are Associated with Obesity in Children and Adolescents. Int. J. Obes. 2016, 40, 1026–1033.

Nemchenko, U.M.; Grigorova, E.V.; Pogodina, A.V.; Belkova, N.L.; Voropaeva, N.M.; Romanitsa, A.I.; Grigoryeva, E.A.; Savelkaeva, M.V.; Rychkova, L.V. The Relationship between the Composition of the Microbiota and Functional Intestinal Disorders in Obese Adolescents. Klin. Lab. Diagn. 2022, 67, 106–109.
Chen, J.; Liu, X.; Zou, Y.; Gong, J.; Ge, Z.; Lin, X.; Zhang, W.; Huang, H.; Zhao, J.; Saw, P.E.; et al. A High-Fat Diet Promotes Cancer Progression by Inducing Gut Microbiota-Mediated Leucine Production and PMN-MDSC Differentiation. Proc. Natl. Acad. Sci. USA 2024, 121, e2306776121.
DiBaise, J.K.; Zhang, H.; Crowell, M.D.; Krajmalnik-Brown, R.; Decker, G.A.; Rittmann, B.E. Gut Microbiota and Its Possible Relationship with Obesity. Mayo Clin. Proc. 2008, 83, 460–469.
Brenchley, J.M.; Douek, D.C. Microbial Translocation across the GI Tract. Annu. Rev. Immunol. 2012, 30, 149–173.
Vermeire, S.; Van Assche, G.; Rutgeerts, P. C-Reactive Protein as a Marker for Inflammatory Bowel Disease. Inflamm. Bowel Dis. 2004, 10, 661–665.
Hollander, D.; Vadheim, C.M.; Brettholz, E.; Petersen, G.M.; Delahunty, T.; Rotter, J.I. Increased Intestinal Permeability in Patients with Crohn's Disease and Their Relatives. A Possible Etiologic Factor. Ann. Intern. Med. 1986, 105, 883–885.
Gardiner, K.R.; Halliday, M.I.; Barclay, G.R.; Milne, L.; Brown, D.; Stephens, S.; Maxwell, R.J.; Rowlands, B.J. Significance of Systemic Endotoxaemia in Inflammatory Bowel Disease. Gut 1995, 36, 897–901.
Mulders, R.J.; de Git, K.C.G.; Schéle, E.; Dickson, S.L.; Sanz, Y.; Adan, R.A.H. Microbiota in Obesity: Interactions with Enteroendocrine, Immune and Central Nervous Systems. Obes. Rev. 2018, 19, 435–451.
Duan, M.; Wang, Y.; Zhang, Q.; Zou, R.; Guo, M.; Zheng, H. Characteristics of Gut Microbiota in People with Obesity. PLoS ONE 2021, 16, e0255446.
Xu, Z.; Jiang, W.; Huang, W.; Lin, Y.; Chan, F.K.L.; Ng, S.C. Gut Microbiota in Patients with Obesity and Metabolic Disorders—A Systematic Review. Genes. Nutr. 2022, 17, 2.
Scheithauer, T.P.M.; Rampanelli, E.; Nieuwdorp, M.; Vallance, B.A.; Verchere, C.B.; van Raalte, D.H.; Herrema, H. Gut Microbiota as a Trigger for Metabolic Inflammation in Obesity and Type 2 Diabetes. Front. Immunol. 2020, 11, 571731.
Zeevenhooven, J.; Browne, P.D.; L'Hoir, M.P.; De Weerth, C.; Benninga, M.A. Infant Colic: Mechanisms and Management. Nat. Rev. Gastroenterol. Hepatol. 2018, 15, 479–496.
Corsello, A.; Pugliese, D.; Gasbarrini, A.; Armuzzi, A. Diet and Nutrients in Gastrointestinal Chronic Diseases. Nutrients 2020, 12, 2693.
Singh, R.; Zogg, H.; Ghoshal, U.C.; Ro, S. Current Treatment Options and Therapeutic Insights for Gastrointestinal Dysmotility and Functional Gastrointestinal Disorders. Front. Pharmacol. 2022, 13, 808195.
Tuck, C.J.; Reed, D.E.; Muir, J.G.; Vanner, S.J. Implementation of the Low FODMAP Diet in Functional Gastrointestinal Symptoms: A Real-world Experience. Neurogastroenterol. Motil. 2020, 32, e13730.
Wirth, S.; Klodt, C.; Wintermeyer, P.; Berrang, J.; Hensel, K.; Langer, T.; Heusch, A. Positive or Negative Fructose Breath Test Results do not Predict Response to Fructose Restricted Diet in Children with Recurrent Abdominal Pain: Results from a Prospective Randomized Trial. Klin. Padiatr. 2014, 226, 268–273.
Rej, A.; Avery, A.; Aziz, I.; Black, C.J.; Bowyer, R.K.; Buckle, R.L.; Seamark, L.; Shaw, C.C.; Thompson, J.; Trott, N.; et al. Diet and Irritable Bowel Syndrome: An Update from a UK Consensus Meeting. BMC Med. 2022, 20, 287.
Hua, C.; Chen, Y.-L.; Tao, Q.-F.; Shi, Y.-Z.; Li, L.-W.; Xie, C.-R.; Chen, M.; Zhou, Z.-L.; Zheng, H. Dietary Interventions for Pediatric Patients with Functional Abdominal Pain Disorders: A Systematic Review and Network Meta-Analysis. Eur. J. Pediatr. 2023, 182, 2943–2956.
Usai Satta, P.; Mocci, G.; Lai, M. FODMAP Diet in Celiac Disease and Gluten-Related Disorders. Nutrients 2024, 16, 4190.
Roncoroni, L.; Elli, L.; Doneda, L.; Bascuñán, K.A.; Vecchi, M.; Morreale, F.; Scricciolo, A.; Lombardo, V.; Pellegrini, N. A Retrospective Study on Dietary FODMAP Intake in Celiac Patients Following a Gluten-Free Diet. Nutrients 2018, 10, 1769.
Lucas Zapata, P.; García Navarro, E.; Ribes Koninckx, C. The Low-FODMAP Diet. An. Pediatría (Engl. Ed.) 2024, 101, 36–45.
Thomassen, R.A.; Luque, V.; Assa, A.; Borrelli, O.; Broekaert, I.; Dolinsek, J.; Martin-de-Carpi, J.; Mas, E.; Miele, E.; Norsa, L.; et al. An ESPGHAN Position Paper on the Use of Low-FODMAP Diet in Pediatric Gastroenterology. J. Pediatr. Gastroenterol. Nutr. 2022, 75, 356–368.
Katsagoni, C.N.; Karagianni, V.-M.; Papadopoulou, A. Efficacy of Different Dietary Patterns in the Treatment of Functional Gastrointestinal Disorders in Children and Adolescents: A Systematic Review of Intervention Studies. Nutrients 2023, 15, 2708.
El Ezaby, S.A.; Manzour, A.F.; Eldeeb, M.; El Gendy, Y.G.; Abdel Hamid, D.M. Effect of the Low Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (FODMAP) Diet on Control of Pediatric Irritable Bowel Syndrome and Quality of Life Among a Sample of Egyptian Children: A Randomized Controlled Clinical Trial. Cureus 2024, 16, e61017.
Tenenbaum, R.B.; Czyzewski, D.; McMeans, A.; Narayana, V.; Chumpitazi, B.P.; Levy, R.L.; Shulman, R.J.; Musaad, S.; Mirabile, Y.Z.; Self, M. Factors Associated with Adherence to a Low Fermentable Carbohydrate Diet in Children with Functional Gastrointestinal Disorders. J. Acad. Nutr. Diet. 2024, 124, 757–762.
Posovszky, C.; Roesler, V.; Becker, S.; Iven, E.; Hudert, C.; Ebinger, F.; Calvano, C.; Warschburger, P. Roles of Lactose and Fructose Malabsorption and Dietary Outcomes in Children Presenting with Chronic Abdominal Pain. Nutrients 2019, 11, 3063.
Kwiecień, J.; Hajzler, W.; Kosek, K.; Balcerowicz, S.; Grzanka, D.; Gościniak, W.; Górowska-Kowolik, K. No Correlation between Positive Fructose Hydrogen Breath Test and Clinical Symptoms in Children with Functional Gastrointestinal Disorders: A Retrospective Single-Centre Study. Nutrients 2021, 13, 2891.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 12924 – 12936
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https://ecohumanism.co.uk/joe/ecohumanism
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Haiden, N.; Savino, F.; Hill, S.; Kivelä, L.; De Koning, B.; Köglmeier, J.; Luque, V.; Moltu, S.J.; Norsa, L.; De Pipaon, M.S.; et al. Infant Formulas for the Treatment of Functional Gastrointestinal Disorders: A Position Paper of the ESPGHAN Nutrition Committee. J. Pediatr. Gastroenterol. Nutr. 2024, 79, 168–180.
Black, R.E.; Williams, S.M.; Jones, I.E.; Goulding, A. Children Who Avoid Drinking Cow Milk Have Low Dietary Calcium Intakes and Poor Bone Health. Am. J. Clin. Nutr. 2002, 76, 675–680.
Lizzi, M.; Sgrazzutti, L.; Porreca, A.; Di Filippo, P.; Cauzzo, C.; Di Pillo, S.; Chiarelli, F.; Attanasi, M. Longitudinal Prospective Anthropometric Evaluation in Caucasian Prepubertal Children with Lactose Intolerance. Front. Pediatr. 2023, 11, 1219195.
Pienar, C.; Pop, L.; Lăzărescu, M.; Costăchescu, R.; Şeclăman, E. Anthropometric and Metabolic Profile of Children with Gene Polymorphisms for Primary Lactose Intolerance. Exp. Ther. Med. 2021, 22, 1333.
Lehtimäki, T.; Hemminki, J.; Rontu, R.; Mikkilä, V.; Räsänen, L.; Laaksonen, M.; Hutri-Kähönen, N.; Kähönen, M.; Viikari, J.; Raitakari, O. The Effects of Adult-Type Hypolactasia on Body Height Growth and Dietary Calcium Intake from Childhood into Young Adulthood: A 21-Year Follow-up Study--the Cardiovascular Risk in Young Finns Study. Pediatrics 2006, 118, 1553–1559.
Jin, R.; Welsh, J.A.; Le, N.-A.; Holzberg, J.; Sharma, P.; Martin, D.R.; Vos, M.B. Dietary Fructose Reduction Improves Markers of Cardiovascular Disease Risk in Hispanic-American Adolescents with NAFLD. Nutrients 2014, 6, 3187–3201.
Farías, C.; Cisternas, C.; Gana, J.C.; Alberti, G.; Echeverría, F.; Videla, L.A.; Mercado, L.; Muñoz, Y.; Valenzuela, R. Dietary and Nutritional Interventions in Nonalcoholic Fatty Liver Disease in Pediatrics. Nutrients 2023, 15, 4829.
Staltner, R.; Burger, K.; Baumann, A.; Bergheim, I. Fructose: A Modulator of Intestinal Barrier Function and Hepatic Health? Eur. J. Nutr. 2023, 62, 3113–3124.
Hou, K.; Wu, Z.-X.; Chen, X.-Y.; Wang, J.-Q.; Zhang, D.; Xiao, C.; Zhu, D.; Koya, J.B.; Wei, L.; Li, J.; et al. Microbiota in Health and Diseases. Signal Transduct. Target. Ther. 2022, 7, 135.
Cho, K.Y. Association of Gut Microbiota with Obesity in Children and Adolescents. Clin. Exp. Pediatr. 2023, 66, 148–154.
Geng, J.; Ni, Q.; Sun, W.; Li, L.; Feng, X. The Links between Gut Microbiota and Obesity and Obesity Related Diseases. Biomed. Pharmacother. 2022, 147, 112678.
Shin, A.; Preidis, G.A.; Shulman, R.; Kashyap, P.C. The Gut Microbiome in Adult and Pediatric Functional Gastrointestinal Disorders. Clin. Gastroenterol. Hepatol. 2019, 17, 256–274.
Chen, X.; Sun, H.; Jiang, F.; Shen, Y.; Li, X.; Hu, X.; Shen, X.; Wei, P. Alteration of the Gut Microbiota Associated with Childhood Obesity by 16S rRNA Gene Sequencing. PeerJ 2020, 8, e8317.
Da Silva, C.C.; Monteil, M.A.; Davis, E.M. Overweight and Obesity in Children Are Associated with an Abundance of Firmicutes and Reduction of Bifidobacterium in Their Gastrointestinal Microbiota. Child. Obes. 2020, 16, 204–210.
Li, X.-M.; Lv, Q.; Chen, Y.-J.; Yan, L.-B.; Xiong, X. Association between Childhood Obesity and Gut Microbiota: 16S rRNA Gene Sequencing-Based Cohort Study. World J. Gastroenterol. 2024, 30, 2249–2257.
Saulnier, D.M.; Ringel, Y.; Heyman, M.B.; Foster, J.A.; Bercik, P.; Shulman, R.J.; Versalovic, J.; Verdu, E.; Dinan, T.G.; Hecht, G.; et al. The Intestinal Microbiome, Probiotics and Prebiotics in Neurogastroenterology. Gut Microbes 2013, 4, 17–27.
Bin Waqar, S.H.; Rehan, A. Methane and Constipation-Predominant Irritable Bowel Syndrome: Entwining Pillars of Emerging Neurogastroenterology. Cureus 2019, 11, e4764.
De Meij, T.G.J.; De Groot, E.F.J.; Eck, A.; Budding, A.E.; Kneepkens, C.M.F.; Benninga, M.A.; Van Bodegraven, A.A.; Savelkoul, P.H.M. Characterization of Microbiota in Children with Chronic Functional Constipation. PLoS ONE 2016, 11, e0164731.
Zhu, L.; Liu, W.; Alkhouri, R.; Baker, R.D.; Bard, J.E.; Quigley, E.M.; Baker, S.S. Structural Changes in the Gut Microbiome of Constipated Patients. Physiol. Genom. 2014, 46, 679–686.
Zoppi, G.; Cinquetti, M.; Luciano, A.; Benini, A.; Muner, A.; Minelli, E.B. The Intestinal Ecosystem in Chronic Functional Constipation. Acta Paediatr. 1998, 87, 836–841.
Closa-Monasterolo, R.; Ferré, N.; Castillejo-DeVillasante, G.; Luque, V.; Gispert-Llaurado, M.; Zaragoza-Jordana, M.; Theis, S.; Escribano, J. The Use of Inulin-Type Fructans Improves Stool Consistency in Constipated Children. A Randomised Clinical Trial: Pilot Study. Int. J. Food Sci. Nutr. 2017, 68, 587–594.
Lohner, S.; Jakobik, V.; Mihályi, K.; Soldi, S.; Vasileiadis, S.; Theis, S.; Sailer, M.; Sieland, C.; Berényi, K.; Boehm, G.; et al. Inulin-Type Fructan Supplementation of 3- to 6-Year-Old Children Is Associated with Higher Fecal Bifidobacterium Concentrations and Fewer Febrile Episodes Requiring Medical Attention. J. Nutr. 2018, 148, 1300–1308.
Abot, A.; Wemelle, E.; Laurens, C.; Paquot, A.; Pomie, N.; Carper, D.; Bessac, A.; Mas Orea, X.; Fremez, C.; Fontanie, M.; et al. Identification of New Enterosynes Using Prebiotics: Roles of Bioactive Lipids and Mu-Opioid Receptor Signalling in Humans and Mice. Gut 2021, 70, 1078–1087.
Everard, A.; Lazarevic, V.; Derrien, M.; Girard, M.; Muccioli, G.G.; Neyrinck, A.M.; Possemiers, S.; Van Holle, A.; François, P.; De Vos, W.M.; et al. Responses of Gut Microbiota and Glucose and Lipid Metabolism to Prebiotics in Genetic Obese and Diet-Induced Leptin-Resistant Mice. Diabetes 2011, 60, 2775–2786.
Kokke, F.T.M.; Scholtens, P.A.M.J.; Alles, M.S.; Decates, T.S.; Fiselier, T.J.W.; Tolboom, J.J.M.; Kimpen, J.L.L.; Benninga, M.A. A Dietary Fiber Mixture versus Lactulose in the Treatment of Childhood Constipation: A Double-Blind Randomized Controlled Trial. J. Pediatr. Gastroenterol. Nutr. 2008, 47, 592–597.
Han, Y.; Zhang, L.; Liu, X.-Q.; Zhao, Z.-J.; Lv, L.-X. Effect of Glucomannan on Functional Constipation in Children: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. Asia Pac. J. Clin. Nutr. 2017, 26, 471–477.

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Staiano, A.; Simeone, D.; Del Giudice, E.; Miele, E.; Tozzi, A.; Toraldo, C. Effect of the Dietary Fiber Glucomannan on Chronic Constipation in Neurologically Impaired Children. J. Pediatr. 2000, 136, 41–45.

Başẗurk, A.; Artan, R.; Atalay, A.; Yılmaz, A. Investigation of the Efficacy of Synbiotics in the Treatment of Functional Constipation in Children: A Randomized Double-Blind Placebo-Controlled Study. Turk. J. Gastroenterol. 2017, 28, 388–393.

Journal of Ecohumanism
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المناهج متعددة التخصصات لفهم وإدارة العلاقة بين السمنة لدى الأطفال واضطرابات الجهاز الهضمي الوظيفية: مراجعة شاملة

الملخص

الخلفية:

تُعد اضطرابات الجهاز الهضمي الوظيفية (FGIDs) شائعة بين الأطفال والمراهقين، وغالبًا ما ترتبط بالسمنة والمشكلات الهضمية المصاحبة لها. يُعد فهم العلاقة المتبادلة بين السمنة واضطرابات الجهاز الهضمي الوظيفية أمرًا بالغ الأهمية لتطوير استراتيجيات علاجية فعالة.

المنهجية:

تستعرض هذه المراجعة السردية العلاقة بين السمنة واضطرابات الأمعاء الوظيفية (FBDs) لدى الأطفال. تم إجراء بحث شامل في قاعدة بيانات **PubMed**، مع التركيز على الدراسات المنشورة باللغة الإنجليزية في السنوات الأخيرة. تسلط المراجعة الضوء على **علم الأوبئة، والفيزيولوجيا المرضية، والاستراتيجيات العلاجية** لاضطرابات الجهاز الهضمي الوظيفية في سياق السمنة لدى الأطفال.

النتائج:

تشير النتائج إلى وجود ارتباط كبير بين **السمنة واضطرابات الجهاز الهضمي الوظيفية**، حيث تُظهر الدراسات معدلات انتشار أعلى لحالات مثل **متلازمة القولون العصبي (IBS) والإمساك الوظيفي (FC)** بين الأطفال الذين يعانون من زيادة الوزن. تحدد المراجعة عدة عوامل خطر شائعة، بما في ذلك **العادات الغذائية، وتغيرات ميكروبيوم الأمعاء، والضغوط النفسية**. وقد أثبتت بعض التدخلات، مثل **تعديلات النظام الغذائي والتثقيف الغذائي**، فعاليتها في تخفيف الأعراض وتحسين النتائج الصحية. ومع ذلك، فإن التفاوت في منهجيات البحث والنتائج يستدعي المزيد من الدراسات المستقبلية.

الاستنتاج:

يتطلب التعامل مع اضطرابات الجهاز الهضمي الوظيفية المرتبطة بالسمنة لدى الأطفال **نهجًا متعدد التخصصات** يشمل **الاستراتيجيات الغذائية، والدعم النفسي، وتعديلات نمط الحياة**. ينبغي أن تركز الأبحاث المستقبلية على توضيح الآليات التي تربط بين السمنة واضطرابات الجهاز الهضمي الوظيفية، بالإضافة إلى تطوير تدخلات موجهة تتناسب مع احتياجات كل مريض. إن اتباع نهج شامل في معالجة هذه الحالات المصاحبة يمكن أن يعزز جودة الحياة للأطفال والمراهقين المتأثرين بها.

الكلمات المفتاحية :اضطرابات الجهاز الهضمي الوظيفية، السمنة، صحة الأطفال، التدخلات الغذائية، ميكروبيوم الأمعاء.