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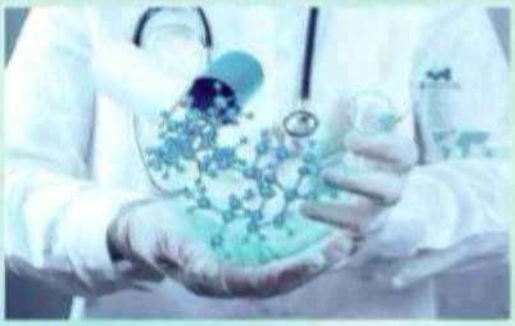

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✓ ***Rezyume***

Ushbu maqolada bolalarda malabsorbsiya sindromi bilan kechuvchi asosiy kasalliklar — seliakiya, laktaza yetishmovchiligi, mukovissidoz, qisqa ichak sindromi va ichak yallig‘lanish kasalliklarining klinik-laborator va instrumental belgilari qiyosiy tahlil qilindi. Malabsorbsiya sindromi bolalar yoshida uchraydigan muhim klinik holat bo‘lib, ozuqa moddalarining ichakda so‘rilish jarayonining buzilishi bilan tavsiflanadi. Qiyosiy tashxisot mezonlari aniqlanib, amaliyotda erta tashxis qo‘yish ahamiyati yoritib berildi.

Kalit so‘zlar: malabsorbsiya sindromi, bolalar, seliakiya, laktaza yetishmovchiligi, mukovissidoz, qiyosiy tashxisot.

СРАВНИТЕЛЬНАЯ ДИАГНОСТИКА ЗАБОЛЕВАНИЙ, ПРОТЕКАЮЩИХ С СИНДРОМОМ МАЛЬАБСОРБЦИИ У ДЕТЕЙ

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✓ ***Резюме***

В данной статье проведён сравнительный анализ клинико-лабораторных и инструментальных признаков основных заболеваний, протекающих с синдромом мальабсорбции у детей — целиакии, лактазной недостаточности, муковисцидоза, синдрома короткой кишки и воспалительных заболеваний кишечника. Синдром мальабсорбции является важным клиническим состоянием в детском возрасте и характеризуется нарушением процесса всасывания питательных веществ в кишечнике. Определены критерии сравнительной диагностики, а также освещено значение ранней постановки диагноза в клинической практике.

Ключевые слова: синдром мальабсорбции, дети, целиакия, лактазная недостаточность, муковисцидоз, сравнительная диагностика.

COMPARATIVE DIAGNOSIS OF DISEASES ASSOCIATED WITH MALABSORPTION SYNDROME IN CHILDREN

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✓ ***Resume***

This article presents a comparative analysis of the main diseases associated with malabsorption syndrome in children, including celiac disease, lactase deficiency, cystic fibrosis, short bowel syndrome, and inflammatory bowel diseases, based on their clinical, laboratory, and instrumental characteristics. Malabsorption syndrome in childhood represents a significant clinical condition characterized by impaired intestinal absorption of nutrients. Differential diagnostic criteria were identified, and the importance of early diagnosis in clinical practice was emphasized.

Keywords: malabsorption syndrome, children, celiac disease, lactase deficiency, cystic fibrosis, differential diagnosis.

Relevance

Malabsorption syndrome (MS) is one of the most complex and multifactorial clinical syndromes in pediatric gastroenterology. It develops as a result of impaired digestion or intestinal absorption of nutrients and manifests in children as body weight deficiency, growth retardation, hypovitaminosis, and metabolic disturbances [1].

Foreign authors emphasize that malabsorption syndrome is not an independent nosological entity but rather a common clinical manifestation of various diseases. W.A. Walker notes: *"Malabsorption in children should be viewed as a clinical signal prompting an extensive search for the underlying disease rather than as a final diagnosis"* [2]. R. Kliegman et al. point out that due to the similarity of clinical manifestations, differential diagnosis of diseases associated with malabsorption syndrome in children presents significant challenges. Symptoms such as diarrhea, steatorrhea, meteorism, and nutritional deficiency may appear similarly in disorders of different etiologies [3].

According to the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN), the most common causes of malabsorption syndrome in children are celiac disease, lactase deficiency, cystic fibrosis, and inflammatory bowel diseases [4]. S. Guandalini reports that due to clinical similarities with other malabsorption disorders, celiac disease is often diagnosed late, resulting in prolonged morbidity and impaired quality of life in pediatric patients [5]. P.M. Farrell highlights that malabsorption syndrome in cystic fibrosis develops as a consequence of exocrine pancreatic insufficiency and is characterized by severe steatorrhea and hypoproteinemia, requiring early detection [6].

According to the World Health Organization (WHO), chronic malabsorption syndrome remains a serious public health issue, especially in developing countries, contributing to increased child mortality, anemia, and developmental delay [9].

These findings confirm that comparative diagnosis of diseases associated with malabsorption syndrome remains an актуал issue in modern pediatrics and pediatric gastroenterology and requires a comprehensive clinical, laboratory, and instrumental approach.

Aim and Objectives: The aim of the study was to conduct a comparative analysis of the clinical and laboratory characteristics of the main diseases associated with malabsorption syndrome in children and to improve differential diagnostic criteria.

— Objectives included:
— Analysis of major diseases associated with malabsorption syndrome;
— Comparative assessment of their clinical manifestations;
— Determination of the diagnostic value of laboratory and instrumental methods;
— Identification of the most reliable differential diagnostic criteria;
— Evaluation of the clinical significance of early diagnosis.

Materials and methods

This retrospective observational comparative study was conducted between 2020 and 2024 in pediatric and pediatric gastroenterology departments. Study Population. A total of 36 children aged 1 to 14 years presenting with clinical signs of malabsorption syndrome were included. Patients were divided into the following groups:

Group I: Celiac disease (n = 9)

Group II: Lactase deficiency (n = 19)

Group III: Cystic fibrosis (n = 3)

Group IV: Short bowel syndrome or inflammatory bowel diseases (n = 5)

The control group consisted of healthy children with normal physical development and no gastrointestinal pathology.

Inclusion Criteria:

- Chronic diarrhea (>2 weeks);
- Body weight deficiency or growth retardation;
- Steatorrhea and meteorism;
- Laboratory signs of malabsorption

Exclusion Criteria:

- Acute intestinal infections;
- Endocrine diseases (diabetes mellitus, hypothyroidism);
- Oncological diseases; I
- nsufficient clinical data

Clinical and Laboratory Assessment. A complete clinical examination was performed. Special attention was given to:

— Nutritional history;
— Duration and characteristics of diarrhea;
— Weight loss dynamics;
— Hereditary factors;
— Associated symptoms (abdominal pain, vomiting, decreased appetite).

Physical development was evaluated according to WHO standards, including body weight, height, BMI, and Z-score indices.

Laboratory investigations included: Complete blood count; Biochemical blood analysis (total protein, albumin, electrolytes); Iron metabolism parameters; Vitamin D and B12 levels; Coprological examination (steatorrhea, amylorrhea, creatorrhea).

Specific tests:

a. In patients with suspected celiac disease, anti-tTG IgA and anti-endomysial antibodies (EMA) were determined.

b. In patients with suspected lactase deficiency, hydrogen breath testing and an elimination diet trial were performed.

c. In cases of suspected cystic fibrosis, sweat testing and assessment of pancreatic enzyme activity were carried out. When indicated, esophagogastroduodenoscopy (EGD) and intestinal mucosal biopsy were performed.

Comparative Diagnostic Method. Based on all collected clinical, laboratory, and instrumental data, a comparative analysis of diseases associated with malabsorption syndrome was performed. The main differential criteria included:

- severity of clinical symptoms;
- degree of nutritional impairment;
- specific laboratory markers;
- results of instrumental investigations.

The obtained data were subjected to statistical analysis. Results were expressed as mean ± standard deviation (M±SD). Differences between groups were considered statistically significant at $p < 0.05$.

Results. All patients exhibited common clinical features of malabsorption syndrome, including:

a. Chronic diarrhea
b. Body weight deficiency
c. Abdominal distension
d. Decreased appetite
e. General weakness

However, severity and predominance of symptoms varied by disease.

Celiac Disease. Most children demonstrated chronic diarrhea, steatorrhea, marked weight deficiency, growth retardation, and hypochromic anemia. Serological markers (anti-tTG IgA, EMA) were significantly elevated. Intestinal biopsy revealed villous atrophy and crypt hyperplasia[11].

Lactase Deficiency. Symptoms intensified after consumption of dairy products. Diarrhea was predominantly osmotic in nature, and general nutritional status was relatively preserved. Hydrogen breath testing was diagnostically decisive[10].

Cystic Fibrosis. This group exhibited the most severe clinical course, characterized by pronounced steatorrhea, hypoproteinemia, hypovitaminosis, and severe growth delay. Sweat test results were positive, and pancreatic insufficiency was confirmed.

Short Bowel Syndrome and Inflammatory Bowel Disease. Electrolyte imbalance, dehydration, and frequent defecation predominated. Malabsorption resulted from reduced absorptive surface area or inflammatory damage[15].

Table 1

Comparative Characteristics of Clinical Manifestations of Diseases Associated with Malabsorption Syndrome in Children

Clinical Signs	Celiac Disease	Lactase Deficiency	Cystic Fibrosis	Short Bowel Syndrome
Chronic diarrhea	+++	++	+++	+++
Steatorrhea	+++	+	+++	++
Abdominal distension	++	+++	++	++
Symptoms associated with dairy products	–	+++	–	–
Body weight deficiency	+++	+	+++	++
Growth retardation	+++	±	+++	++
Anemia	++	–	++	+
Hypovitaminosis	++	–	+++	++

Note: +++ – pronounced; ++ – moderate; + – mild; ± – occasional; – – not characteristic.

Comparative analysis demonstrated that despite similar clinical presentations, specific laboratory and instrumental investigations allow accurate differentiation. Serological markers were crucial for celiac disease, functional tests for lactase deficiency, and biochemical and sweat testing for cystic fibrosis.

Z-score indices were significantly lower in celiac disease and cystic fibrosis groups compared to controls ($p < 0.05$). In the lactase deficiency group, these parameters were found to be relatively mildly impaired.

Laboratory findings confirmed the different pathogenetic mechanisms underlying malabsorption syndrome.

In the celiac disease group, elevated levels of anti-tTG IgA and anti-endomysial antibodies (EMA) were detected.

In the cystic fibrosis group, a statistically significant decrease in serum total protein and albumin levels was observed.

In children with lactase deficiency, coprogram analysis revealed an acidic stool environment and features of osmotic diarrhea.

In short bowel syndrome, electrolyte imbalance and micronutrient deficiencies were noted[14,16].

Instrumental Investigation Results. Esophagogastroduodenoscopy and intestinal biopsy findings in the celiac disease group confirmed mucosal villous atrophy and crypt hyperplasia. In cystic fibrosis, changes characteristic of pancreatic insufficiency were identified.

Table 2

Comparative Analysis of Laboratory and Instrumental Indicators in Diseases Associated with Malabsorption Syndrome

Indicators	Celiac Disease	Lactase Deficiency	Cystic Fibrosis	Short Bowel Syndrome
Anti-tTG IgA	+++	–	–	–
EMA antibodies	+++	–	–	–
Steatorrhea in coprogram	+++	+	+++	++
Decreased total protein	+	–	+++	++
Electrolyte disturbances	±	–	+	+++
Hydrogen breath test	–	+++	–	–
Sweat test	–	–	+++	–
Intestinal biopsy: villous atrophy	+++	–	–	±

Note: The data presented in the comparative table demonstrate that although malabsorption syndrome may present with clinically similar manifestations, the diseases can be clearly differentiated through specific laboratory and instrumental investigations. In particular, serological markers are decisive in the diagnosis of celiac disease, functional tests are essential for lactase deficiency, while biochemical parameters and sweat tests play a crucial role in diagnosing cystic fibrosis.

Results of the Comparative Analysis: Based on the obtained data, the comparative assessment of diseases associated with malabsorption syndrome showed the following: despite the similarity of clinical manifestations, specific laboratory markers have decisive diagnostic value; serological tests demonstrate the highest sensitivity in the diagnosis of celiac disease; functional tests represent the main diagnostic method for lactase deficiency; and in cystic fibrosis, comprehensive clinical and biochemical evaluation is required[12].

Discussion: the obtained results demonstrated that although diseases associated with malabsorption syndrome in children share similar clinical manifestations, there are significant differences in their etiology, pathogenesis, and diagnostic criteria. The collected data are reflected in the comparative tables and are of substantial practical importance for establishing a differential diagnosis.

In the present study, children with celiac disease most frequently presented with chronic diarrhea, steatorrhea, underweight, and growth retardation. These findings are consistent with studies conducted by Guandalini et al., who describe celiac disease as one of the most common causes of malabsorption syndrome in children. Moreover, the high diagnostic value of serological markers—anti-tTG IgA and EMA antibodies—was also confirmed in this study [13].

In the lactase deficiency group, clinical symptoms were primarily associated with the consumption of dairy products, while overall nutritional status remained relatively preserved. This observation indicates that the mechanism of malabsorption in this condition is limited and mainly related to carbohydrate metabolism. Therefore, functional tests, particularly the hydrogen breath test, proved to be of decisive importance in the differential diagnosis of lactase deficiency.

Children with cystic fibrosis were found to have the most severe clinical course of malabsorption syndrome. Due to exocrine pancreatic insufficiency, steatorrhea, hypoproteinemia, hypovitaminosis, and marked physical growth retardation were observed. These findings are consistent with the data described by Farrell, confirming that malabsorption syndrome in cystic fibrosis significantly affects the quality of life in pediatric patients [14].

In patients with short bowel syndrome and inflammatory bowel diseases, electrolyte disturbances, dehydration, and frequent defecation were identified as predominant clinical manifestations. In these conditions, malabsorption syndrome is explained by a reduced absorptive surface area resulting from intestinal resection or inflammatory damage [16].

The comparative analysis showed that relying solely on clinical manifestations may often lead to incorrect conclusions. In particular, similar clinical presentations of celiac disease and cystic fibrosis cannot be clearly differentiated without specific laboratory and instrumental investigations. Therefore, as recommended in contemporary literature, a comprehensive diagnostic approach should be applied when malabsorption syndrome is suspected in children.

The obtained results are of significant importance for practicing pediatricians and pediatric gastroenterologists, contributing to the improvement of differential diagnostic algorithms. Early and accurate diagnosis allows prevention of nutritional complications, skeletal disorders, and immunodeficiency conditions.

Conclusion

Malabsorption syndrome in childhood is a common clinical condition observed in diseases of various etiologies and is manifested by growth retardation, underweight, and metabolic disturbances.

The conducted comparative analysis revealed that celiac disease, lactase deficiency, cystic fibrosis, and short bowel syndrome are among the most frequent causes of malabsorption syndrome in children.

In children with celiac disease and cystic fibrosis, malabsorption syndrome is characterized by a severe clinical course, with steatorrhea, hypoproteinemia, hypovitaminosis, and growth delay occurring at a significantly higher frequency.

In lactase deficiency, clinical symptoms are mainly associated with impaired carbohydrate metabolism, while the relatively preserved overall nutritional status serves as an important criterion in the differential diagnosis of this condition.

It was established that in the differential diagnosis of diseases associated with malabsorption syndrome, specific laboratory (serological and biochemical) and functional investigations have greater diagnostic value than clinical manifestations alone.

When malabsorption syndrome is suspected in children, the application of a comprehensive clinical, laboratory, and instrumental approach enables early diagnosis, appropriate selection of treatment strategies, and prevention of long-term nutritional and developmental complications.

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