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THE SIGNIFICANCE OF HELICOBACTER PYLORI INFECTION IN GASTROINTESTINAL FOOD ALLERGIES IN CHILDREN

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Abstract: This review presents the data of modern scientific studies indicating the pathogenetic relationship of Helicobacter pylori infection with the gastrointestinal form of food allergy in children. From the position of foreign researchers, the cascade mechanism of the immune response is considered, in the form of an allergic reaction that occurs when the integrity of the gastrointestinal barrier is violated by Helicobacter pylori infection. The authors have formulated a conclusion about the spectrum of pathogenicity of the microbe, its dual role in the immune system, as a protective agent and a factor provoking food allergies.

Keywords: Helicobacter pylori, gastrointestinal allergy, food allergy, immunity, gastrointestinal tract, children

Introduction: Chronic diseases of the digestive system are among the most common in childhood. The leading etiopathogenetic factor in the formation of inflammatory gastroduodenal pathology is Helicobacter pylori infection. Numerous studies in this area have made a significant contribution to understanding the mechanisms of Helicobacter pylori persistence in the body [1].

Helicobacter pylori is the most common bacterial infection in the world. The bacteria have the ability to persist in infected individuals for many decades. Over the course of evolution, bacteria have acquired character traits that allow them to evade and destroy both innate and adaptive branches of the immune system to ensure their persistence before the local and systemic immune response [2].

Helicobacter pylori is estimated to be present in the stomach of about half of the world's population. It usually colonizes the gastric mucosa from early childhood, where it persists throughout life if it is not treated with antibiotics. This is the main cause of peptic ulcer and stomach cancer, however, the disease occurs only in 10-15% of cases, and the infection usually remains asymptomatic [3].

In recent years, there has been a tendency to reduce the prevalence of Helicobacter pylori infection among children. In their study, Chinese researchers Tang et al. a statistically significant decrease in the level of Helicobacter pylori infection in children with symptoms of the disease was reported in the period from 2005 (25.6%) to 2017 (12.8%) in China [4].

The researchers compared the prevalence of active Helicobacter pylori infection among children with and without allergies, as well as further analysis of the relationship between various environmental risk factors and the presence of allergies [5].

Many intestinal and extra-intestinal symptoms of most diseases are associated with this infection. Helicobacter pylori allows food allergens to access the blood, destroying the gastric mucosa, predisposing to food allergies (PA). Previous studies have considered chronic urticaria as a known symptom of PA and a skin manifestation of Helicobacter pylori infection. The Helicobacter pylori antigen was detected in the stool of a group of patients complaining of both disorders [6].

Helicobacter pylori has a wide range of pathogenicity factors, in particular cytotoxins, aggression enzymes and factors that provide protection against human immunity. The most well-studied cytotoxin contributing to epithelial cell damage is vacuolizing cytotoxin (VacA) and cytotoxin-associated gene (CagA). To date, it is known that Helicobacter pylori induces strong humoral and cellular immune reactions, but they are not able to eliminate the bacterium [7].

In most people, Helicobacter pylori infection is asymptomatic, and only a small part develops a stomach ulcer and duodenal ulcer, and if it persists for a long time, lymphoma or stomach cancer. Consequently, a more accurate understanding of the molecular mechanisms of the pathogenesis of Helicobacter pylori may allow us to more effectively find ways of eradication [8].

Experimental data obtained on the association of allergies and infections generated in mouse models of allergic diseases show that these disorders do not develop in the presence of Helicobacter pylori. And the proposed mechanisms of the protective action of Helicobacter pylori, apparently, involve regulators (T-reg) with a high degree of suppressive activity in the induction of T-lymphocytes [9].

Helicobacter pylori affects the immune system by shifting the cytokine balance to the type of T-helper (Th)1, which suppresses allergic diseases that depend on the Th2 cell type, protecting infected individuals from the development of allergic diseases. This may also explain the low prevalence of eosinophilic esophagitis in Helicobacter pylori-infected people [10].

According to the results of most studies of the Western world, selective immunoglobulin (Ig) A deficiency is the most common and is associated with the growth of Helicobacter pylori - associated diseases. The relationship between atopic bronchial asthma and the ability of Helicobacter pylori to modulate the anti-Th2 inflammatory response through activation of the neutrophil protein was studied. In addition, in patients with Helicobacter pylori and asthma, there was a decrease in the levels of IdE, interleukin (IL)-4 and IL-13 in the blood serum and an increase in IL-10 and interferon (IFN) - γ compared to the control group [11].

Recent scientific works prove the importance of microbiocenosis of the gastrointestinal tract (gastrointestinal tract) in the process of allergy formation, that the prevalence of Helicobacter pylori infection significantly differed between children with and without allergies, and also revealed the role of the interaction of genetic (family history of allergies) and environmental (type of birth, breastfeeding,

previous antibacterial therapy) factors in the development of allergies. Several meta-analyses have demonstrated an inverse relationship between Helicobacter pylori infection and allergy. According to the results of these studies, the main confusion regarding the relationship between infection and allergy is associated with many factors that could affect the lower prevalence of infection in allergic children [12-14].

Protective factors of the gastric mucosa, as well as environmental factors and bacterial virulence are associated with the clinical outcome of the disease in Helicobacter pylori infection. There have been a limited number of studies examining these interactions, but several studies published last year included pediatric patients and explained new mechanisms of their pathophysiology. Alvarez et al. protective factors of the gastric mucosa and the risk of developing stomach cancer in the presence of Helicobacter pylori infection were studied [15].

Chen et al. the effect of Helicobacter pylori infection on the gastric mucosa, which causes an inflammatory reaction by producing inflammatory peptides - cytokines, was studied. They observed that IL-6 activates serum exosomes secreted by gastric epithelial cells and promotes the release of the pro-inflammatory cytokine IL-1a, since it is a receptor for the expression of this cytokine [16].

Helicobacter pylori is a risk factor for the development of chronic urticaria and food allergies[17]

Gastrointestinal symptoms may also accompany anaphylactic reactions to food. At the same time, non-IgE-mediated allergic reactions to food, especially isolated gastrointestinal manifestations of allergy in the absence of skin rashes, cause the greatest difficulties in diagnosis [18].

The higher prevalence of Helicobacter pylori among patients with allergic diseases, observed in some studies, raised the question of the role of inflammation in the development of allergies. The positive relationship between Helicobacter pylori and allergic diseases is still being discussed in relation to PA [19].

Helicobacter pylori causes an inflammatory response as a chronic persistent infection not only inside the stomach, but also causes extraintestinal diseases that require eradication [20].

Helicobacter pylori allows food allergens to gain access to the blood, destroying the gastric mucosa, predisposing to PA. Approximately 20% of the Helicobacter pylori microorganisms in the stomach adhere to the surface of the stomach epithelial cells. This physical contact causes damage to epithelial cells, causes inflammation and facilitates the delivery of toxins, which in turn contributes to bacterial invasion and persistence. Helicobacter pylori infection is able to trigger an IgE immune response. Studies have found an increase in IdE as a result of increased Th2-type production in frequently ill children [21].

In PA, children had a deep deficiency of CD4+ lymphocytes against the background of an increase in the relative content of lymphocytes with a receptor for apoptosis-CD95+lymphocytes by 1.2 times ($P<0.05$), while the absolute value was increased by 1.3 times ($P<0.05$) [22].

Sang Pyo Lee's research has shown that Helicobacter pylori infection has a pathogenetic connection with allergic diseases. Helicobacter pylori can provoke the

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release of histamine from basophils and, apparently, also suppresses the allergic reaction of the immune response through Th cells. Thus, the results obtained contradict each other, suggesting that Helicobacter pylori infection is both associated with the risk of developing allergies and is also a protective factor against allergies [23].

CONCLUSION

1. Helicobacter pylori infection in children is clinically different from its manifestations in adults. Along with gastrointestinal diseases, Helicobacter pylori in children has extra-intestinal manifestations.
2. The atopic tendency of the immune response in children determines a high level of IdE to Helicobacter pylori and a decrease in IdE in the gastrointestinal mucosal barrier, which is manifested by the clinical picture of gastrointestinal allergy.
3. Helicobacter pylori induces a higher level of Th1 cellular immune response, which can balance the pro-allergic Th2 response.
4. A reliable way to detect Helicobacter pylori is the most important issue that is still being actively discussed. In addition, new diagnostic methods should be better studied in order to reduce healthcare costs and provide patients with less invasive diagnostic alternatives.

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