

**PREVALENCE, PREDISPOSING FACTORS, AND PATHOGENETIC ASPECTS OF  
ULCERATIVE COLITIS**

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**Abstract**

This article is devoted to a literature review on the etiopathogenetic aspects of ulcerative colitis. The prevalence of ulcerative colitis ranges from 21 to 268 cases per 100,000 population. The annual increase in incidence is 5-20 cases (per 100,000 population), and this figure continues to grow (approximately 6 times over the past 40 years). Significant factors in the genesis of ulcerative colitis include the use of non-steroidal anti-inflammatory drugs, oral contraceptives, high hygiene standards in childhood, lactose intolerance, consumption of large amounts of refined carbohydrates, and the potential role of artificial feeding and psychological stress. It is known that appendectomy at a young age has a protective effect against the development of ulcerative colitis.

**Keywords**

Ulcerative colitis, pseudopolyps, E. coli, genetic factors.

Ulcerative colitis is a chronic disease of unknown etiology characterized by immune-mediated inflammation of the large intestine mucosa, manifesting as tenesmus, diarrhea with blood and mucus [1, 3]. Some patients may also have extraintestinal manifestations (arthropathies, skin and eye lesions, primary sclerosing cholangitis, etc.). The clinical course of the disease is unpredictable: some patients experience alternating periods of exacerbation and remission, while others have a continuously recurring course [4, 7].

Morphologically, ulcerative colitis is characterized by disruption of crypt architecture, their atrophy, the presence of chronic inflammatory infiltrate, and ulcers. Characteristic signs of ulcerative colitis are inflammatory pseudopolyps, which persist in most cases during disease remission.

The first peak incidence of ulcerative colitis occurs at 15-30 years of age, the second at 50-70 years [1, 2]. Studies show that the number of patients with inflammatory bowel diseases is equal among women and men. The prevalence of ulcerative colitis ranges from 21 to 268 cases per 100,000 population. The annual increase in incidence is 5-20 cases (per 100,000 population), and this figure continues to grow (approximately 6 times over the past 40 years) [3, 5]. According to epidemiological studies conducted in the Moscow region, the incidence of ulcerative colitis in the European part of our country is 20.4 per 100,000 population [11]. The highest prevalence rates of ulcerative colitis are observed in economically developed countries of North America [12].

The incidence of ulcerative colitis is high in Scandinavia [2, 8] and Great Britain [4, 5], while in Eastern Europe it remains at a lower level [10]. Variations in the reported frequency of ulcerative colitis worldwide are explained by the availability of endoscopic examination in a particular region, physicians' awareness of this disease, genetic predisposition, dietary habits, lifestyle, and, of course, the methodology used in epidemiological studies.

Significant factors in the genesis of ulcerative colitis include the use of non-steroidal anti-inflammatory drugs, oral contraceptives, high hygiene standards in childhood, lactose intolerance, consumption of large amounts of refined carbohydrates, and the potential role of artificial feeding and psychological stress. It is known that appendectomy at a young age has a protective effect against the development of ulcerative colitis [5, 9].

Among environmental factors, smoking plays an important role. Smoking appears to prevent the development of ulcerative colitis but contributes to the development of bacterial colitis. There is a view that quitting smoking can lead to remission of bacterial colitis and, conversely, to the exacerbation of ulcerative colitis [4, 6].

According to most scientists, genetic, immunological, and bacterial mechanisms are involved in the pathogenesis of ulcerative colitis [4, 39]. The role of intestinal microflora in the pathogenesis of ulcerative colitis is also discussed. In individuals suffering from inflammatory bowel diseases, the ratio of normal to pathogenic intestinal bacteria changes. In ulcerative colitis, changes in the metabolism or virulent properties of commensal bacteria are significant [1, 2, 6].

*Escherichia coli* (*E. coli*) are gram-negative rod-shaped bacteria that are part of the normal gastrointestinal microflora in humans. In addition to symbiotic strains, there are clones that possess virulent properties. More than 100 "enterovirulent" types of *E. coli* are grouped into 4 classes: enteropathogenic (EPEC), enterotoxigenic (ETEC), enteroinvasive (EIEC), and enterohemorrhagic (EHEC). Pathogenic strains of *E. coli* adhere to the intestinal mucosa, penetrate epithelial cells, and produce enterotoxins and cytotoxins. Studies on the mucosal adhesion of pathogenic *E. coli* strains in the genesis of ulcerative colitis are controversial. Several studies demonstrate that pathogenic *E. coli* strains are found only in a small number of tissue samples from patients with ulcerative colitis [3, 6]. According to other authors, virulent *E. coli* strains participate in the pathogenesis of ulcerative colitis [3, 8]. A third viewpoint suggests that not all pathogenic *E. coli* strains are associated with ulcerative colitis [14].

According to a number of studies, it is known that *Clostridium difficile* toxin is associated with exacerbation of inflammatory bowel diseases [14]. *Bacteroides vulgatus* is part of the normal colonic microflora in healthy individuals, but is found in increased concentrations in ulcerative colitis and produces mucin-degrading enzymes [13]. Microflora imbalance leads to increased bacterial production of hydrogen sulfide, which blocks the metabolism of short-chain fatty acids in the colonic epithelium, resulting in energy starvation of the epithelium and is one of the important aspects of ulcerative colitis pathogenesis [7, 8, 12].

It is known that antimicrobial peptides (AMPs) play a key role in protecting the macroorganism from infectious agents. Two types of AMPs have been identified - defensins and cathelicidins.  $\alpha$ -,  $\beta$ - and  $\gamma$ -defensins are distinguished, whose significance in antimicrobial immunity is confirmed by their high levels in circulating neutrophils [1]. When serum  $\alpha$ -defensin levels exceed 312 ng/ml,  $\beta$ -defensin in coprofiltrate exceeds 213 ng/g, and fecal calprotectin exceeds 232  $\mu$ g/g, the risk of ulcerative colitis recurrence increases [3].

Genetic factors involved in inflammatory and immune mechanisms play an important role in the pathogenesis of inflammatory bowel diseases. Hereditary information is encoded as a sequence of nucleotides in deoxyribonucleic acid (DNA). The key pathway for realization of genetic information in the cell proceeds from DNA to RNA and then to protein. About 75% of DNA in the human genome is transcribed, serving as a template for RNA synthesis. Only 3% of DNA encodes RNA that will subsequently be translated into proteins [2, 9], meaning that most of the RNA in the cell is non-coding. A remarkable discovery of recent decades has been the identification of a new class of compounds - microRNAs, which can influence DNA transcription processes, cause mRNA degradation at the post-transcriptional level, and suppress the synthesis of products from overexpressed genes. It is evident that the suppression of gene expression involving microRNAs is a universal mechanism widely involved in most intracellular signaling pathways. It has been proven that microRNAs are necessary for maintaining cellular homeostasis and the normal functioning of various systems, and changes in their expression are associated with the development of pathological processes, including oncological, infectious,

neurodegenerative, and autoimmune diseases. Studies of the microRNA (miR) profile in patients with autoimmune diseases have revealed alterations in their expression [4, 8].

Thus, progress in elucidating the role of microRNAs in the pathogenesis of ulcerative colitis will enable their use as biomarkers and prognostic predictors. Overall, studying the role of microRNAs in the regulation of autoimmune inflammation in inflammatory bowel diseases can contribute to understanding the pathological processes and influence the development of strategies for the prevention and treatment of these socially significant diseases.

Summarizing the research data, it can be concluded that ulcerative colitis is a disease that occurs at the intersection of genetic predisposition, exposure to certain environmental factors, and changes in intestinal microflora. None of these factors alone is sufficient for the development of the disease. It should be noted that the prevalence of inflammatory bowel diseases is increasing in both economically developed and developing countries. In this regard, it is necessary to timely identify groups of individuals who require in-depth instrumental examination. The results of studies involving a large number of patients with ulcerative colitis have provided information on the role of currently available biomarkers in determining disease activity, conducting differential diagnosis of intestinal pathology, predicting therapeutic response, and early detection of recurrence.

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