

RHEUMATOID ARTHRITIS: UNDERSTANDING ITS PREVALENCE AND RISK FACTORS

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Abstract. This article explores the pathogenesis and epidemiological features of rheumatoid arthritis (RA), including genetic predisposition, environmental factors, gender and age-related characteristics, and geographic variations. Emphasis is placed on the importance of early diagnosis and a comprehensive treatment approach to reduce disability and improve patients' quality of life.

Keywords: rheumatoid arthritis, pathogenesis, autoantibodies, epidemiology, genetic predisposition, early diagnosis, disability

Introduction. Rheumatoid arthritis (RA) is a chronic autoimmune inflammatory disease primarily affecting the joints, with possible systemic involvement of internal organs [27]. This condition can also lead to severe disability and a significant decline in quality of life if not adequately controlled. This article examines the relevance and importance of understanding the pathogenesis and prevalence of rheumatoid arthritis in the context of the modern healthcare system.

RA is a systemic disease in which the body's immune system mistakenly attacks its own tissues, primarily the synovial membrane of joints. This triggers a cascade of inflammatory reactions accompanied by the activation of immune cells and the production of autoantibodies (rheumatoid factor and antibodies to cyclic citrullinated peptide). Prolonged inflammation leads to the formation of pathological tissue - pannus - and, ultimately, to the destruction of cartilage and bone. Understanding these key mechanisms of pathogenesis is crucial both for comprehending the nature of the disease and for developing new approaches to control it and prevent its progression [1].

It is also important to consider the epidemiological significance of rheumatoid arthritis. The disease affects approximately 0.5-1% of the population, with women suffering from it 2-3 times more frequently than men [3]. Typically, the onset of the disease occurs between the ages of 30 and 60 - the most socially and professionally active period of life [13]. The high

prevalence, pronounced impact on work capacity, as well as the high risk of systemic complications underscore the need for widespread awareness of the disease among healthcare professionals and the general public [16].

Thus, a thorough understanding of the pathogenetic mechanisms and prevalence patterns of RA plays a crucial role in the timely detection of the disease, prevention of its severe consequences, and the development of effective public health strategies.

The aim of this study is to analyze the pathogenetic mechanisms and epidemiological characteristics of rheumatoid arthritis, as well as to substantiate the importance of these aspects for raising awareness about the disease and improving strategies for its early detection and prevention of complications.

The method of information retrieval consisted of literature analysis, which was conducted using leading scientific and medical resources, including eLIBRARY, PubMed.NCBI, CyberLeninka, as well as the official portal of the International Diabetes Federation (IDF - International Diabetes Foundation). The review included publications released between 2000 and 2025.

Results of Original Research.

Incidence of rheumatoid arthritis

Rheumatoid arthritis (RA) is a systemic autoimmune disease affecting approximately 0.5-1% of the adult population worldwide [16; 24; 25]. Precise figures may vary depending on geographical region, ethnicity, and research methods employed. Studies in North America and Europe indicate a prevalence of RA within 1-2%, while in Asian and African countries, this figure may be lower [16; 25]. This chronic inflammatory disease is characterized by progressive joint damage, which, if left untreated, can lead to significant deformities and loss of functionality. RA manifests as joint pain, typically symmetrical (affecting the same joints on both sides of the body), swelling, stiffness (particularly in the morning), and general weakness. Eventually, uncontrolled inflammation results in damage to cartilage, bones, and surrounding tissues, causing irreversible changes in joint structure. It is extremely important to understand the prevalence of RA, not only for planning healthcare resources and developing effective screening programs but also for raising public awareness about symptoms and the necessity of seeking medical attention in a timely manner. Delay in diagnosis and initiation of treatment can lead to disease progression and worsening of the prognosis [22].

Gender inequality

Interestingly and, unfortunately, predictably, women are more susceptible to RA, with a prevalence 2-3 times higher than in men. According to numerous studies, RA is diagnosed in women 2-5 times more frequently than in men. The reasons for this gender difference are not fully understood and are likely multifactorial. Among the most probable factors influencing women's increased susceptibility to RA, hormonal factors such as the effects of estrogen and progesterone on the immune system are highlighted. Estrogen can intensify inflammatory processes. Genetic factors also play an important role: certain genes associated

with RA may be more prevalent in women. Moreover, environmental factors, such as exposure to tobacco smoke or infections, can interact with genetic predisposition and hormonal background, increasing the risk of RA development in women [12]. Smoking is an established risk factor for RA development, and its effects may be more pronounced in women. Some studies also suggest that autoimmune diseases such as RA may be associated with exposure to certain microorganisms or their components, and these factors can affect men and women differently [9].

Starting age

RA usually begins between the ages of 30 and 50, although it can occur at any age, including childhood (juvenile rheumatoid arthritis) and old age. RA also occurs in individuals under 30, but it is less common. Although the peak of RA occurs in middle age, it's important to note that the disease can develop gradually, and the first symptoms can be non-specific and easily ignored. The peak of RA morbidity in middle age can significantly affect a person's quality of life and productivity, limiting employment opportunities, participation in social activities, and daily tasks. Early detection and treatment of RA are important for preventing disability and joint damage [19]. Modern diagnostic methods, such as blood tests for rheumatoid factor and antibodies to cyclic citrullinated peptides (CCCP), as well as imaging studies such as X-ray and MRI, allow for the detection of RA in its early stages, when treatment can be most effective. Modern treatment methods, including disease-modifying antirheumatic drugs (DMARDs), allow for inflammation control, slow the progression of the disease, and improve the quality of life of RA patients [10; 20].

Geographic variations of rheumatoid arthritis (RA)

The prevalence of rheumatoid arthritis (RA), as a rule, shows a tendency towards a higher level in developed countries of North America, Europe, and Australia [16]. This is likely due to several factors, among which significantly better access to qualified medical care, including regular preventive examinations and consultations with rheumatologists, is highlighted. In addition, modern diagnostic tools such as radiography, ultrasound, and magnetic resonance imaging are widely available and used in developed countries, allowing for the detection of RA at earlier stages, when symptoms may be barely noticeable. Studies show that the prevalence of RA in North America and Western Europe can range from 0.5 to 1.5% of the population, while in some countries of Asia and Africa, this figure can be significantly lower [16; 24; 25]. However, it's important to note that RA can affect people worldwide, regardless of their geographical location and socio-economic status. In countries with limited access to healthcare, RA is often diagnosed in later stages, when the disease has already led to significant joint damage and decreased quality of life. Understanding the geographical distribution of RA, as well as the factors influencing its prevalence in various regions, can help healthcare providers adapt treatment approaches to meet the needs of various population groups, taking into account the availability of resources and the specifics of local medical infrastructure [5].

Genetic predisposition to rheumatoid arthritis

Family history plays a significant role in the development of rheumatoid arthritis. If a person has first-line relatives (parents, brothers, sisters, children) suffering from RA, their risk of

developing this disease increases significantly - in some studies, this risk is assessed as 2-5 times higher than in individuals without a family history [2; 26]. This indicates the presence of a genetic component in the development of RA. Certain genetic markers, such as HLA-DR4 and HLA-DR1, which encode the proteins of the main complex of histocompatibility (MHC), are particularly important. These proteins play a key role in the immune system, participating in the recognition of "foreign" antigens. People carrying these markers have an increased likelihood of developing an autoimmune response directed against their own body tissues, which can lead to the development of RA. The presence of the HLA-DR4 allele in combination with certain genetic variants related to the immune response significantly increases the risk of developing early and aggressive RA [28]. Genetic testing, including MHC gene analysis and genetic counseling, can help identify individuals who may be at increased risk of developing RA, even if they have no symptoms yet. This allows for early intervention strategies such as changing lifestyle (diet, physical activity), taking preventive medications (in some cases), and more thoroughly monitoring joint condition. It is important to note that genetic predisposition does not necessarily mean the inevitability of RA development; it only increases the likelihood of the disease, and environmental factors also play an important role in its development [11].

As we continue to reveal the complexities of rheumatoid arthritis, it is crucial to raise awareness about this exhausting condition and promote early detection and effective treatment strategies. Early diagnosis, as a rule, leads to a more favorable prognosis and allows preventing or slowing down the progression of joint damage. Timely initiation of treatment with disease-modifying antirheumatic drugs can significantly improve the quality of life of patients and prevent disability. By understanding the prevalence and risk factors associated with RA, we can give people the opportunity to take proactive steps to improve joint health and overall well-being. This includes regular physical exercise, maintaining a healthy weight, quitting smoking, and following a balanced diet rich in antioxidants and omega-3 fatty acids [6].

So, rheumatoid arthritis is a multifaceted condition that can affect people of all ages and backgrounds, regardless of gender, race, or socio-economic status. Being informed about the prevalence and risk factors for RA, including genetic predisposition and geographical features, we can work to improve outcomes for those living with this chronic autoimmune disease. Remember, early detection, accurate diagnosis, and personalized treatment, developed considering the patient's individual characteristics and the stage of the disease, are key to effective RA management and achieving remission or at least control of symptoms. It is also necessary to emphasize the importance of a multidisciplinary approach to RA treatment, including consultations with a rheumatologist, physiotherapist, ergotherapist, and, if necessary, a psychologist.

Pathogenesis of rheumatoid arthritis

The development of rheumatoid arthritis is a complex multifactorial process in which the interaction of genetic predisposition and the influence of adverse external factors plays a key role [21].

Genetic predisposition: Although rheumatoid arthritis is not a purely genetic disease, the presence of certain genetic markers significantly increases the risk of its development. The

genes of the main histocompatibility complex (MHC), specifically the HLA-DR4 and HLA-DR1 alleles, play a particularly important role in the pathogenesis. These genes participate in the representation of antigens to the immune system and influence the effectiveness of the immune response. The presence of these alleles is associated with increased susceptibility to the development of rheumatoid arthritis and its more severe course. However, it is important to note that the presence of these genes does not guarantee the development of the disease, but only increases the likelihood. In addition to HLA genes, other genes involved in regulating the immune response, cytokine genes, and transcription factors can also be involved in the pathogenesis of rheumatoid arthritis [29].

External factors: In addition to genetic predisposition, various external factors play an important role in the development of rheumatoid arthritis, which can act as triggers that trigger the immune response [23; 30]. These include:

Infections: Some infectious agents, such as viruses (Epstein-Barr virus, parvovirus B19) and bacteria (*Porphyromonas gingivalis*), can cause molecular mimicry - a similarity between microorganism antigens and the body's own tissues. This can lead to an autoimmune reaction directed against the joints [30].

Smoking: Smoking is one of the most significant modifiable risk factors for developing rheumatoid arthritis. It contributes to the increase in the production of citrullinized proteins, which, in turn, stimulates the formation of anti-CCP [8].

Other potential risk factors include joint injuries, exposure to certain chemical substances, and environmental factors [4].

The immune response and the formation of autoantibodies: Under the influence of provoking factors, the activation of the immune system, in particular, T- and B-lymphocytes, occurs. This leads to the disruption of immune tolerance and the formation of autoantibodies - antibodies directed against the body's own tissues. The most characteristic autoantibodies in rheumatoid arthritis are [14]:

Rheumatoid factor (RF): This is an antibody to the Fc fragment of G class immunoglobulins (IgG). Although RF is found in a significant portion of patients with rheumatoid arthritis, it is not specific to this disease, as it can occur in other autoimmune diseases, as well as in healthy individuals [18].

Anti-CCP (antibodies to cyclic citrullinated peptide): These antibodies are directed against proteins that have undergone the citrullination process - a chemical change in which arginine is replaced by citrullin. Citrullination occurs under the influence of enzymes activated during inflammation and can lead to changes in protein structure and their recognition by the immune system as foreign. Anti-CCP has high specificity for rheumatoid arthritis and is often found in patients with early stages of the disease [1].

Chronic inflammation and destruction of joints: Autoantibodies that form in response to provocative factors contribute to the development of chronic inflammation in the synovial membrane of joints - the thin membrane that lines the inner surface of joints. Inflammation leads to thickening of the synovial membrane, its swelling, and infiltration by inflammatory

cells (macrophages, lymphocytes). Subsequently, the synovial membrane tissue proliferates, forming a pannus - granulation tissue that grows into the joint cavity, destroying the cartilage and bone structures [15].

Final destruction of joints: Chronic inflammation and pannus lead to progressive destruction of articular cartilage and bone tissue. The cartilage loses its shock-absorbing properties, while bone structures undergo erosion and deformation. As a result, joint deformity, limited mobility, and ultimately disability develop [7; 17].

Conclusion.

Rheumatoid arthritis (RA) is a chronic, systemic, autoimmune disease characterized by persistent joint inflammation, which, in the absence of timely and adequate treatment, can lead to irreversible destruction of cartilage and bone tissue, severe joint deformity, disability, and significant deterioration in patients' quality of life. The disease is not confined to the musculoskeletal system alone: in severe cases, it can affect internal organs, including the heart, lungs, kidneys, and skin, rendering RA a serious medical and social issue.

A deep understanding of the pathogenetic mechanisms of RA development, such as the interplay between genetic predisposition (particularly HLA-DR4 and HLA-DR1 alleles), environmental factors (infections, smoking, adverse ecological conditions), and immune response abnormalities (formation of autoantibodies, including rheumatoid factor and anti-CCP), paves the way for developing more precise diagnostic methods, prognostic models, and personalized therapeutic strategies. The immunological mechanisms underlying chronic inflammation and pannus formation remain the focus of scientific research aimed at creating new biological drugs and immunotherapy approaches.

Epidemiological analysis confirms the high social significance of RA: the highest incidence of the disease occurs in the age range of 30 to 60 years, which coincides with the peak of professional activity. Significant gender differences in the prevalence and course of RA (higher incidence in women) necessitate further study of the role of hormonal status and gender-specific characteristics of the immune response. Geographic variations in the prevalence of RA indicate the influence of genetic, socio-economic, and cultural factors, as well as the accessibility of medical care and early diagnosis.

Given the complexity of the pathogenesis and the diversity of RA clinical manifestations, it is crucial to implement a multidisciplinary approach to treatment, involving a rheumatologist, general practitioner, physiotherapist, psychologist, and other specialists. Only a comprehensive approach allows not only effective control of symptoms and slowing down the disease progression but also maintaining the patient's social activity and work capacity.

Thus, combating rheumatoid arthritis requires not only the advancement of medical technologies but also raising awareness among healthcare professionals and the general population, as well as actively implementing screening, prevention, and rehabilitation programs. Early diagnosis, personalized treatment selection, and regular patient monitoring can significantly alter the course of the disease, improve prognosis, and enhance the quality of life for millions of people living with this severe chronic condition.

List of references.

1. Абдушукурова К. Р., Шоимова О. Р. Иммунопатогенетические основы ревматоидного артрита: Обзор литературы //Eurasian Journal of Medical and Natural Sciences. – 2024. – Т. 4. – №. 4-1. – С. 58-70.
2. Бафаев Ж. Т. Влияние Метаболического Контроля На Уменьшение Инвалидности При Ревматоидном Артрите У Пациентов С Сахарным Диабетом //Miasto Przyszłości. – 2024. – Т. 55. – С. 1563-1569.
3. Жакешов Е. И. и др. Структурно-функциональные преобразования внутренних органов под влиянием ревматоидного артрита //Журнал гуманитарных и естественных наук. – 2025. – №. 18. – С. 244-255.
4. Жиляков А. В. и др. Современные гидрогелевые материалы для внутрисуставного лечения остеоартрита. – 2024.
5. Иванков А. П., Селиверстов П. В. Современные аспекты лучевой диагностики субхондрального перелома недостаточности коленного сустава //Вестник рентгенологии и радиологии. – 2022. – Т. 103. – №. 1-3. – С. 83-92.
6. Иванникова Е. В., Дудинская Е. Н., Ткачева О. Н. Вопросы питания и нутритивной поддержки при остеопорозе //Российский журнал гериатрической медицины. – 2023. – №. 2. – С. 92-104.
7. Калиберденко В. Б. и др. Корреляция уровня CD-14 и тяжести ревматоидного артрита //Медицина. Социология. Философия. Прикладные исследования. – 2025. – №. 2. – С. 72-75.
8. Кулигина С. А. и др. Влияние курения на митотическую активность эпителиоцитов //Молодежь и наука: результаты и перспективы. – 2022. – С. 77-78.
9. Лиля А. М. и др. Роль микробиома в патогенезе иммуновоспалительных заболеваний (дискуссионные вопросы) //Современная ревматология. – 2021. – Т. 15. – №. 1. – С. 15-19.
10. Лудан В. В., Касаева Г. Р. Применение антиоксидантов при ревматоидном артрите //Инновации. Наука. Образование. – 2021. – №. 25. – С. 1316-1319.
11. Мельникова Е. В. и др. Развитие мирового и национального рынков персонализированной медицины: магистерская диссертация по направлению подготовки: 38.04. 01-Экономика. – 2022.
12. Милькаманович В. Основы медицинских знаний. – Litres, 2025.
13. Муркамилов И. Т. и др. Ревматоидный артрит и поражения почек: современный взгляд на проблему //The Scientific Heritage. – 2021. – №. 58-2. – С. 29-37.
14. Нестерова И. В. Интеграционная программа коррекции иммунной системы в лечении иммунокомпрометированных пациентов с атипичными хроническими герпес-вирусными инфекциями.
15. Обыденко В. И., Баясхаланова Ц. Б. Обзор методов развития морфологических признаков ревматоидного артрита у крыс в эксперименте //Актуальные проблемы патофизиологии. – 2021. – С. 65-68.