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# Fungal And Parasitic Infections: Etiopathogenesis And Morphological Changes

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ABSTRACT

This article presents the origin, mechanism of development of fungal and parasitic infections, and morphological changes that occur in tissues under their influence. Diseases caused by fungi and parasites are characterized by a chronic course in the human body. These pathologies cause a significant decrease in the immune system and the development of structural and functional changes in internal organs. Pathological processes accompanied by deep tissue damage play a leading role in the pathogenesis of fungal infections. In this case, as a result of chronic inflammation in the epithelium, connective tissue and internal organs, granulomas are formed, foci of necrosis appear, and destructive changes alternate with fibrosis and dystrophy. Direct mechanical damage to tissues by pathogens during parasitic invasions causes hemodynamic disorders and pathological changes in the vascular walls. Also, as a result of the specific reaction of the organism, inflammatory infiltrates rich in eosinophils are formed in the area and deep dystrophic processes develop. In parasitic infections, special attention is paid to morphological processes that develop as a result of mechanical damage, toxic-allergic effects and immunopathological reactions. The article systematically and clearly analyzes the macro- and microscopic changes that occur in organs as a result of these infections. At the same time, the role of pathoanatomical signs in differential diagnosis and their practical significance in making an accurate clinical diagnosis are substantiated.

**Keywords**: Fungal infections, parasitic diseases, etiopathogenesis, pathoanatomical changes, morphology, immunopathology, inflammatory.

## INTRODUCTION

Fungal and parasitic infections are one of the most important problems in modern medicine and pathomorphology. These infections occur in a large part of the world's population, and are characterized by severe and complicated course, especially in patients with reduced immunity, children, the elderly, and patients with chronic

diseases. Globalization, increased migration processes, changes in environmental factors, and the emergence of drug-resistant pathogens create more favorable conditions for the spread of fungal and parasitic diseases. Fungal infections are etiologically associated with various pathogenic fungi, which can damage the skin, mucous membranes, and internal organs. These infections are often manifested by deep morphological changes such as chronic inflammatory processes, granulomatous reactions, necrosis, and fibrosis. Parasitic infections, on the other hand, develop under the influence of protozoa and helminths and lead to complex pathoanatomical changes in tissues and organs as a result of the mechanical, toxic-allergic, and immunopathological effects of parasites. A thorough study of the morphological changes that develop in fungal and parasitic infections is important for understanding the pathogenesis of the disease, making the correct diagnosis, and determining effective treatment measures. In fungal infections, pathogenic fungi penetrate the cell when the host's immune system is weak and provoke inflammatory processes, which leads to a chronic course of the disease [1]. Therefore, a systematic and scientific elucidation of the etiopathogenesis of fungal and parasitic infections and the morphological changes that occur under their influence is one of the urgent issues today.

## METHOD

Fungal and parasitic infections differ in etiology, pathogenesis, and morphological changes that develop in tissues and organs under their influence, but they are closely related to common pathoanatomical processes. These infections are often characterized by a chronic course, impaired immune system function, and deep structural changes in tissues. Chronic fungal infections are accompanied by granulomatous inflammation, necrosis, and fibrosis in tissues, which cause structural and functional disorders [2]. Etiopathogenesis and morphological changes of fungal infections. The development of fungal infections begins with the entry of pathogenic fungi into the body through the skin, mucous membranes, or respiratory tract. In immunocompetent individuals, fungi are often limited to a local process, but in cases of immunodeficiency, the infection can become generalized and damage internal organs. The pathogenic effect of fungi is associated with their enzymatic activity, toxin secretion, and induction of an immune response through cell wall components. Morphologically, fungal infections are characterized by inflammatory infiltration, foci of necrosis, and granulomatous processes in the epithelium and connective tissue. Epithelioid cells, multinucleated giant cells, and lymphocytes are found in the composition of granulomas. In some cases, granulomas with central necrosis are formed, which create a picture similar to tuberculosis granuloma. In chronic fungal infections, the structure and function of the affected organs are disrupted as a result of increased fibrosis processes. In internal organs, in particular, in the lungs, liver, and spleen, fungal infections can be accompanied by focal or diffuse inflammation, damage to the vascular walls, and hemorrhagic changes. Microscopic examination reveals the location of fungal mycelium or spores in the tissues, which is an important pathognomonic sign in diagnosis. Etiopathogenesis and morphological changes of parasitic infections. Parasitic infections are caused by protozoa and helminths, which lead to various pathoanatomical changes depending on their life cycle and localization. The effect of parasites on the body is mainly carried out through three mechanisms: mechanical damage, toxic-allergic effects and immunopathological reactions. As a result of mechanical action, foci of pressure, erosion, vascular damage and necrosis occur in the tissues where the parasites are located. For example, helminths damage the intestinal wall, causing inflammation and ulceration. Toxic-allergic effects occur through metabolites secreted by parasites, causing general intoxication and allergic reactions in the body. Morphologically, parasitic infections are characterized by an inflammatory infiltrate rich in eosinophils. Swelling, dystrophic changes, dilation of blood vessels and perivascular infiltration are observed in the tissues. In some parasitic diseases, granulomatous processes develop, which are formed around the eggs or larvae of parasites. In infectious diseases, immunopathological reactions complicate the pathogenesis of the disease and lead to structural and functional disorders in organs. Parasitic infections in the liver, lungs, brain, and muscle tissues can cause severe pathoanatomical changes. For example, in liver parasitosis, parenchymal dystrophy, fibrosis, and damage to the biliary system are observed. The detection of the parasites themselves, their eggs or larvae during microscopic examination is of great

importance for diagnosis. Common pathoanatomical aspects in fungal and parasitic infections In both types of infection, inflammatory processes, granulomatous reactions, and dystrophic changes occupy a leading place. The immune system response is crucial in the course of the disease, and when immunity decreases, the process becomes more severe and generalized. A thorough study of the morphological features of fungal and parasitic infections allows for the clarification of pathoanatomical diagnosis and the selection of the right direction in clinical practice.

**Relevance**. Fungal and parasitic infections are currently one of the most pressing problems facing the global health system. These diseases affect millions of people worldwide, especially in regions with low socio-economic development and inadequate sanitary and hygienic conditions. In recent years, against the background of immunosuppressive therapy, oncological diseases, HIV infection, and the increase in transplantation practices, severe, atypical and chronic forms of fungal and parasitic infections have become more common. The relevance of these infections is due to their often long-term latent course, vague clinical symptoms, and similarity to other diseases. This situation creates difficulties in diagnosis, leads to late detection of the disease and the development of complications. In particular, in fungal and parasitic infections, morphological changes in tissues are profound and irreversible, which can lead to functional failure of organs. In addition, the increasing resistance of pathogenic fungi to antifungal drugs and the complexity of the life cycle of parasites reduce the effectiveness of treatment. In-depth study of the etiopathogenesis and pathoanatomical features of these infections, as well as early and accurate diagnosis based on morphological signs, are of great importance in clinical practice. Timely detection of fungal and parasitic infections and correct assessment of their morphological aspects contribute to the prevention of the disease, effective treatment, and reduction of severe complications.

**Research goal**. The purpose of this study is to systematically study the etiopathogenesis of fungal and parasitic infections, the mechanisms of their effect on the human body, and the morphological changes that occur in tissues.

The following tasks are carried out through the study.

1. To determine the mechanisms of development of fungal and parasitic infections.
2. To describe the inflammatory, necrotic, granulomatous and dystrophic processes that occur in tissues under their influence.
3. To study the possibilities of identifying and differentiating diseases based on macroscopic and microscopic pathoanatomical signs.
4. To create a scientific basis for increasing the effectiveness of clinical diagnosis and treatment based on the results of the study.

According to the theory of parasitology, in cases of immune system deficiency, parasites penetrate deep into the host tissues and create inflammatory infiltrates rich in eosinophils, which leads to tissue damage [5].

Materials and methods of research. The main material used in the study were human tissues and organs affected by fungal and parasitic infections. The research material includes the following.

1. Macroscopic materials - the appearance, size, location and distribution of lesions of the affected tissues and organs (liver, lungs, intestines, muscles, skin) obtained by autopsy or biopsy.
2. Microscopic materials - histological sections prepared from the affected tissues, which were stained with H&E (hematoxylin - eosin) and analyzed under a microscope for inflammation, necrosis, granulomatous and dystrophic changes.
3. Infectious agents - various types of fungi (Candida, Aspergillus, Mucor, etc.) and parasites (protozoa, helminths) were identified in laboratory conditions.

Research methods include the following.

1. Pathoanatomical analysis - identification of morphological changes in affected tissues through macroscopic and microscopic examinations.
2. Histological methods - hyper- or hypochromatic staining of tissue sections, detection of granulomas, foci of necrosis and inflammatory infiltrates.
3. Clinical laboratory methods - identification of fungi and parasites through biological samples.
4. Literature analysis - systematization of information on etiopathogenesis and morphological features through the study of available scientific sources.

With the help of these materials and methods, it is possible to clearly describe the morphological changes that occur in tissues of fungal and parasitic infections, their clinical significance and role in diagnosis.

## RESULTS

The results obtained show that fungal and parasitic infections cause profound morphological changes in the human body with a specific pathogenesis and clinical picture. Pathomorphological analyses show that fungal infections trigger an immune response in the body and cause an inflammatory process through cytokines and leukocytes [3].

1. Pathomorphology of fungal infections

Fungal lesions are mainly characterized by a chronic inflammatory process.

Macroscopically. Visible pathological foci, swelling of tissues and pathological changes in color were observed in the affected organs.

Microscopically. Diffuse inflammatory infiltrates were detected in the epithelium and connective tissues. In particular, the formation of granulomatous nodules with a necrotic central part and fibrosis processes deforming the tissue structure take a leading place.

Diagnostic significance: The detection of fungal spores and mycelium in the tissues serves as a pathognomonic sign confirming the disease. Such changes lead to functional failure of vital organs such as the lungs, liver, spleen, and skin.

2. Mechanisms of action of parasitic infections

Parasitic invasions create a complex pathological chain in the body. Their effect is explained by the following three main factors. Direct physical damage to tissues and organs. Toxic-allergic effect: Poisoning of the body by the products of parasite life and causing strong sensitization.

Immunopathological changes: Self-damage of tissues as a result of an incorrect or excessive reaction of the body's defense system to the parasite. In parasitic infections, an inflammatory infiltrate rich in eosinophils is formed as a result of the mechanical and toxic-allergic effects of parasites. The results of the study showed that. Parasites cause tissue necrosis, vascular damage, and perivascular infiltrates. An inflammatory infiltrate rich in eosinophils is formed, which is the main microscopic sign of parasitic infections; Granulomatous processes develop around the parasite eggs or larvae and fibrosing over time. Dystrophic changes and structural disorders are detected in the liver, lungs, and muscle tissues.

The study showed that inflammation, granulomatous processes, and dystrophic changes are the leading pathoanatomical signs in both types of infection. In cases of reduced immunity, the infection is chronic and severe, and structural and functional disorders develop in the affected organs. Systematic study of macroscopic and microscopic signs is important in distinguishing fungal and parasitic infections from other pathological processes and in accurately establishing a clinical diagnosis.

## CONCLUSION

The results of the study show that the etiopathogenesis of fungal and parasitic infections is complex, they cause deep and multifaceted morphological changes in the human body. These infections often have a chronic course, worsen against the background of a decrease in the activity of the immune system, and cause irreversible structural and functional disorders in various organs. Severe complications of fungal infections are often noted in patients with weakened immunity, therefore, accurate diagnosis and effective therapy are of paramount importance [4]. In parasitic infections, as a result of the mechanical, toxic-allergic and immunopathological effects of parasites, an inflammatory infiltrate rich in eosinophils, vascular damage, granuloma formation, and dystrophic processes predominate. In both types of infections, macroscopic and microscopic changes have been confirmed to be of significant diagnostic importance in determining the disease. The results of the study showed that in-depth study of pathomorphological signs in fungal and parasitic infections is of great importance for early diagnosis, differentiation of diseases and development of effective treatment strategies. These conclusions can be applied in clinical and pathoanatomical practice, which will help reduce the complications of infectious diseases and improve the quality of life of patients. Pathoanatomical changes in infectious processes, including inflammation, necrosis and dystrophic changes characteristic of fungal and parasitic infections, are often detected at the microscopic level and play an important role in diagnosis [6].

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