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Sevinj Ahmadova
Azerbaijan Medical University
Doctor of Philosophy in Medicine
sevinc-ahmedova-84@mail.ru
https://orcid.org/0000-0002-1700-7802
Vafa Nasirova
Azerbaijan Medical University
Doctor of Philosophy in Medicine
vafaiskenderli@mail.ru
https://orcid.org/0000-0002-9848-3455

Characteristic Clinical and Laboratory Features of the Course of Mycotic Lesions of the Visual Organ

Abstract

In the article, brief information on the characteristic clinical and laboratory features of the course of mycotic lesions of the visual organ. The population of Baku is characterized by a worldwide trend − an increase with a very strong positive correlation connection (γ=+0,88 ± 0,10) as the age of the examined frequency of infection of their eye organs is increased by pathogenic fungi−from 8,9 ± 2,5 % to 32,6 ± 4,0 % of cases (χ^2=51,88; p<0,001). For the first time detected patients with my were registered 91 people (67,4 ± 4,0 %), with repeated recurrent diseases − 44 people (32,6 ± 4,0 %). The algorithm for diagnosis of patients with eye mycosis should include the evaluation of lipid peroxidation and antioxidant protection systems to correctly assess compensatory capabilities of the body in order to choose the method of correcting metabolic disorders. It is recommended to include the most informative indicators characterizing the state of cellular immunity and phagocytic activity neutrophils.

Keywords: *mycotic infections, eye mycoses, polymerase chain reaction, diagnostics, etiological structure, fungal keratitis*

Introduction

Mycotic infections (MI) are still a pressing health problem. Even fifty years ago, ophthalmicosis were relatively rare (Niculae, 2024, p. 30). In the ophthalmological special literature, only isolated cases were described, when fungal etiology of the disease was established by cultural methods or simply the presence of the disease was assumed (Cintra, 2023, p. 74; Arboleda, 2024, p. 1065). Mycotic keratitis, commonly known as fungal keratitis, is about 1-44 % of all cases of microbial keratitis, depending on the geographical location (Phongkhun, 2023, p. 1738; Soleimani, 2023, p. 222). In general, it is more common in tropical and subtropical regions (Dong, 2023, p. 691). The delivery, which usually causes corneal infection, includes *Fusarium, Aspergillus, Curvularia, Bipolaris* and *Candida* (Cabrera-Aguas, 2022, p. 543; Breazzano, 2022, p. 73). Most of these species are saprophytes (Herwig-Carl, 2022, p. 867). Rare fungal pathogens include *Fonsecaea pedrosoi, Lasiodiplodia theobromae, Cylindrocarpon species, Scedosporium prolificans, Metarhizium anisopliae, Paecilomyces species* and *Pythium insidiosum*. Most currently available antifungal drugs have limitations such as low bioavailability and limited eye penetration, especially in cases of deep lesions Some of the changes in endemic fungal infections can be attributed to climate change, expansion of human habitat, ease of movement and population displacement (Chiou, 2022, p. 55). Risk groups for opportunistic fungal infections or common endemic fungal infections include patients who have received transplants, prescribed immuno-depressants and chemotherapy agents, HIV-infected patients, premature infants, the elderly, and patients who have undergone major surgery (Karaca, 2022, p. 91). Although the epidemiology of fungal diseases has changed a lot over the past few decades, Aspergillus, Candida, Cryptococcus

species, Pneumocystis jirovecii, endemic dimorphic fungi such as Histoplasma capsulatum and Mucormycetes remain the main fungal pathogens responsible for most cases of serious fungal disease (Fang, 2022, p. 307). Thus, early diagnosis and properly administered treatment at the initial stages of the disease, regular, maintenance of the therapy in the distance will significantly improve the quality of life of such patients.

Research

The obtained clinical-laboratory results allowed the patients of the main group to form the appropriate clinical groups: 1 group (n = 86) − patients, from the MI having different eye diseases for the study period. 2 group (n = 49) − patients with MI, for the duration of the study were without clinical manifestations of eye diseases. In the work were used instrumental, clinical-laboratory, biochemical, epidemiological, bacteriological and statics methods of research.

Mycological examination of patients included microscopic examination of pathological material and cultural study. To identify the species of the selected fungi, polymerase chain reaction (PCR) diagnostics were used. PCR analysis used in this study takes 4 hours to produce results much faster than 2 days to 2 weeks required by any method of fungal culture. While fungal smears can be analyzed with light microscopy in minutes, the effectiveness of this method is more variable, and the results are not final. The ability of PCR-based tests to detect or exclude the presence of fungi in less time will represent progress in the treatment of eye infections, and can also contribute to efforts to recognize and study fungal keratitis. Intracellular production in the peripheral blood of cytokines lymphocytes was carried out using whole blood with sodium heparin for anticoagulation.

The research has shown that the population of Baku is characterized by a global trend – high body of sight with pathogenic fungi: The incidence of men was 45,2 ± 4,3 %, women – 54,8 ± 4,3 % of cases. Another trend is characterized by an increase with a very strong positive correlation (γ =+0,88 ± 0,10) as the age of the examined frequency of the tested of their eye organ is increased by pathogenic fungi − from 8,9 ± 2,5 % to 32,6 ± 4,0 % of cases (χ^2=51,88; p<0.01).

Although the parameters of the frequency of testing of the eye organ in the 1st group of all parameters, according to the Van der Warden criterion, are significantly higher than in the 2nd group (X = 3,47; p<0,01), we attach great importance to the hygienic factor, along with immunological factors. Thus, the incidence of the body of vision with pathogenic fungi among men is higher than women - respectively 64,5 ± 3,1 % and 53,1 ± 2,9 % (χ^2 =10,44; p<0,01). It is true both for the surveyed 1st group – 79,1 ± 3,3 % to 63,5 ± 3,6 % (χ^2 = 9,67; p<0,01), and for the surveyed 2nd group – 40,2 ± 5,1 % and 35,8 ± 4,6 % (χ^2 =0,42; p>0,05). The distribution by sex and age may reflect an increased impact on the environment of fungi. The predominant proportion of patients with mycoses of the eyes is represented by the affected in the age group of 36-55 years and 19-35 years: Respectively 32,6 ± 4,0 % and 25,1 ± 3,7 %. For the first time detected patients of the disease were registered 91 people (67,4 ± 4,0 %), with repeated recurrent diseases − 44 people (32,6 ± 4,0 %). In the study of the symmetry of the process, depending on the age groups, it was established that the two-sided lesion, revealed in 87 patients (174 eyes, 66,4 ± 4,1 %), a one-sided lesion was detected in 48 patients (48 eyes, 35,6 ± 4,1 %). A total of 222 eyes were struck. In the study of infection with pathogenic fungi in different age groups, depending on the symmetry of the lesion, the greatest defeat in the unilateral process was noted in the age group of 36-55 years − 20 cases (41,7 ± 7,1 %). In the other age groups, the distribution of patients was approximately the same: From 10,4 ± 4,3 % in the age group of 5-7, to 14,6 ± 5,2 % in the age groups of 8-12 and 13-18 years, respectively.

The age group of 19-35 years – 18,7 ± 5,7 % − was slightly higher. In the bilateral process, the greatest lesion was noted in the age group of 19-35 years − 25 cases (28,7 ± 4,7 %). Approximately the same was the distribution of patients in the age group of 36-55, and 13-18 years: 25,4 ± 4,6 % and 24,1 ± 4,6 %, respectively.

The age group of 8-12 years – 13,8 ± 3,7 % was slightly less affected and the lowest age group was 5-7 years – 8,0 ± 2,9 %.

In the study of the characteristics of different groups of patients in degrees of severity of the disease, it was established that in the first group of patients studied (with a slight current) the

number of patients was 28 people (20,7 ± 3,5 %). In the second group with a moderate disease, the number of patients was 62 people (45,9 ± 4,3 %; t = 4,39; p<0,001). In the third study group (with heavy current), 45 patients (33,4 ± 4,1 %; t = 4,12; p<0,001) were admitted.

An analysis of the distribution of the groups of patients studied by severity of the disease among 91 patients first identified with eye mycoses showed that the number of patients with light current was 20 (21,9 ± 4,3 %; t = 5,78; p<0,001). In the group of patients studied with the course of an average disease, the number of patients was 43 people (47,3 ± 5,2 %; t = 3,54; p<0,001). In the third group of patients studied with heavy current, the number of patients was 28 people (30,8 ± 4,8 %; t = 4,73; p<0,001). In 44 patients with recurrent eye mycosis, the number of patients with mild current was determined to be 8 (18,2 ± 5,8 %). In the group of patients with an average course of disease, the number of patients was 19 people (43,2 ± 7,5 %). In the third study group of patients with heavy current, the number of patients was 17 (38,6 ± 7,4 %). The mild severity of the disease among the patients studied was as follows: For the first time detected cases of eye mycosis were 20 people (71,4 ± 8,5 %), recurrent forms 8 people (28,6 ± 8,5 %). The average severity of the disease among the patients studied was as follows: for the first time detected cases of mycosis of the eye were 43 people (69,4 ± 5,9 %), recurrent forms − 19 people (30,6 ± 5,9 %).

The strongest activity of pathogenic fungi is observed to such sub-biopsies as cornea and biopsies of eye tissues, since the frequency of strong intensity of their seeding is very high from 47.3 ± 5.8 % (χ^2=8,17; p<0,01) to 53,1 ± 7,2 % (χ^2=0,75; p>0,05). Almost the same indicators of their average intensity from 32,7 ± 6,8 % (χ^2=2,16; p >0.05) to 37,5 ± 7,8 % (χ^2=1,06; p>0,05). Very low indicators of low intensity of seed − from 14,3 ± 5,1 % (χ^2=4,60; p>0,05) to 17,6 ± 4,5 % (χ2=0,86; p>0,05). Analysis of background diseases in patients with fungal eye pathology showed that mainly diseases from the gastrointestinal tract (chronic gastritis, gastric ulcer) − in 32 (23,7 ± 3,6 %), in 39 (28,9 ± 3,9 %) patients in the history of lambliosis, in 45 (33,3 ± 4,1 %) varicose symptomatic complex. The results obtained are consistent with the results of ultrasound, hepato-biliary system.

Changes in 95,4 ± 3,8 % have been detected; undoubtedly, determine the relationship between somatic pathology and fungal diseases of the eyes.

As the main trigger factors that provoke exacerbation or increase the intensity of the disease, most patients noted the psychogenic factor (99 patients, 73,3 ± 3,8 %) (the connection of the onset of another exacerbation with work stress, personal situations, overfatigue), as well as seasonality (82 patients, 60,7 ± 4,2 %) − deterioration in the autumn-winter season of the year. In addition, 72 (53,3 ± 4,3 %) patients noted as a starting factor contact with the allergen (household chemistry, washing powders, domestic dust, plant pollen), 55 (40,7 ± 4,2 %) patients noted errors in diet (use of honey, citrus, eggs, chocolate, coffee, fish). Allergic reactions to drugs in the history were noted in 76 (56,3 ± 4,3 %) people. Analysis of questionnaires allowed evaluating the existing practice of treating eye mycosis in outpatient conditions.

Analysis of questionnaires allowed evaluating the existing practice of treating eye mycosis in outpatient conditions. Previously, 83 (61,5 ± 4,2 %) patients received treatment from various fungal diseases, including 100 % topical antimicrobitics, and systemic − only 7 patients (5,2 %). The absence of treatment effect and recurrence of the disease is registered in 29 (34,9 ± 5,2 %) patients previously treated with drugs from the azole group, 26 (31,3 ± 5,1 %) − allilamines, 11 (13,5 ± 3,8 %) − naphthyphine and 17 (20,3 ± 4,5 %) − drugs of other groups.

Conclusion

The study of the spectrum of etiology of isolated pathogens in fungal pathologies indicated a small proportion of Coccidies immitis (7,4 ± 2,4 %), Actinomicetes (8,9 ± 2,6 %), Sporotrichum (11,1 ± 2,8 %), a share in cases where micromycetes (otherwise mold fungi) (37,8 ± 3,7 %) spp. Penicillum (13,4 ± 2,9 %), Aspergillus (24,4 ± 3,7 %) and Candida (34,8 ± 4,1 %). The release of independant pathogens in patients with mycosiases as etiological agents is determined by the degree of dominance of mold fungi (37,8 ± 3,7 %) and fungi of the Candida species (34,8 ± 4,1 %). Synergistic effect can be traced in various mold pathogenic fungi from species Aspergillus,

Penicillum, Sandidda (50,0 ± 2,9 %). The population of Baku is characterized by a worldwide trend − an increase with a very strong positive correlation connection (γ=+0,88±0,10) as the age of the examined frequency of infection of their eye organs is increased by pathogenic fungi − from 8,9 ± 2,5 % to 32,6 ± 4,0 % of cases (χ^2=51,88; p<0,001).

The algorithm for diagnosis of patients with eye mycosis should include the evaluation of lipid peroxidation and antioxidant protection systems to correctly assess compensatory capabilities of the body in order to choose the method of correcting metabolic disorders. It is recommended to include the most informative indicators characterizing the state of cellular immunity and phagocytic activity neutrophils.

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