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# ACANTHAMOEBIASIS STATISTICS OF INCIDENCE IN THE POPULATION , ETIOLOGY OF MORBIDITY, PATHOGENESIS AND MODERN APPROACHES TO TREATMENT

***cc****Department of infectious diseases ,*

*Andijan State Medical Institute*

*Uzbekistan, Andijan*

**Annotation:** Acanthamoebiasis is a protozoal lesion of the eyes, skin, and central nervous system caused by free-living amoebas. The disease occurs in the form of acanthamoebic conjunctivitis and keratitis, dermatitis or granulomatous encephalitis. Complications of acanthamoebiasis can be corneal perforation, the formation of abscesses of internal organs. The diagnosis of acanthamoebiasis is established by detecting amoebas and their cysts in tear fluid, corneal scrapings, skin biopsies, and cerebrospinal fluid. Local and systemic treatment of acanthamoebiasis is carried out with antibiotics of the aminoglycoside group (in the form of eye drops, ointments, injections).

**Key words:** Acanthamoebiasis, keratitis, dermatitis.

Acanthamoebiasis is a protozoosis caused by pathogenic amoebas of the genus Acanthamoeba. In most cases, acanthamoebiasis occurs in the form of acanthamoebic keratitis and acanthamoebic skin lesions. Sporadic cases of acanthamoebic dermatitis are more often reported in countries with subtropical and tropical climates. Acanthamoebic keratitis usually occurs in people who use contact vision correction. Acanthamoebic granulomatous encephalitis is less commonly diagnosed. About 400 cases of acanthamoebiasis with CNS involvement have been registered worldwide; the survival rate for this form is only 2-3%. Thus, acanthamoebiasis is an urgent interdisciplinary problem solved by specialists in the field of ophthalmology, dermatology and neurology.

Among the free-living pathogenic amoebas of the genus Acanthamoeba, 6 species are dangerous for humans: A. hatchetti (cause eye damage), A. palestinensis and A. astronyxis (cause CNS damage), A. polyphaga, A. Culbertsoni, A. castellanii (cause various lesions, including skin). During the life cycle, amoebas of the genus Acanthamoeba pass through the vegetative stage (trophozoite) and the cystic stage.

Acanthamoebae are aerobic organisms that live in the soil and stagnant freshwater of natural and artificial reservoirs, especially those polluted by wastewater discharges. In addition, single-celled protozoa safely live in tap water, sewage, and water from heating pipes. The increase in the acanthamoeba population is facilitated by the water temperature above 28°C and the presence of various organic substances in it. If the ambient temperature decreases or the reservoir dries up, acanthamoebas are encysted. In the state of cysts, parasites tolerate fluctuations in temperature and pH, as well as the effects of antiseptics and disinfectants.

When acanthamoebiasis pathogens enter the human body, they again go into a vegetative state and become capable of parasitism. The source of infestation is acanthamoeba-contaminated soil and water. Human infection is carried out by contact-household, food and water

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routes. Acanthamoebiasis of the eyes usually occurs in patients who do not follow the hygiene rules for wearing and caring for soft contact lenses: do not remove them during bathing and showering, neglect disinfection measures, do not treat their hands before putting on lenses, etc. In healthy people, acanthamoebae are often found in nasopharyngeal mucus and feces, but the development of acanthamoebiasis of the central nervous system is mainly affected by people with immunodeficiency (especially HIV infection), diabetes mellitus, malignant neoplasms, and alimentary insufficiency.

Symptoms of acanthamoebiasis

Acanthamoebiasis most often occurs in the form of acanthamoebic keratitis. Initial symptoms of an eye infection include redness of the eyes, cutting pain in the eyes, photophobia, lacrimation, blurred vision, and a foreign body sensation in the eye. In the late period, a ring-shaped or disc-shaped opacity of the cornea becomes noticeable. Alternating exacerbations and remissions in acanthamoebiasis of the eyes often leads to uveitis, scleritis, iridocyclitis, and hypopion formation. Without adequate therapy, acanthamoebiasis progresses rapidly, causing corneal perforation.

Acanthamoebiasis of the skin can occur primarily (independently) or secondarily, due to the initial damage to the central nervous system. Primary acanthamoebic skin damage occurs when water contaminated with amoeba cysts enters open skin wounds. At the same time, single or multiple nodules, papules or spots of gray-black color are formed on the skin of the face, chest, back, and limbs, reaching a diameter of 0.5-3 cm. In the future, these elements are transformed into skin ulcers covered with scabs. Acanthamoebic abscesses of muscles, lymph nodes, liver, lungs, and other internal organs may form during prolonged treatment. Secondary acanthamoebiasis of the skin is caused by the dissemination of acanthamoebae from the primary focus.

Damage to the central nervous system in acanthamoebiasis causes the development of granulomatous acanthamoebic encephalitis. This rare pathology usually occurs when acanthamoebae enter the brain from primary foci. Amoebic damage can affect the brain substance, vascular or arachnoid membrane, basal ganglia. With normal resistance of the body, granulomatous inflammation develops; with reduced resistance, a necrotic process develops. The incubation period for acanthamoebic brain damage lasts from several weeks to a month or more. The initial period of acanthamoebiasis is characterized by unstable subfebrility, drowsiness, headaches, convulsions, and convergence disorders. The progression of acanthamoebiasis of the central nervous system leads to the development of coma and death.

Diagnosis and treatment of acanthamoebiasis

Depending on the form of acanthamoebiasis, its diagnosis and treatment is carried out by ophthalmologists, dermatologists, and neurologists. The diagnosis of acanthamoebic lesions of the eyes, skin, and brain is confirmed by detecting vegetative and cystic forms of acanthamoebas in the test material. In acanthamoebic keratitis, this is lacrimal fluid, flushes and corneal scrapings; in acanthamoebic dermatitis, the discharge of infiltrates, skin biopsies; in granulomatous encephalitis, cerebrospinal fluid. In addition to microscopic examination of drugs, a culture method, serological tests, and a biological sample are used to verify the diagnosis of acanthamoebiasis. If acanthamoebiasis is suspected, keratitis, encephalitis and dermatoses of a different etiology should be excluded from the patient.

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Treatment of acanthamoebic keratitis requires avoiding contact lenses. Local therapy includes hourly instillation into the conjunctival cavity of antibacterial drugs (gentamicin, neomycin, polymyxin B, etc.), corticosteroids; the use of antifungal agents (amphotericin B, ketoconazole). In combination with eye drops, ointment applications for the eyelid of the same products are used. With progressive changes in the cornea, keratoplasty may be indicated.

With acanthamoebiasis of the skin, systemic antibiotic therapy with drugs from the group of aminoglycosides, local application of ointments with neomycin, polymyxin, etc. is carried out. The most difficult task is the treatment of acanthamoebic encephalitis. In this clinical form of acanthamoebiasis, intravenous administration of amphotericin B, the appointment of a combination of trimethoprim and sulfamethoxazole, aminoglycosides is indicated. Treatment of acanthamoebiasis of the central nervous system is effective only in isolated cases.

Prognosis and prevention of acanthamoebiasis

With acanthamoebic lesions of the skin and eyes, the prognosis for life is favorable, but acanthamoebiasis of the brain in the vast majority of cases ends fatally. Prevention of acanthamoebic keratitis consists in following the rules for the use and care of contact lenses, storing them only in special sterile solutions, processing containers for lenses, periodically instilling bactericidal agents (sodium sulfacyl, etc.) into the eyes, the need to remove contact lenses during bathing, visiting the bath and sauna, washing in the shower. To prevent acanthamoebiasis of the skin and central nervous system, it is possible to observe the rules of personal hygiene, limit contact with contaminated water bodies that are habitats of acanthamoebas.

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