

## Prevalence of ocular diseases in patients with pulmonary tuberculosis and HIV infection

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**Background:** Given the high prevalence and rate of disability from ocular pathologies, it is clinically and socially important to determine their prevalence in patients with tuberculosis and HIV infection.

**Purpose:** To determine the prevalence of ocular diseases in patients with tuberculosis and HIV infection.

**Materials and Methods:** Medical records related to regular medical check-up of 212 patients with tuberculosis (including those co-infected with HIV) at the Odessa Region Tuberculosis Dispensary in the year 2015 were retrospectively analyzed.

**Results:** Ocular involvement was found in 86 (40.5%) patients (52 (60.4%) men and 34 (39.5%) women; mean age,  $32.43 \pm 7.45$  years). Out of them, 52 (60.4%) patients (70 eyes) had both pulmonary and lymph node tuberculosis, whereas 34 (39.6%) patients had both tuberculosis and HIV. Focal chorioretinitis, disseminated chorioretinitis, keratitis, optic neuritis, scleritis and iridocyclitis were found in 31.3%, 22.09%, 17.44%, 8.13%, 8.13%, and 12.79%, respectively, of patients.

**Conclusion:** Given the high prevalence of ocular pathology in patients with tuberculosis and HIV, ophthalmologists should give special attention to them. Posterior segment disorders (focal or disseminated chorioretinitis or optic neuritis) accounted for a major portion (61.52%) of the burden of ocular pathology in these patients. The frequency of glaucoma and hemorrhagic complications (retinal periphlebitis or vasculitis) in HIV-positive tuberculosis patients were 7.5 times and 6 times, respectively, higher than those in non-HIV tuberculosis patients.

**Key words:** tuberculosis, HIV infection, ocular diseases

### Introduction

The tuberculosis (TB) and HIV/AIDS epidemics exist in parallel in many populations over the world and are closely linked. Never before, in the history of human kind, has there been a threat of death so rapidly developing as that which is now posed by TB and HIV. Tuberculosis is a cosmopolitan infection, with 19% to 43% of the world population affected; the disease remains widespread in Ukraine and internationally [1,2]. In 2000, the World Health Organization (WHO) recognized TB as a global danger to people's health, so great was the concern about the modern TB epidemic. According to the WHO fact sheet, in 2015, 10.4 million people fell ill with TB and 1.8 million died from the disease (including 0.4 million among people with HIV). In addition, TB is one of the top 10 causes of death worldwide, the leading cause of death worldwide surpassing malaria and HIV. Tuberculosis in its active form is estimated to affect eight million people every year. According to the Ukrainian Centre for Socially Dangerous Disease Control, Ministry of Health of Ukraine, 7612 new cases of HIV (including 1365 cases in children younger than 14 years) were registered in Ukraine during the first six months of 2016. For a period since 1987, a total of 287970 new

cases of HIV and 39887 deaths from the disease have been registered in Ukraine. The Dnipro, Donetsk, Kyiv, Mykolaiv and Odesa regions, and the city of Kyiv have been identified as the regions and the city with the highest prevalence of HIV in Ukraine [3]. The majority of new HIV infections in Ukraine occur among people aged 15-30 years. The presence of mixed opportunistic infections (including those with ocular involvement) is typical for HIV-positive individuals. Acquired Immune Deficiency Syndrome (AIDS) is the final stage of HIV infection. Some patients are unaware of their condition, since persons newly infected with HIV are asymptomatic and because of the inadequate public awareness of the disease. The presence of mixed infections (including opportunistic infections) with ocular involvement is typical for HIV-positive individuals [4]. The ocular manifestations are sometimes the first sign of HIV infection and of severe complications of the disease [5].

The purpose of the study was to determine the prevalence of ocular diseases in patients with tuberculosis and HIV infection.

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**Materials and Methods**

Medical records related to regular medical check-up of 212 patients with tuberculosis (including those co-infected with HIV) at the Odessa Region Tuberculosis Dispensary in the year 2015 were retrospectively analyzed. Ocular involvement was found in 86 (40.5%) patients (52 (60.4%) men and 34 (39.5%) women; mean age, 32.43 ± 7.45 years). Fifty-two (60.4%) patients (70 eyes) out of them had both pulmonary and lymph node tuberculosis, whereas 34 (39.6%) patients had both tuberculosis and HIV. Patients underwent a standard ophthalmological examination including visual acuity, visual field, tonometry and OCT. In addition, various immunological examinations were performed.

**Results and Discussion**

Posterior segment disorders accounted for a major portion (61.52%, totally, including focal chorioretinitis, disseminated chorioretinitis and optic neuritis in 31.3%, 22.09% and 8.13%, respectively) of the burden of ocular pathology in these patients. Anterior segment disorders accounted for the rest (including keratitis, scleritis and iridocyclitis in 17.44%, 8.13%, and 12.79%, respectively) of the burden of ocular pathology in these patients. HIV infection was found in 6% of cases having tuberculosis with ocular involvement. Among 52 patients having pulmonary and lymph node tuberculosis with ocular pathology, primary open-angle glaucoma was revealed in 2 patients (3.8%), cataract was diagnosed in 7 patients (13.4%), refractive errors were detected in 23 patients (44.2%), and no secondary glaucoma was detected. In addition, physical examination and laboratory tests revealed ocular tuberculosis in the active inflammatory phase in 43 patients (82.6%; 57 eyes) and in the scarring phase (inactive inflammatory process) in 9 patients (17.3%; 13 eyes). Furthermore, hemorrhagic manifestations presenting as retinal vein periphlebitis was noted in 3 patients (5.7%). Table 1 shows ocular findings in non-HIV study patients with both pulmonary and lymph node tuberculosis in the active or inactive phase.

Ocular pathologies were present in 39.5% (34 of 86 patients; 68 eyes) of HIV-positive patients and the causes included POAG (8 patients (23%)), secondary glaucoma (2 patients (5.8%)), cataract (5 patients (14.7%)), and

either retinal periphlebitis or partial vitreous hemorrhage (12 patients (35.2%)) as a hematogenous complication of tuberculosis, with the latter rate being 6 times higher than that in active tuberculosis. All HIV-positive patients had tuberculosis in the active inflammatory phase. Table 2 shows ocular findings in HIV-positive tuberculosis patients of the study.

Posterior segment pathologies (focal or disseminated chorioretinitis) were present in 53.9% of all HIV-positive tuberculosis patients with ocular pathologies. Out of the patients with focal chorioretinitis, 12 (44.4%) had the foci in the macula, and 15 (55.5%) had them in the extreme periphery of the posterior pole. Patients with the peripheral location of the foci complained neither of reduced vision nor of visual field narrowing. Typical features of anterior uveitis (iridocyclitis) were serous-plastic or fibrinous changes, whereas a severe exudative process associated with ocular hypertension and glaucoma was observed in keratouveitis. Besides serous-plastic changes, engorgement of iris vessels and hyphema, HIV-positive tuberculosis patients with iridocyclitis had hemorrhagic process in the form of iris roseola in their eyes. Patients with ocular neuritis experienced an especially severe course of disease, resulting in optic nerve atrophy and loss of vision. HIV-positive tuberculosis patients with toxic or allergic retinal vasculitis (6 patients (17.6%)) also experienced a very severe course of disease. Compression of retinal vessel lumens resulted in alterations in retinal blood flow and increased exudation, with abrupt development of retinal edema, hemorrhages and proliferating foci which appeared distinctly separate from adjacent unimpaired retinal tissue. In HIV-positive tuberculosis patients, changes in fundus corresponded to those of systemic disease stages II or III. In the eyes of HIV-positive tuberculosis patients, chorioretinal changes were initially located at the peripheral fundus and sometimes spread to the macula, whereas in the non-HIV tuberculosis patients, they were located mostly at the optic disc. In the presence of inactive inflammatory process (scarring phase), inactive tuberculosis process was found in 9 patients (17.3%; 13 eyes). Secondary retinal choroidal dystrophy was found in most of patients (5 patients) with focal chorioretinitis in the presence of inactive inflammatory process (scarring phase).

**Table 1.** Ocular involvement in non-HIV study patients with both pulmonary and lymph node tuberculosis

Ocular pathology	Patients number, active phase	Patients, percentage	Patients number, scarring phase	Patients, percentage	Patients number, total
Focal chorioretinitis	9	17.3	7	13.4	16
Disseminated chorioretinitis	2	3.8	2	3.8	4
Optic neuritis	3	5.7	-	-	3
Keratouveitis	14	26.9	-	-	14
Scleritis	6	11.5	-	-	6
Iridocyclitis	9	17.3	-	-	9
Total	43	82.5	9	17.2	52

**Table 2.** Ocular involvement in HIV-positive patients with tuberculosis in the active phase

Ocular pathology	Patients number, active phase	Patients, percentage
Focal chorioretinitis	11	32.3
Disseminated chorioretinitis	15	44.1
Optic neuritis	3	8.8
Keratouveitis	2	5.8
Scleritis	1	2.9
Iridocyclitis	2	5.8
<b>Total</b>	<b>34</b>	<b>99.7</b>

Therefore, the results demonstrated severe ocular pathologies and evidenced pathologically irreversible changes in patients with pulmonary tuberculosis and HIV.

**Conclusion**

First, given the high prevalence of ocular pathology in patients with tuberculosis and HIV, ophthalmologists should give special attention to them. Posterior segment disorders (focal or disseminated chorioretinitis or optic neuritis) accounted for a major portion (61.52%) of the burden of ocular pathology in these patients.

Second, the frequency of glaucoma and hemorrhagic complications in HIV-positive tuberculosis patients were 7.5 times and 6 times, respectively, higher than those in non-HIV tuberculosis patients. In addition, all HIV-positive tuberculosis patients had tuberculosis in the active inflammatory phase.

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