

Ophthalmologic manifestations of elderly patients with human immunodeficiency virus infection

Manifestações oftalmológicas dos pacientes idosos com infecção pelo vírus da imunodeficiência humana

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ABSTRACT

Objectives: Identify and describe ocular changes in elderly with HIV or aids through ophthalmological examination. Evaluate the association between ocular alterations and the level of TCD4 lymphocytes, time of antiretroviral therapy, demographic characteristics and age range. **Methods:** Case series of 40 elderly patients with HIV infection. The study was carried out at the ophthalmology and immunology outpatient clinics of the Gaffrée and Guinle University Hospital (HUGG) from January 2017 to June 2018. The patients were attended at the ophthalmology clinic and underwent an ophthalmological exam including: anamnesis, visual acuity, ocular motility, pupillary reflex, biomicroscopy, aplanation tonometry and funduscopy. Statistical analyses were performed using SPSS 20.0. **Results:** The average of the 40 patients was 64.7 years (sd: 5.1), aged between 60 and 78 years, and the average time of HIV infection was 16.6 years (sd: 7 years). Most of the patients examined had normal vision (55%) and normal intraocular pressure (between 11 and 21 mmHg). The main complaints of patients during anamnesis were visual blurring (50%), visual acuity reduction (47.5%), ocular itchiness (27.5%), tearing (25%) and burning (25%). The most frequent changes in biomicroscopy were: cataract (92.5%) and dry eye (32.5%). Funduscopy found 43.8% of retinal vascularization alterations, 43.8% of alterations related to the optic nerve and 31.3% related to retinal posterior pole. **Conclusion:** Ocular changes were common and can be explained by senility, inflammatory changes caused by chronic HIV infection, adverse effects of antiretroviral therapy and early biological ageing associated to HIV infection.

Keywords: Aged; HIV; Aids; Ocular abnormalities; Ocular manifestations; Antiretroviral therapy

RESUMO

Objetivos: Identificar e descrever as alterações oculares em idosos com HIV ou aids através de exame oftalmológico. Avaliar a associação entre as alterações oculares encontradas e o nível de linfócitos T CD4, tempo da terapia antirretroviral, características demográficas e faixa etária. **Métodos:** Série de 40 casos de pacientes idosos com HIV examinados nos serviços de oftalmologia e imunologia do Hospital Universitário Gaffrée e Guinle (HUGG) de janeiro de 2017 a junho de 2018. Foi realizado o seguinte exame oftalmológico: anamnese, acuidade visual, motilidade ocular, reflexo pupilar, biomicroscopia, tonometria de aplanção e fundoscopia. As análises estatísticas foram realizadas pelo SPSS 20.0. **Resultados:** A média de idade dos 40 pacientes foi 64,7 anos (dp: 5,1) e o diagnóstico de infecção pelo HIV foi em média há 16,6 anos (dp:7). A maioria dos pacientes examinados possui visão normal (n=22; 55%) e pressão intraocular normal (entre 11 e 21 mmHg). As principais queixas dos pacientes durante a anamnese foram: embaçamento visual (50%), redução da acuidade visual (47,5%), prurido ocular (27,5%), lacrimejamento (25%) e ardência (25%). As alterações biomicroscópicas mais frequentes foram catarata (92,5%), seguida de olho seco (32,5%). Na fundoscopia encontrou-se 43,8 % de alterações da vascularização retiniana, 43,8 % de alterações relacionadas ao nervo óptico e 31,3% relacionadas ao pólo posterior da retina. **Conclusão:** Alterações oculares foram comuns e podem ser justificadas pela: senilidade, estado inflamatório gerado pela infecção crônica do HIV, efeitos adversos da Terapia antirretroviral prolongada e senescência biológica precoce associada a infecção do HIV.

Descritores: Idoso; HIV; Aids; Anormalidades oculares; Manifestações oculares; Terapia antirretroviral

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INTRODUCTION

HIV (Human Immunodeficiency Virus) is a serious global public health problem, and to date has taken 36 million lives. By mid-2016, there were approximately 36.7 million HIV-infected people in the world; of these, one third inhabitants of Africa.⁽¹⁾

Among men, there was an increase during the last ten years in the rate of detection among those aged between 15 and 19 years, 20 and 24 years, and 60 years and older. Among women, the rate of detection has shown a downward trend in almost all age groups over the last ten years, except between 15 and 19, and 60 years and older: there were increases of 13.9% among the youngest, and 14.3% among those in the oldest age group, compared to 2006 and 2016.⁽²⁾

The expressive increase in the elderly with HIV can be explained due to the general development in medicine and the pharmaceutical industry, which allow a longer active sexual life. Whether due to the development of pills for erectile dysfunction or treatments such as hormone replacement and penile prostheses, the sexual life of the elderly became more active increasing the vulnerability of this age group to sexually transmitted diseases (STDs), among them HIV. In addition, the introduction of antiretroviral therapy (ART) for HIV treatment has increased the life expectancy of patients infected with the virus.⁽⁴⁾

Recent studies show that elderly patients have greater morbidity and mortality than young HIV-infected patients. This fact can be justified by the fragility of the immune system in the elderly, which often leaves them vulnerable to conditions similar to the initial manifestations of HIV, such as weight loss, diarrhea, recurrent pneumonia, candidiasis, anemia, among others, which hinders and delays the diagnosis in this age group. Also, the elderly do not respond as effectively to ART as young people due to the immunological deficiency that comes with age.

Currently, despite the increasing incidence of HIV in people over 60 years of age, the literature emphasizes knowledge about HIV/AIDS in young individuals and health professionals, with a lack of information related to AIDS and HIV infection by the elderly. Recent studies have shown that HIV-infected individuals are biologically older than uninfected individuals of the same age and socioeconomic characteristics. Biological age markers in the eye such as opacity of the crystalline and width of blood vessels may be increased in individuals with HIV.⁽⁴⁾

Due to this lack, it is extremely relevant to carry out studies in this area in order to guide both prevention and control measures, and specific medical care for this age group.

OBJECTIVES

Identify the ocular alterations in the elderly with HIV or AIDS through ambulatory ophthalmologic examination and the association between the biomicroscopic alterations found and:

- a) The level of CD4 T lymphocytes
- b) ART time
- c) Age group

METHODS

Study of a series of cases of 40 elderly patients (60 years or older) with HIV infection according to the criteria established by the National STD/AIDS Program conducted in the era of ART.

The present study was designed to collect information on the frequency and course of ocular manifestations in this population.

The study was carried out at the Ophthalmology and Immunology ambulatories of Hospital Universitário Gaffrée e Guinle (HUGG) from January 2017 to June 2018, and was approved by the HUGG Research Ethics Committee (CAAE: 36848614.0.0000.5258) with approval number 086999/2014, on 10/30/2014.

Patients of both sexes aged 60 years and older among the 3,200 patients diagnosed with HIV infection by the HUGG immunology ambulatory were included in the study.

Patients with cognitive difficulties preventing them from collaborating with the ocular exams necessary for the research were excluded.

Patients were selected with or without ocular symptoms by an active search in the HUGG immunology ambulatory. The ophthalmologist visited the immunology ambulatory on a weekly basis to evaluate the medical records of the patients who would be treated at that time in the sector. Those who met the inclusion criteria and were questioned about the interest and possibility of participating in the study were selected. Subsequently, a date was scheduled for the ophthalmologic exams. Some patients who met the criteria for inclusion in the research were also referred directly to the ophthalmology sector, and were followed in the HUGG immunology sector.

The patients were treated at the Ophthalmology ambulatory, and underwent ophthalmologic examination including anamnesis, visual acuity with and without correction, ocular motility, pupillary reflex, biomicroscopy, aplanation tonometry, and fundoscopy. All eyes were examined by ophthalmologists. When necessary, other ophthalmologic exams and laboratory tests related to the diseases were used. During the appointment, all patients provided details about their medical history, diagnosis, and treatments used for HIV since their diagnosis. The data was inserted on an exam form made specifically for the research.

Data was organized in an Excell spreadsheet including gender, age, medical record number, date of the last ophthalmological examination, ocular symptoms, history of ocular surgery, time of HIV diagnosis, use of ART, CD4+ T cell count, viral load, and presence of systemic comorbidities.

Any patient with positive specific tests for HIV attached to the medical record was considered HIV infected.

The following tools were used in ophthalmic exams: Snellen table, aplanation tonometer, indirect ophthalmoscope, slit lamp, 20D Volk lens, 90D Volk lens. For examination of the dilated fundus, a drop of tropicamide 1% and phenylephrine 10% eyedrops was used. In order to anesthetize the surface of the eye during intraocular pressure measurement, a drop of proximetacaine hydrochloride 5 mg/ml eyedrops was used.

Initially, the data was analyzed descriptively. Absolute and relative frequencies were used for the categorical variables, and for the numerical ones the summary-measures (average, quartiles, minimum, maximum, and standard deviation).

The patient profile, frequency of ophthalmologic alterations, and associated factors including the presence of ocular symptoms, CD4 T levels, use of ART, and years of HIV infection were analyzed.

The statistical analyzes were performed using the statistical software SPSS 20.0.

RESULTS

We analyzed information from 40 elderly patients whose average age was 64.7 years (SD = 5.1 years), 55.0% of which were female, and 45.0% were male. Table 1 shows that the elderly presented on average 16.6 years of HIV time and 15.3 years of ART, and an average of 710 cells/mm³ of CD4 lymphocytes.

According to table 2, there was no significant difference between the levels of ART, CD4, and age group regarding the frequency of diseases in the anterior segment and annexes. The highest frequency of diseases occurred for cataracts (92.5%), keratitis (25%) and blepharitis (25%).

There were 16% of corneal alterations divided into: 77% of dry keratoconjunctivitis, 8% of guttata, 8% of dellen, and 7% of senile halo. Most patient complaints during the anamnesis corresponded to dry eye symptoms such as tearing (25%), ocular burning (25%), and pruritus (27.5%).

According to table 3, there was a greater number of patients with normal visual acuity among those with a shorter ART time, a greater amount of CD4 lymphocytes and younger

Table 1
Measures of central tendency and dispersion of the main clinical variables studied.

Variables studied	Average	Standard Deviation	Min.	Max.	N
Age (years)	64.7	5.1	60	78	40
HIV time (years)	16.6	7.0	3.0	31.0	40
ART time (years)	15.3	6.3	3.0	30.0	40
TCD4(ce1/mm3)	710	329.1	250.0	1781.0	40

age, and there was worse visual acuity among patients with a lower number of CD4 lymphocytes and older age.

We observed in the present study that 55.0% of right eyes and 45.0% of left eyes of the elderly presented normal vision. The vision was close to normal in 32.5% of right eyes, and 40.0% of left eyes. Regarding intraocular pressure (IOP), 95% of elderly presented values between 11-21mmHg both in the right and left eye. Five percent of the elderly had vision lower than 11 mmHg.

Table 2
Diseases in the annexes and anterior segment of elderly HIV-infected patients according to the use of ART, CD4 count, and age

Diseases in annexes and anterior segment	ART				CD4				Age					
	>10 years		<10 years		< 500		>500		60-65		66-70		>71	
	n	%	N	%	n	%	n	%	n	%	n	%	n	%
Cataract	29	90.6	8	100	12	100	25	86.3	22	88	9	100	6	100
Keratitis	8	25	2	25	2	18	8	28.6	4	16	4	44.4	2	33.3
Blepharitis	8	25	2	25	0	0	10	35.7	8	32	2	22.2	0	0
Lacrimal Apparatus Alterations	4	12.5	3	37.5	1	9	6	21.4	4	16	3	33.3	0	0
Degeneration of the iris	4	12.5	0	0	1	9	3	10.7	2	8	1	11.1	1	16.7
Pterygium	3	9.4	0	0	1	9	2	7.1	1	4	2	22.2	0	0
Corneal degenerations	3	9.4	0	0	0	0	3	10.7	3	12	0	0	0	0
Eyelid wart	2	6.25	0	0	1	9	1	3.6	1	4	1	11.1	0	0
Anomaly of the pupillary function	1	3.2	1	12.5	2	18	0	0	2	8	0	0	0	0
Xanthelasma	2	6.25	0	0	0	0	2	7.1	2	8	0	0	0	0
Ptosis	2	6.25	0	0	0	0	2	7.1	1	4	1	11.1	0	0
Conjunctival hemorrhage	2	6.25	0	0	0	0	2	7.1	2	8	0	0	0	0
Chronic hemifacial spasm	1	3.2	0	0	0	0	1	3.6	1	4	0	0	0	0
Ectropion	1	3.2	0	0	0	0	1	3.6	1	4	0	0	0	0
Conjunctival nevi	0	0	1	12.5	0	0	1	3.6	1	4	0	0	0	0
Total Alterationss *	70	219	17	212.5	20	172	67	268.6	55	220	23	255.4	9	50
Total de patients in each category **	32	75	8	25	12	30	28	70	25	62.5	9	22.5	6	15

*one patient may have more than one alteration, and therefore the sum may be greater than the total patients in each category or 100%. **The percentage of total patients in each category refers to the total number of patients examined, i.e., 40.

As shown in table 4, there was a higher frequency of vascular alterations of the retina (32.5%), followed by glaucoma (17.5%).

There were alterations in funduscopy including the optic nerve (27%), vessels (27%), macula (19%), peripheral retina (19%), and others (8%).

The alterations of the optic disc in decreasing order of frequency were increased excavation (62%), pigmentary epithelium atrophy (13%), bayonet vessels (13%), and haemorrhages (12%).

Retinal vascular alterations in descending order of frequency were of arterio venular ratio (46%), increased arteriole and venular tortuosity (40%), arteriovenous nicking (7%), and central retinal vein occlusion (7%).

Peripheral retinal alterations in descending order of frequency were drusen (29%), retinal pigment epithelial atrophy (29%), haemorrhages (14%), cottony exudates (14%), and retinal detachment (14%).

Table 3
Classification of vision according to antiretroviral therapy time (ART), CD4 lymphocyte level, and age

Classification of vision	TARV				CD4				IDADE					
	<10 years		>10 years		< 500		>500		60 - 65		66 - 70		>71	
	n	%	N	%	N	%	n	%	n	%	n	%	n	%
Normal	12	75	28	44	9	37.5	31	55	31	62	6	30	3	25
Close to normal	2	12	28	44	9	37.5	21	37.5	16	32	7	35	7	58
Moderate low vision	0	0	2	3	0	0	2	3.5	0	0	2	10	0	0
Severe low vision	0	0	1	1	0	0	1	2	0	0	1	5	0	0
Close to blindness	1	7	5	8	6	25	0	0	2	4	2	10	2	17
Total blindness	1	7	0	0	0	0	1	2	1	2	0	0	0	0
Total*	16	100	64	100	24	100	56	100	50	100	18	100	12	100

*the total number is of eyes

The posterior pole alterations in descending order of frequency were retinal pigment epithelium atrophy (25%), drusen (25%), epiretinal membrane (13%), retinal detachment (13%), cottony exudates (12%), and hemorrhages (12%).

Table 4
Distribution of the elderly by diseases evidenced in funduscopy

Diseases of the posterior segment	N	%
Glaucoma	7	17.5
Optic atrophy	1	2.5
Retinal hemorrhage	2	5
Hypertensive retinopathy	1	2.5
Diabetic retinopathy	1	2.5
Retinal vascular occlusion	1	2.5
Vascular alterations of the retina	13	32.5
Degenerations of the macula or posterior pole	5	12.5
Peripheral degenerations of the retina	4	10
Retinal detachment	1	2.5

DISCUSSION

In 2013, Stephen D. Lawn and colleagues published a cross-sectional study of 216 African individuals with HIV who were older than 30 years, and described the increase in venular caliber as the main retinal manifestation presented by patients.⁽⁴⁾ Likewise, a group of 100 HIV patients were evaluated in 2016, and the main ocular manifestation presented (23%) was alteration of the retinal vascular diameter.⁽⁵⁾

In our study, the main funduscopy alterations found are related to the optic disc and the retinal vascularization. A total of 43.8% of retinal vascular alterations were found in the study patients, among them arteriole and venular disproportion with increased caliber of veins and reduction of arterioles caliber (46%), increased vascular tortuosity (40%), retinal central vein occlusion (7%), and pathological arteriole and venular nicking (7%). We found double vascular alterations compared to Martin-Odom et. al., which may be justified by our sample comprising only the elderly, whereas the other sample included patients of all age groups.⁽⁵⁾

It is known from the medical literature that the elderly present a natural increase of the arteriole and venular

disproportion and vascular alterations. Another factor that may justify this large percentage of retinal vascular alterations found in our study is related to the inflammatory process. Inflammation is known to be a key pathogenic process in HIV infection;⁽⁶⁾ and the increased in the venular caliber of the retina is associated with the elevation of systemic inflammatory markers such as PCR, fibrinogen, and IL-6.⁽⁷⁾ This suggests that the intensified inflammatory processes observed in HIV infection may be responsible for this variation of retinal vascular caliber.

Although not frequent in the population, the central retinal vein occlusion (CRVO) is a disease threatening vision and capable of causing marked reduction of visual acuity and loss of quality of life. The CRVO presents an increased prevalence directly related to the increase in age, and its risk factors are systemic arterial hypertension, diabetes, increased intraocular pressure, hypercoagulability states, and chronic inflammatory response.⁽⁸⁾

Another recent study demonstrated that occlusions of branches of the central retinal vein (0.6%) and occlusions of the central retinal vein (0.1%) were uncommon in the general population and increased with age, affecting respectively 1.3% and 0.4% of patients between 60 and 75 years of age or older.⁽⁹⁾

There is a strong association between CRVO and the chronic inflammatory mechanism. Studies have shown that the release of inflammatory cytokines (mainly interleukin-1, 6, and tumor necrosis factor alpha) is capable of inducing a state of systemic hypercoagulability.⁽¹⁰⁾

In our series of cases we found a percentage of 7% of CRVO, which can be considered high when compared to the studies previously mentioned. This large percentage of CRVO may be justified by the fact that all patients in our study were elderly and affected by a chronic inflammatory process secondary to the long-standing HIV infection.

Alterations in retinal microcirculation have also been associated to optic nerve lesions. The deceleration of blood flow may cause ischemia of the retina and optic nerve, and HIV-infected macrophages can accelerate nerve degeneration by the injury to its axons. Such manifestations tend to become more frequent with increasing age. According to the study by Kozac et. al. (2012), 8.1% of optic nerve alterations were found in 246 HIV patients of different ages. Of these, the prevalence of disk pallor, hemorrhage, notching, and papilloedema were 1.6%, 0.0%, 0.0%, and 6.5%, respectively.⁽¹¹⁾ The present study found alterations in the optic nerve in 27% of patients divided into increased nerve excavation (62%), nerve atrophy (13%), bayonet vessels (13%), and disk hemorrhages (12%).

Glaucoma is the leading cause of irreversible global blindness. According to Klein BE et al., the worldwide prevalence of open-angle glaucoma is 2.1%, and the prevalence increased with age from 0.9% in people aged 43 to 54 years to 4.7% in people aged 75 years or older.⁽¹²⁾

Primary open-angle glaucoma is an age-related disease. Some factors are associated to increased IOP in the elderly, such as the increase of free radicals acting on the trabecular and capable of reducing the production of glycosaminoglycans and leading to obstruction of the local flow of aqueous humor. With age, there is also loss of elasticity of the ciliary muscle and the trabecular meshwork, which can cause accumulation of extracellular material in the trabecular and increased resistance to the aqueous humor flow, resulting in IOP elevation.⁽¹³⁾

In our research we found a percentage of 17.5% of patients with glaucoma; and among the alterations found in the optic nerve, 62% correspond to increased excavation, 13% to bayonet vessels, and 12% to disk hemorrhages, which are characteristic signs of glaucoma as a whole. This fact may be justified by the increased prevalence of this condition in the elderly, since studies report a poor relation between HIV and glaucoma.⁽¹⁴⁾ Muccioli C. et al. found only 0.27% of patients with glaucoma in a series of 1,100 HIV patients examined.⁽¹⁵⁾

Contrary to what happens in glaucoma, Mattheus T. et al. show in a case-control study that HIV patients in use or not of ART have a lower IOP (intraocular pressure) when compared to controls. The study raised the hypothesis that the CD4 T-cell count <700 cells/mm³ contributes to a decrease of 2.1 mmHg in intraocular pressure, and also demonstrated that HIV patients were about 7 times more likely to have an IOP ≤ 10 mmHg, whereas patients with a CD4 count ≤ 700 cells/mm³ were 13 times more likely to have an IOP ≤ 10 mmHg.⁽¹⁶⁾

The current suggestion is that low-grade cyclitis may contribute to IOP reduction, which would explain why the immune recovery is associated with a return to values compatible with those without HIV. CMV (cytomegalovirus) retinitis has also been specifically related to decreased IOP and hypotonia due to ciliary body atrophy.⁽¹⁷⁾ Administration of cidofovir for the treatment of CMV retinitis is associated with hypotonia. However, in our study, there were no patients on CMV treatment who could be taken for comparison.⁽¹⁸⁾

In the present study, 95% of patients presented IOP between 11 and 21mmHg, considered within normal limits. Only 5% of patients had IOP lower than 10 mmHg. Considering that the average age of the patients is about 65 years, their average IOP is expected to be higher than that of other studies in the literature whose average age of patients is 20 years younger. Added to that is the fact that the average CD4 T of our patients is greater than 700cel/mm³. In our study, we found 17.5% of patients with glaucoma, but no patient presented IOP greater than 21mmHg. However, this fact still needs further investigation regarding the development of normal IOP glaucoma or possible biomechanical alteration of the cornea that might justify such findings in this population.

The involvement of the anterior segment of the eye in the patient with HIV infection includes dry keratoconjunctivitis, keratitis, and iridocyclitis. Dry keratoconjunctivitis is observed in approximately 20% of patients, and is believed to be an inflammatory destruction of the lacrimal glands mediated by the HIV virus.⁽¹⁹⁾ A study by the University of Vienna (2002) found a percentage of 17.8% of dry eye syndrome in HIV patients on ART for 7 years, and did not show any correlation between dry eye syndrome and the immune status of patients.⁽²⁰⁾

In 2009, Schaumberg et al. showed that the prevalence of dry eye syndrome increased with age from 3.90% among men aged 50 to 54 years to 7.67% among men aged 80 years.⁽²¹⁾ In our patients, we found 16% of cornea alterations divided into 77% of dry keratoconjunctivitis, 8% of guttata, 8% of dellen, and 7% of senile halo. Most patient complaints during the anamnesis correspond to dry eye symptoms such as tearing (25%), ocular burning (25%), and pruritus (27.5%). In addition, an increase in the percentage of dry eye associated with increasing age was also evidenced: 28.0% in the age group of 60 to 65 years, and 40.0% in 66 to 70 years of age.

We believe that the high prevalence of dry keratoconjunctivitis can be justified both by the HIV virus which is capable of causing destruction of the lacrimal glands reducing the production of tears, and by the advanced age of our patients.

Aging can affect the tear unit in different ways. With aging, there is a reduction in response to external stimuli due to the secondary loss of sensory corneal axons. In addition, there is a reduction of the blink reflex, probably explained by loss of dopaminergic neurons of the substantia nigra. The secretory function of the lacrimal glands and Meibomius also decreases due to the alteration of the parasympathetic cholinergic innervation. These glands have androgen receptors, and therefore androgenic hormones play an important role in the elderly dry eye, since there is a reduction in their production with age.⁽¹³⁾

Due to all these factors, we postulated that the percentage of 77% of dry keratoconjunctivitis found among the total of 16% of corneal alterations in the patients of our study was related to both the age-specific alterations and the immunologic action of the HIV virus. We had a percentage of dry keratoconjunctivitis similar to that found in a population of patients infected with HIV. Comparing data from the present study to studies in the elderly population only, a higher percentage of dry keratoconjunctivitis was observed in our sample.

According to recent studies, the prevalence of visual impairment due to cataract increases seven times each decade of life. The prevalence of crystalline opacity was studied in the Framingham Eye Study to show senile cataract in 42% of patients between 52 and 64 years. Between 75 and 85 years, almost all the population presented some degree of cataract.⁽²²⁾

According to the meta-analysis carried out by Acosta et al. in 2006, the prevalence of cataract was 40% and 60% in the populations of 70 and 75 years, respectively. In our study, we also observed an increase in age-related cataract: in the age group of 60 to 65 years 68.0% of patients had cataract, whereas in the age group of 66 to 70 this percentage increased to 90.0%.⁽²³⁾

The etiology of cataract formation is multifactorial, and although age is an important risk factor for the development of cataract it can also be induced, for example, by viral infections, ocular surgery, steroids, diabetes, and possibly cardiovascular disease.⁽²⁴⁾

In their case-control study in 2010, Rasmussen D. et al. found a higher risk of the HIV-infected population developing cataract (1.87) than controls without HIV (1.50).⁽²⁴⁾ The author emphasizes that the risk was higher in patients with a DC4 T-cell count below 200 cells/mm³.⁴ In our study, we also found a higher percentage of cataract in patients with lower CD4 T levels: 81.8% of patients with CD4 T between 200 and 500 cells/mm³ had cataract, with a reduction to 71.4% in patients with CD4 T higher than 500cells/mm³.⁽²⁴⁾

In the current research, we found a percentage of 92.5% of patients with cataract. The percentage found in our sample was

much higher than that evidenced by international studies in the population of elderly without HIV, which reinforces the fact that HIV contributes to the development of this ocular pathology.

In our study, no ocular alteration was found secondary to common opportunistic infections in HIV patients. We did not have cases of CMV, herpes, kaposi, or ocular toxoplasmosis. We believe that the absence of secondary ocular infections is directly related to the fact that our patients use ART for a long period, an average of 15.3 years of antiretroviral treatment, with the vast majority of patients (72.5%) using the medication for more than 10 years. Added to that is the fact that most patients (71.79%) had CD4 T levels higher than 500 cells/mm³; only 28.2% with CD4 T between 200 and 500 cells/mm³, and no patient with CD4 T lower than 200 cells/mm³.

The ocular adverse effects related to drugs of the antiretroviral regimen, although rare, are described in the medical literature. The main drug involved in dose-dependent ocular alterations is Didanosine (DDI). In 2013, 3 cases of patients with DDI-induced retinopathy after a long period of ART were reported.⁽²⁵⁾ In 2016, 9 cases of peripheral retinopathy due to the use of DDI were reported.⁽²⁶⁾ In Brazil, there is only one case report published by Andre Curi in 2001 associated to retinopathy caused by DDI.⁽²⁷⁾ Regarding Zidovudine, there is a case report (1991) of cystoid macular edema associated to its use in the ART regimen.⁽²⁸⁾ In our study, although patients used ART on average for 15.3 years, no ocular adverse effects of the drugs used in ART were found. Said fact may be explained by the fact that these drugs are no longer the first choice in ART, and more modern drugs such as Lamivudine, Ritonavir and Nevirapine have been used to date, which have not been associated with any adverse ocular effects. The present study confirms the rarity of the ocular adverse effects of these drugs.^(25,28)

CONCLUSION

There was a high frequency of cataract (92.5%) in the study population. Said pathology can be explained by senility and physiological aging of the crystalline, and increased by the chronic inflammatory process generated by the systemic infection of HIV.

Symptoms and signs of dry eye were very frequent in our sample, which may be related to the destruction of the lacrimal glands by the HIV virus, as well as the reduction of the dopaminergic stimulus characteristic of aging.

Vascular retinal alterations (43.8%) can be caused both by the aging process and senile atherosclerosis, and by HIV infection. This fact suggests that elderly HIV patients may present a greater risk of thrombotic phenomena, and funduscopy is essential for screening and preventing vascular complications in this population.

There was a high frequency of glaucoma (17.5%) with normal IOP in the patients examined. It is known that the incidence of glaucoma increases with age. However, HIV infection is associated to reduced IOP. We suggest further studies to evaluate the correlation between normal pressure glaucoma and HIV, as well as biomechanical alterations of the cornea associated with HIV.

These results suggest that the synergism between HIV infection, increased age, and early senescence associated with the use of ART may be the main cause of the increased frequency of these pathologies in this group studied.

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