PATTERN OF OCULAR MANIFESTATIONS AMONG ADULT PATIENTS WITH HIV/AIDS ATTENDING HIV CLINIC AT MUHIMBILI NATIONAL HOSPITAL - DAR ES SALAAM, 2014

Mustafa E. Yusufali, MD

MMed (Ophthalmology) Dissertation
Muhimbili University of Health and Allied Sciences
November, 2014

PATTERN OF OCCULAR MANIFESTATIONS AMONG ADULT PATIENTS WITH HIV/AIDS ATTENDING HIV CLINIC AT MUHIMBILI NATIONAL HOSPITAL - DAR ES SALAAM, 2014

By

Mustafa E. Yusufali, MD

A Dissertation Submitted in Partial Fulfillment of the Requirements for Degree of Master of Medicine (Ophthalmology) of Muhimbili University of Health and Allied Sciences

Muhimbili University of Health and Allied Sciences
November, 2014

CERTIFICATION

The undersigned certify that she has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **"*The pattern of ocular manifestation among adult patients with HIV/AIDS attending HIV clinics at Muhimbili National Hospital, Dar es Salaam*"**, in partial fulfillment of the requirements for the degree of Master of Medicine (Ophthalmology) of the Muhimbili University of Health and Allied Sciences

_____

Dr. Milka Mafwiri

Supervisor

_____

Date

DECLARATION AND COPYRIGHT

I, **Dr Mustafa E. Yusufali**, hereby declare that this **dissertation** is my original work and that it has not been presented nor will it be presented to any other University for a similar or any other degree award.

Signature…….. Date……

ACKNOWLEDGEMENT

I convey my sincere gratitude to my supervisors Dr. M. Mafwiri, Dr. A. Sanyiwa and Dr P. Dilawar for their tireless supervision, constructive criticism and encouragement for this dissertation.

I would also like to express my sincere thanks to Prof .J. Sangawe and Prof.N. Kinabo for their constant advice and encouragement.

I am very thankful to the Muhimbili National Hospital and especially the HIV clinic staff for their full cooperation that enable me to conduct my study smoothly.

I would also like to thank my colleague Dr. Patrice Karumugabo for his constant advice, guidance and encouragement in writing my proposal and dissertation.
I would like to thank all participants in my study for agreeing to participate in the study.
My acknowledgement will not be complete without extending my thanks to the all nursing staff and ophthalmologist in the eye clinic who supported me in one way or another during the time of doing this study.

Lastly, I wish to extend my sincere and heartfelt gratitude to my wife and daughter for tolerating my absence from home during the time when I had to spend long hours at work, and who fully supported me to finish my study.

DEDICATION

To my late father who passed away in the middle of doing this work, for sending me to school and never stopped sacrificing in my education and to my mother and wife who always supported me. May the Almighty God rest his soul in eternal life.

ABSTRACT

Introduction: HIV, the virus that causes AIDS, "acquired immunodeficiency syndrome," has become one of the world's most serious health and development challenges. The estimated prevalence of HIV infection among adults in Tanzania is 5.6%, there are about 1,400,000 total HIV cases. About 86000 people have died from the disease. The available evidence show that an estimate of 70–80% of adult AIDS patients will develop an ocular complication (Orbital and its adnexa) at some point of their illness. Untreated ocular manifestations may cause irreversible blindness or loss of the affected eye and even death. Early detection of these conditions is necessary to allow early diagnosis and appropriate management. Currently no studies have been done in Tanzania on the pattern of ocular manifestations among HIV infected patients. Results of this study will inform the policy makers, eye health stakeholders including health personnel, HIV patients and the general public to put in place strategies that would enable early detection, diagnosis and appropriate management for ocular manifestations in order to prevent blindness and loss of eyes among HIV patients.

Aims: To determine the pattern of ocular manifestations among adults patients with HIV/AIDS attending HIV clinic at Muhimbili National Hospital, Dar es Salaam.

Methodology: This study was a hospital based cross sectional study conducted at Muhimbili National Hospital, Dar es salaam, Tanzania among adult patients attending HIV clinic. Systematic sampling was used to select patients for the study. All consenting patients underwent a through history for particulars and to determine whether they were on ARV medication. A detailed ocular examination was then done. The results for CD4 count done within 6 months of the study were extracted from the HIV clinic cards. Data were recorded on a semi structured questionnaire and later analyzed using the SPSS version 12.0.

Results: A total of 296 patients were recruited, where 153 (51.7%) patients were on ARVs and 143 (48.3%) patients were not on ARV medication. The prevalence of ocular manifestation was 124(41.9%) ,of which 28(18.3%) patients were on ARV and 96(67.1%) were not on ARV`s. Anterior segment Ocular manifestations occurred in 84(14.2%) eyes, followed by the neuro-ophthalmic 79(13.3%) eyes and posterior segment 31,(5.2%).The most common anterior segment manifestation was cataract 25,(29.8%), keratitis 23,(27.4%)eyes and conjunctiva mass in 16,(19 %) eyes. The most common posterior segment manifestation was HIV retinopathy which occurred in 21(67.7%) eyes followed by toxoplasmosis 7, (22.6%) eyes and CMV retinitis 1, (3.2%) eyes. Optic atrophy was the commonest neurophthalmology ocular manifestation that affected 54, (68.4%) eyes. Others eyes had papilloedema 13, (16.5%) and pappilitis 12, (15.2%). Most ocular manifestations occurred in patients not on ARV medication. Except for optic atrophy other ocular manifestations tended to increase with decreasing CD4 cell count.

Conclusion The study has found out that the prevalence of ocular manifestations in HIV/AIDS patients at Muhimbili National Hospital HIV clinic is high. Most OM occurred in patients who were not on ARV and whose CD4 counts was less than 200 cells per cm^3. Cataract, keratitis and conjunctival mass were the leading anterior segment OM while HIV retinopathy, toxoplasmosis and optic atrophy were the commonest posterior segment and neurophthalmic manifestations respectively. The main causes of blindness were cataract, HIV retinopathy and optic atrophy.

Recommendation: It is recommended that routine ocular screening of all patients with HIV be established to identify patients with OM for early diagnosis and appropriate management.

TABLE OF CONTENTS

LIST OF TABLES

ABBREVIATIONS

AIDS	-	Acquired Immunodeficiency Syndrome
ART	-	Antiretroviral treatment
ARN	-	Acute retinal necrosis
ARV	-	Antiretrovirus
CNS	-	Central nervous system
CMV	-	Cytomegalovirus
HIV	-	Human Immunodeficiency virus
HZO	-	Herpes zoster ophthalmicus
KS	-	Kaposis sarcoma
MNH	-	Muhimbili National Hospital
MUHAS	-	Muhimbili University of Health and Allied Sciences
NLP	-	No light perception
PORN	-	Progressive outer retinal necrosis
SCC	-	Squamous cell carcinoma
OM	-	Ocular manifestations
UNAIDS	-	United Nations Program for HIV/AIDS
VA	-	Visual acuity
VZV	-	Varicella-zoster virus
WHO	-	World Health Organization

INTRODUCTION AND LITERATURE REVIEW

HIV, the virus that causes AIDS, "acquired immunodeficiency syndrome," has become one of the world's most serious health and development challenges. The first cases were reported in 1981 and today, more than 30 years later there are approximately 34 million people currently living with HIV and nearly 30 million people have died of AIDS-related causes since the beginning of the epidemic. While cases have been reported in all regions of the world, almost all those living with HIV (97%) reside in low- and middle-income countries, particularly in sub-Saharan Africa.[1,2,3] HIV not only affects the health of individuals, it impacts households, communities, development and economic growth of nations.[1]

According to UNAIDS Report on the Global AIDS Epidemic 2010, Global prevalence rate of HIV is 0.8%, while prevalence varies from below 0.1% in parts of Central Europe to above 1% in parts of Eastern Europe., while in USA prevalence is 0.7% and Canada is 0.3%.[1, 2]
Prevalence of adults HIV patient in ASIA also varies from country to country like in China (<0.1%), India (1.1%), Japan (<0.1%), Pakistan (0.1%), Nepal (0.3%), Malaysia (0.4%). [1, 2, 3]
Sub-Saharan Africa has prevalence rate of 4.9%. Prevalence in South Africa is 17.3% , Swaziland is 26% ,Kenya is 6.3% and in Uganda is 5.4 %. [1, 2]
It is estimated that adult prevalence of HIV infection in Tanzania is 5.6% and total HIV cases are 1,400,000 and death due to HIV were 860,00 people.[2]

Prevalence of ocular manifestations among HIV/AIDS patients

It is estimated that 70–80% of adult AIDS patients will experience an ocular complication (Orbital and its adnexa) at some point in their illness.[4]
In a cross sectional study done in India on Prevalence of HIV-associated ophthalmic disease among patients enrolling for antiretroviral treatment was 17.5%.[5] A similar study done in Chennai showed ocular lesions in 45.7% patients [6], while hospital based studies in Nepal and Korea showed prevalence of 56% and 28.5 % respectively.[8,9]

A number of studies have been done in Africa on OM among HIV patients. A study done in Nigeria on the pattern of presentation of OM in HIV/AIDS, 12.3% cases presented with ocular complications. [9] Similar hospital based studies done in Mali and Ethiopia showed prevalence of 33.3% and 21.4% respectively [10,11].

In a teaching referral hospital in Kenya prevalence of OM was 77 %.[12]A study done in a private hospital (TMJ) in Tanzania showed a prevalence of 76 % [13], while similar study done among children in a tertiary national referral hospital showed a prevalence of 38 % [14].

Prevalence of ocular manifestation in association with CD4 count

CD4+ T Lymphocyte have been proven to be a reliable predictor of ocular complications of HIV infection. Studies done in different parts of the world have showed that the lower the CD4 count the higher the prevalence of OM. A study done in JJ referral hospital, Mumbai showed a prevalence of 23.8% in patient with CD4 counts <200 cells/μL.[4] while another study done in Western India in a tertiary care hospital reported that the prevalence of OM and visual impairment was higher with the CD4 count of less than100 cells.[15]A Korean study showed that OM in Acquired Immunodeficiency Syndrome were significantly seen in lower CD4+ T cell count .[8]

A similar study done in Nepal showed an increasing prevalence of posterior segment findings in relation to decreasing CD4+ T-cell count. OM occurred in 11.9%, 20% and 64.8% of patients with CD4 count above 500 cells/mm3, between 200-500 cells/mm^3 and 51-199cells/mm^3 respectively. Patients with CD4 count below 50cells/mm^3 showed 100% prevalence of various OM.[16]

Prevalence of anterior and posterior OM varied with CD4 counts, anterior segment OM were found to be more common in patients with higher CD4+ count whereas posterior segment manifestations were commoner in those with a lower range of CD4+ count. [5, 16]

Several studies have been done in Africa. In Mali, a hospital based study on OM concluded that 91.7% of patients with ocular complications had a CD4 count not exceeding 200/mm^3, [10] and in Ethiopia similar study reported that 32.8% of patients with CD4 counts less than 200 had OM. [11]

In Cameroon a study to identify ocular complications of HIV/AIDS showed 43% of the patients with ocular complications had a CD4 count of less than 200/mm³,[17] while that in Senegal showed 52% of overall patients with OM 27% had CD4% of <200/mm^3.[18]
Similarly studies done in Kenya at MOI hospital showed that participants with CD4 counts of between 0 – 100 were 5.7 times more likely to have OM than participants with CD4 counts of >100.[12] and that in Tanzania showed that 1.3 times more likely to have OM with CD4 counts <200.[13]

Prevalence of ocular manifestation by segment

Ophthalmic manifestations of HIV infection may involve both anterior and posterior segments of the eye.

Adnexa

Molluscum contagiosum Molluscum contagiosum is caused by a DNA poxvirus, which spreads by direct contact with infected persons or by formites. The small, painless, umbilicated lesions contain poxvirus particles that are released into tears which lead to associated toxic keratoconjunctivitis. Involvement of the eyelids may occur in up to 5% of HIV infected patients.[19] Treatment is by excision of the lesion, curettage or cryotherapy.[20, 21]

Kaposi sarcoma (KS) is a vascular tumor that appears as multiple purple-to-red nodules on the skin and mucous membranes. In approximately 20% of individuals with HIV-associated KS, the tumor involves the eyelids, conjunctiva, and, in rare cases, the orbit. In the conjunctiva, KS may appear as a persistent subconjunctival hemorrhage or as a raised, purplish-red mass. KS does not invade the eye, and no treatment is necessary if it causes no symptoms and is cosmetically acceptable. [20] However, KS may cause discomfort through a mass effect and secondary corneal changes, and also may be disfiguring. Under these circumstances, KS may be treated by cryotherapy, surgical excision, radiation, or chemotherapy.[20, 21]

Squamous cell carcinoma (SCC) is one the most common neoplasm associated to HIV

infection. This may be due to an interaction between HIV, sunlight and Human Papilloma Virus. SCC appears as a pink, gelatinous growth, cauli flower like, usually in the interpalpebral area. Often an engorged blood vessel feeding the tumour is seen. It may extend onto the cornea, but deep invasion and metastasis are rare. The treatment of choice is local excision and cryotherapy but the presence of orbital invasion is an indication of exenteration.[22,23]

Herpes zoster ophthalmicus (HZO) Herpes zoster is a painful vesiculobullous dermatitis that results from the localized reactivation of varicella-zoster virus (VZV) infection. The virus travels down the involved nerve, causing pain followed by a vesicular rash in the dermatome. Herpes zoster can involve any dermatome, but particularly T3 to L3 and cranial nerve V (most commonly the ophthalmic division, V1). Herpes zoster of the ophthalmic division of the trigeminal nerve, with or without ocular involvement, is referred to as HZO. Apart from HIV, other predisposing factors for herpes zoster include aging, immune-suppression, trauma, irradiation, surgery, or debilitating systemic disease. HZO affects about 5-15% of patients who are infected with HIV.[24]

Anterior segment manifestations

Herpes simplex virus (HSV) can cause painful and often recurrent corneal ulcerations with a characteristic branching or dendritic pattern on slit lamp exam. HSV keratitis often is associated with corneal scarring and iritis, appears to require a prolonged course of treatment as it reocurs frequently. Treatment consists of trifluorothymidine, acyclovir and cycloplegic drugs, Orally administered acyclovir is also effective.[25]

Keratocojuctivitis Sicca syndrome This is generally dry eye, More than 20% of patients with HIV infection may have keratoconjunctivitis sicca Symptoms may include foreign body sensations, photophobia and decreased vision.This is due to infection from blepharitis which may lead to destruction of the lacrimal glands glands [26].Treatment is with tear supplements [26].

Fungal keratitis is supurative coneal ulcer caused by fungus; Candidal species are the most common fungal organisms causing keratitis in HIV-positive patients. [27] Other fungal organisms

include *Fusarium* and *Aspergillus* species. In some developing countries, fungal keratitis may be an indicator of HIV infection. In a study from Africa, 26 of 32 (81.2%) patients with fungal keratitis were found to be HIV positive.[28]

Uveitis is the inflammation of uveal tissue, it occurs with several chronic infections and it is seen frequently in patients with HIV disease, including tuberculosis, syphilis, histoplasmosis, coccidioidomycosis, and toxoplasmosis. Clinical signs of anterior uveitis include cells and flares in the anterior chamber, keratic precipitates, posterior synechiae, and hypopyon. Clinical signs of posterior uveitis include vitritis, chorioretinal infiltrates, vascular sheathing, and retinal hemorrhages. Treatment includes topical and oral steroids, in severe cases subconjuctival triamcinalone injections are effective [29].

Posterior Segment Disease

Syphilitic Ophthalmic syphilis is believed to result from the proliferation and subsequent infiltration of Treponema pallidum spirochetes into ocular structures. It usually affects the cornea, iris, retina, and choroid. Syphilis may affect the retina in HIV positive patients. The retinitis is characterized by a deep yellow lesion. Retinal vasculitis and intraocular inflammation may be present. The diagnosis can be confirmed by the serum fluorescent treponema antibody absorption test (FTA ABS) and micro hemaglutination assay (MHA-TP). When the diagnosis is confirmed, vigorous treatment should be started with 12-24 million units of intravenous penicillin G for 7-10 days. Tetracycline, erythromycin and chloramphenicol are options for patients allergic to penicillin [30, 31].

Progressive outer retinal necrosis (PORN)

Is a rapidly progressive, necrotizing retinitis that has been reported in patients with advanced AIDS. It is associated with a history of VZV infection in patients with AIDS. Exact pathophysiologic mechanism for PORN has not been elucidated completely, the general consensus is that severe immunocompromise, along with a previous infection with at least VZV, are necessary.[43]

Studies done to identify proportion of types of common ocular manifestations like in USA showed that Cytomegalovirus (CMV) retinitis was the most common opportunistic ocular infection, affecting 37% of the patients with AIDS [38]. Other opportunistic ocular infections, including ocular toxoplasmosis, varicella zoster virus retinitis, and Pneumocystis choroidopathy were all much less common [38].

A study done in Mumbai in a tertiary referral centre and teaching hospital showed that cytomegalovirus retinitis (CMVR) was the most frequent retinal infection with prevalence of 8.7% and HIV retinopathy was the second most common ophthalmic manifestation [6].

A study done in a tertiary hospital in west India showed the prevalence of ocular manifestations in HIV/ AIDS patients on HAART to be 8%.[15] The OM included HIV retinopathy (5%), immune recovery uveitis (3%), immune recovery vitritis (3%) and Cytomegalovirus retinitis [15]. At the Government of India medical institute the involvement of the anterior segment was less and included complicated cataract, anterior uveitis, fungal keratitis, herpes simplex and zoster keratitis, peripheral ulcerative keratitis and bacterial keratitis. The most common ophthalmic manifestation in that study was CMV retinitis, which was present in 12% of all HIV-infected patients,[16] A similar study in Shimla ,India showed that most common OM was HIV retinopathy in 19 (46%) patients anterior uveitis in (10%) patients.[5] Other lesions seen were ocular toxoplasmosis in (7%), corneal opacity in (7%), acute retinal necrosis in 2 (5%), cytomegalovirus (CMV) retinitis in (5%), choroidal tubercles in (5%), papilledema in (5%), herpes zoster ophthalmicus in (5%), optic atrophy in (2%), keratitis in (2%), ulcerative blepharitis in (2%), stye in (2%), and 6th nerve palsy in (2%) patient. [5]

Another study in India showed prevalence of ocular lesions, the most common being cytomegalovirus (CMV) retinitis (21.4%). Other lesions included cotton-wool spots (12.8%), chorioretinitis (5.7%), endogenous endophthalmitis (8.5%), anterior uveitis (4.2%), and molluscum contagiosum (1.4%), optic atrophy (2.8%), lid ulceration (2.8 %,) and Herpes zoster ophthalmicus (1.4%) [5, 15].

In study done in Nepal ,the common anterior segment findings were herpes zoster ophthalmicus (4.27%), anterior uveitis (2.56%), blepharitis (2.56%) and conjunctivitis (1.7%), whereas HIV retinopathy (19.6%), CMV retinitis (5.1%), ocular toxoplasmosis (2.5%) and presumed ocular tuberculosis (0.85%) were common posterior segment findings.[9, 16] similar study done in Africa (Nigeria) showed similar findings of Herpes Zoster Ophthalmicus (HZO) being the commonest form of presentation in (69.6%) patients, followed by ocular tumours in (13.6%) patients and cotton-wool spots in (4%) patients [9].

In a study done in Korea 23 (40.3%) patients showed retinal microvasculopathy, and 22 (38.5%) patients showed cytomegalovirus (CMV) retinitis. Other manifestations included retinal vein occlusion, herpes zoster ophthalmicus, syphilitic uveitis, acute retinal necrosis and progressive outer retinal necrosis [8].

A prospective study conducted at the Mali General Hospital presented the main lesions in the anterior segment as herpetic keratitis (9,52%) and herpes zoster ophthalmicus (12.69%)and the most common lesions of the posterior segment were cytomegalovirus retinitis (12,69%) and uveitis (15,87%) [10].

In Nigeria study done on ocular diseases found OM like proptosis (2.5%), orbital cellulitis (2.5%), and cytomegalovirus retinitis (2.5%) keratoconjunctivitis sicca (2.5%) and corneal keratitis (2.5%), molluscum contagiosum (2.5%), iridocyclitis (2.5%) disc edema (30%), and choroidoretinitis (15%), ocular toxoplasmosis (5%) and herpes zoster (7.5%) , Kaposi sarcoma (12.5%), conjunctivitis (7.5%), and uveitis (7.5%) [9].

The ocular manifestations among HIV patients noted in a study done in Ethiopia in Gondar University Hospital included retinal microvasculopathy (24%), neuro-opthalmic disorders (9.6%), uveitis (7.4%), ophthalmic Herpes Zoster (5.6%), Molluscum contageousum (4.8%), and Conjunctival carcinoma (4%) [11].

A study in Kenya at MOI hospital showed that the most common findings were observed in the posterior segment in 53% of the patients, followed by anterior segment in 26.5%. Retinal

microvasculopathy (37.5%), chorioretinitis (4.5%), vitreous opacities (4%), macular edema (4%) and CMVretinitis (2.5%) were the main posterior segment findings. Fibrous membrane attached to the iris mostly near the papillary margin (18.5%) and iridocyclitis (5.5%) were the main anterior segment findings. Conjunctival growth (6.5%), Herpes zoster ophthalmicus (6.5%) and Kaposi (5%), conjunctival microvasculopathy (4%) and molluscum contagiosum (2.5%) were the main ocular adnexal findings [12].

Tanzania at TMJ hospital, presented OM like micro-vasculopathy of the retina in 25%, uveitis in 8%, CMV retinitis in 7%, neuro-ophthalmic manifestation in 6%, Herpes zoster ophthalmicus in 5%, Kaposi's sarcoma in 3% and conjunctival carcinoma in 2% of cases. Fifty-three percent of the cases had other anterior segment disorders like conjunctivitis, blepharitis and corneal ulcers [13].

STATEMENT OF THE PROBLEM

The Human Immuno-deficiency Virus (HIV) infection has spread worldwide with various adverse health economic implications particularly in the developing world.

A global summary of the HIV/AIDS epidemic from 2011 by joint United Nations Program for HIV/AIDS (UNAIDS) and WHO estimate that there are 34 million people worldwide living with HIV/AIDS.

At present about 90% of HIV infected persons live in developing countries in particular in sub-Sahara Africa and South East Asia.The estimated prevalence of HIV infection among adults in Tanzania is 5.6% as per data of 2011. The eye is affected in 50 -75% of adult patients. These observations indicate that regular screening of HIV positive patients is warranted to allow early identification of potential vision and life threatening disease.

This study will inform the policy makers, eye health stakeholders including health personnel, HIV patients and the general public to put in place strategies that would enable early detection, diagnosis and appropriate management for ocular manifestations in order to prevent blindness and loss of eyes among HIV patients.

RATIONALE OF THE STUDY

This study is the first study to be conducted at Muhimbili in adult population related to CD4 count. Therefore, it will provide baseline data for future studies related to importance ophthalmic screening in adult patient with HIV. The study is also expected to raise awareness to the medical team on the importance of regular screening of patients regardless of their CD4 count as ocular manifestations can occur in patients with better CD4 count. This study will finally contribute towards the efforts of the hospital on improving the quality of care of patients by putting forward needful strategies for regular screening.

OBJECTIVES

Broad objective

To determine the pattern of ocular manifestations among adults patients with HIV/AIDS attending the HIV clinic at Muhimbili National Hospital, Dar es Salaam.

Specific objectives

1. To determine the proportion of adult patients with ocular manifestations among patients with HIV/AIDS on ARV`s and those not on ARV`s.
2. To determine types of ocular manifestations among HIV patients on ARV`s and those not on ARV.
3. To determine the association between ocular manifestations and CD4+ T lymphocyte count in patients with HIV/AIDS.

METHODOLOGY

A cross sectional hospital based study was conducted at Muhimbili National Hospital (MNH) which is a National referral and University Teaching Hospital. A total of 296 patients were recruited from HIV/AIDS clinic at MNH. Out of these, 153 were on ARV and 143 were not yet on ARV. Patients of aged 18 years and above and those who had done CD4 count within 6 months prior to the day of examination were recruited for the study.

The sample size was calculated by the formula given below:

$$n = \frac{Z^2_{crit} * P(1-P)}{D^2}$$

Where n = required sample size,

P = prevalence of ocular manifestation among HIV patient set at 0.77 [12],

D = Precision of the Study set at 0.05 (5%) and

Both Z_{crit} is the cut off points along the x-axis of the standard normal probability distribution that represents probabilities matching the 95% confidence interval (1.96).

Substituting the above in the formulae we get;

$n \approx 272$

= 280 patients

This formula was chosen because the study design of this study is a cross sectional hospital based study.

Sampling and patient selection

Systematic sampling method was done, where patient were selected from HIV adult clinic from the registry, three days per week.

The HIV clinic at Muhimbili National Hospital is expected to see approximately 100 patients per day of clinic from Monday to Friday. Patient`s list for the particular day is presented before the clinics start .All the patients attending HIV clinics at MNH had their CD4 count tested 6 monthly intervals regardless of their initial CD4 count.

Every day of data collection early morning before HIV clinic started all the patients were collected and given education on importance of eye check up due to several ocular manifestations associated with HIV patients. Then Systematic sampling method was used, every 5^{th} patient on the list was selected and were given special cards if they agree to participate in the study. All those who gave verbal consent were then taken to eye clinic for ocular examination.

On arrival at eye clinic standardised ophthalmological examination was done which included VA using Snelen`s chart, IOP using puff tonometer, ocular structures examination using slit lamp. All patients were dilated using tropicamide and fundus examination was done.

Ocular examination included inspection of ocular adnexa and anterior segment using torch for presence of eye discharge, conjunctiva injection or hyperaemia, conjunctival mass, corneal disorder anterior chamber depth and pupillary reaction (including direct ,consensual and swinging) done using torch. Further examination of cornea, anterior segment, uvea, pupil, lens and vitreous were done using a slit lamp.

To confirm the presence of a corneal ulcer, staining with flourecein was done and examined under cobalt blue light. Direct and indirect funduscopy were done using a direct ophthalmoscope and slit lamp and retina lens of 90/70 after full pupillary dilatation.

Finally evaluation of ocular motility was done in search of neuro-ophthalmological manifestations of HIV such as cranial nerve palsy.

Patients who were suspected to have pathology or systemic disease were sent for laboratory and radiological investigations. Like patient with diabetes and hypertension, blood pressure and blood glucose were estimated. For those suspected to have toxoplasmosis or space occupying lesion in the brain were sent for blood test (toxoplasma Ag) and ct-scan brain respectively.

Those patients who had conjunctiva mass were counselled for excisional biopsy. Those who agreed were managed accordingly and those who were not ready for excisional biopsy were educated on importance of follow up for serial counselling.

The CD4 counts of the patients were obtained from the HIV clinic card. So only those who had done CD4 count within 6 months period were recruited for the study.

Patient's awareness was also enquired while filling questionnaire by asking them whether they were aware if HIV infection can affect eyes. For those who were aware further evaluation was done for the source of their knowledge.

In general all the patients who were recruited in the study were counselled for regular eye check up and those patients with OM were treated or counselled for follow up in the eye clinic accordingly.

Inclusions Criteria

All patients of aged 18yrs and above known with HIV/AIDS attending Muhimbili HIV clinic, during the period of my study.

Exclusion Criteria

Those who have not tested CD4 count within the past 6 months from the study.

Ethical consideration

Ethical approval was requested from and granted by the Ethical and Research Committee at MUHAS. Both verbal and written informed consent was obtained from all participants. For subjects not capable of giving informed consent, surrogate consent was obtained. Results were communicated to the patients and appropriate treatment was instituted where necessary. Confidentiality and privacy was maintained throughout the study. Data was stored safely and only made accessible to the researchers. There was no gender or racial biases.

RESULTS

A total of 296 patients with HIV/AIDS were recruited for the study and all of them were included in the analysis. The demographic features of the study population are presented in table1.

Table 1: The distribution of the study population by demographic features and ARV medication use

		ARV medication use		
Demographic features		Yes	No	
		n (%)	n (%)	***p***-value
Age (years)	<30 yrs.	10 (6.5)	6 (4.2)	0.402
	31 – 40 yrs.	54 (35.3)	56 (39.2)	
	41 – 52 yrs.	61 (39.9)	45 (31.5)	
	53 – 64 yrs.	20 (13.1)	24 (16.8)	
	>65 yrs.	8 (5.2)	12 (8.4)	
Total		153(100)	143(100)	
Sex	Male	69 (45.1)	62 (43.4)	0.663
	Female	84 (54.9)	81 (56.6)	
Total		153(100)	143(100)	

There were 131 males and 165 females. The Age range was from 21 to 73years, with mean age of 38 years. Majority of the patients were within the age group 31- 52. A total of 153(51.7%) patients were on ARV while 143(48.3%) were not.

Table 2: The distribution of the study population by awareness of effects of HIV on eye and socio-demographic features.

Demographic features		Awareness		
		Yes	No	
		n (%)	n (%)	*p*-value
Age (years)	<30 yrs	7 (5.9)	9 (5.0)	
	31 – 40 yrs	45 (38.5)	65 (36.3)	
	41 – 52 yrs	37 (31.6)	69 (38.5)	0.812
	53 – 64 yrs	19 (16.2)	25 (19.6)	
	>65 yrs	9 (7.6)	11 (6.1)	
	Total	117(100)	179(100)	
Sex	Male	46 (39.3)	85 (47.5)	0.166
	Female	71 (60.7)	94 (52.5)	
	Total	117(100)	179(100)	

A total of 117(39.5%) patient were aware of effects of HIV on eyes. A higher proportion (71, 60.7%) of female patients and those of age group between 31-52 (82, 70%) were aware than males (46, 39.3%) and patients of other age groups. The difference was however not statistically significant (*p*-value0.166 and 0.812 and 0.166 respectively)

Table 3: The distribution of ocular manifestations among the study population by ARV medication use.

Ocular manifestations	ARV medication use		
	Yes	No	Total
	n (%)	n (%)	n (%)
Yes	28 (18.3)	96 (67.1)	124 (41.9)
No	125 (81.7)	47 (32.9)	172 (58.1)
TOTAL	153 (100)	143 (100)	296 (100)

(Chi-square=66.79, *p*<0.013)

There were more patients with ocular manifestation (96, 67.1%) among patients not on ARV medication than among those on ARV medication (28, 18.3%). The difference was statistically significant. (p-value <0.013)

Table 4. The distribution of ocular manifestations by socio-demographic features

		Ocular manifestations		
Demographic features		Yes	No	
		n (%)	n (%)	***p***-value
Age (years)	<30 yrs.	5(4.0)	11(6.4)	0.51
	31 – 40 yrs.	46(37.1)	64(37.2)	
	41 – 52 yrs.	39(31.5)	67(38.9)	
	53 – 64 yrs.	25(20.2)	19(11.0)	
	>65 yrs.	9(7.3)	11(6.4)	
Total		124(100)	172(100)	
Sex	Male	53(42.7)	78(45.3)	0.09
	Female	71(57.3)	94(54.7)	
Total		124(100)	172(100)	

There were more female patients with ocular manifestation than males with the highest proportion in the age group between 31-52 years (68.6%) however the difference was not significant (P - 0.51)

Table 5: The distribution of the prevalence of ocular manifestation by CD4 count among the study population.

Level of CD4 count (cells/mm$^{3)}$	Ocular manifestation		Total
	Yes	No	
	n%	n%	n%
<200	44 (73.3)	16 (26.7)	60 (20.3)
200 - 350	31 (43.1)	41 (56.9)	72 (24.4)
>350	49 (29.9)	115 (70.1)	164 (55.4)
	124(41.9)	172(58.1)	296 (100)

(Chi-square=34.13, p<0.044)

A total of 124 patients had ocular manifestations. The highest proportion of patient with ocular manifestations was in the group of patients with CD4 counts of less than 200 cells/mm^3 (44,73.3%). The proportion of patients with ocular manifestation decreased with increasing CD4 count. This relationship was statistically significant. (p-value <0.04)

Table 6: The distribution of visual acuity by presence or absence of ocular manifestation among 592 eyes

Visual acuity	Ocular manifestations		Total
	Yes	No	
	n (%)	n (%)	
6/6 - 6/18	82 (42.3)	206 (51.8)	288 (48.6)
6/18 – 6/60	64 (32.9)	146 (36.7)	210 (35.5)
6/60 – 3/60	40 (20.6)	42 (10.6)	82 (13.9)
3/60 - NPL	8 (4.1)	4 (1.0)	12 (2.0)
TOTAL	194(100)	398 (100)	592 (100)

Chi-square=7.21, p value =0.045

There were 288(48.6%) eyes with normal vision between 6/6-6/18. The proportion of eyes with severe visual impairment (40, 20.6%) and blindness (8, 4.1%) was higher among eyes with ocular manifestations than those without (42, 10.6% and 4, 1% respectively).

Table 7: The distribution of visual acuity by CD4 count among patients with ocular manifestations

Visual acuity	CD4 count level			
	<200counts n(%)	200-350 counts n(%)	>350 counts n(%)	Total n(%)
6/6 - 6/18	31(44.2)	29(49.2)	22(33.8)	82(42.3)
6/18 – 6/60	34(48.6)	19(32.2)	11(16.9)	64(32.9)
6/60 – 3/60	17(24.3)	9(15.3)	14(21.5)	40(20.6)
3/60 - NPL	4(5.7)	1(1.7)	3(5.6)	8(4.1)
TOTAL	70(100)	59(100)	65(100)	194(100)

(chi- square= 13.7, P= 0.31)

Most 82(42.3%) patients with ocular manifestations had normal vision between 6/6-6/18. Although the proportion of patients with visual impairment tended to increase with decreasing CD4 cell counts generally there was no association between level of visual acuity and level of CD4 cell count.

Table 8: The distribution of visual acuity by type of ocular manifestation

VA	Ocular manifestations			
	Anterior segment	Posterior segment	Neuro-ophthalmology	Total
6/6-6/18	45(53.6)	16(51.6)	21(26.6)	82(42.3)
>6/18- 6/60	14(16.7)	10(32.3)	35(44.3)	64(32.9)
>6/60-3/60	24(28.6)	3(9.7)	18(22.8)	40(20.6)
>3/60-NPl	1(1.2)	2(6.4)	5(6.3)	8(4.1)
Total	84(100)	31(100)	79(100)	194(100)

Chi-square=6.37, p value =0.056

There were only 21(26.6%) eyes with normal vision among patients with neuro-opthalmological ocular manifestations compared to 45(53.6%) and 16(51.6%) patients with anterior and posterior segment ocular manifestations respectively. Thus most eyes with good vision were seen in patients with anterior segment manifestations while those with poor vision were seen in patient with neuro –ophthalmological manifestation.

Table 9: The distribution of sub- groups of ocular manifestation among 592 eyes

Ocular manifestations	ARV medication use		
	Yes n (%)	No n (%)	Total n(%)
Anterior segment	26(8.5)	58(20.3)	84(14.2)
Posterior segment	2(0.6)	29(10.1)	31(5.2)
Neuro ophthalmology	19(6.2)	60(20.9)	79(13.3)
No ocular manifestation	259(84.6)	139(48.6)	398(67.2)
TOTAL	**306(24.5)**	**286(75.6)**	**592(100)**

(Chi-square = 3.49, *p*=0.21)

A total of 194(32.7%) eyes-had ocular manifestations. There were more eyes with anterior segement 84(14.2%) manifestations. This was followed by Neuro-ophthalmological (79, 13.3%) and posterior segment (31, 5.2%). Anterior segment ocular manifestations were leading among eyes of patients on ARV medication. In the group not on ARV anterior segement and neuro-opthalmology ocular manifestations were almost equal in proportion; the difference was not statistically significant. (p-value 0.21) (table-8).

Table 10: The distribution of anterior segment ocular manifestation among 84 eyes by ARV medication use.

Anterior segment	ARV medication use		
	Yes	No	Total
	n (%)	n (%)	n (%)
Keratoconjuctivitis sicca	2 (7.7)	0 (0)	2(2.4)
Herpes zoster ophthalmicus	1(3.8)	5(8.6)	6(7.1)
Kaposi sarcoma	0 (0)	2(3.4)	2(2.4)
Conjunctiva Mass	1(3.8)	15(25.9))	16(19.0)
Molluscum contangiosum	0(0)	2(3.4)	2(2.4)
Keratitis	9(34.6)	14(24.1)	23(27.4)
Iridocyclitis	5(19.2)	3(5.2)	8(9.5)
Cataract	8(30.8)	17(29.3)	25(29.8)
TOTAL	**26(100)**	**58(100)**	**84(100)**

(Chi-square = 10.3, *p*=0.47)

Keratitis and complicated cataract were the leading ocular manifestation among eyes of patients on ARV`s while cataract and conjunctival mass were leading among eyes of patients not on ARV`s. Conjuctiva masses seemed to almost (15/16, 93.7%) exclusively occur in patients not on ARV. There was no association between types of anterior segment OM and ARV medication use.

Table 11: The distribution of Posterior segment ocular manifestation among 31 eyes by ARV medication use

Posterior segment ocular manifestation	ARV medication use		
	Yes	No	Total
	n (%)	n (%)	n(%)
HIV Retinopathy	1 (50)	20 (68.9)	21(67.7)
CMV Retinitis	0	1 (3.4)	1(3.2)
Chorioretinitis	0	2 (6.9)	2(6.5)
Toxoplasma retinochoroiditis	1 (50)	6(20.7)	7(22.6)
TOTAL	**2(100)**	**29 (100)**	**31(100)**

(Chi-square = 1.54, *p*=0.54)

Majority (29/31, 93.5%) of eyes affected by posterior segement OM were of patients not on ARV. HIV retinopathy was the most common (20/29, 68%) (table-10)

Table 12: The distribution of Neuro ophthalmic ocular manifestation among 79 eyes on ARVs medication use

Neuro- ophthalmic manifestation	ARV medication use		
	Yes n (%)	No n (%)	Total n(%)
Optic atrophy	18 (94.7)	36 (60.0)	54(68.4)
Papilloedema	1 (5.3)	12 (20.0)	13(16.5)
Papillitis	0 (0)	12 (20.0)	12(15.2)
TOTAL	**19 (100)**	**60 (100)**	**79(100)**

(Chi-square = 9.34, *p*=0.05)

A total of 79 (13.3%) eyes were affected by neuro –ophthalmologic manifestation. Optic atrophy was the leading ocular manifestation that affected a total of 54(68.4%) eyes. The proportions of eyes with OM were far much lower among eyes of patients on ARV than those who were not. Pappilitis and Papiloedema almost exclusively affected eyes of patients not on ARV medication. The differences in the proportions of affected eyes between patients on and not on ARV was statistically significant (p=0.05)

Table 13: The distribution of anterior segment ocular manifestation by the level of CD4 Count among 84 eyes

	CD4 counts level			
Anterior segment ocular manifestation	<200 counts n (%)	200-350 counts n (%)	>350 counts n (%)	TOTAL n (%)
Keratoconjuctivitis sica	2(6.3)	0 (0)	0(0)	2(2.4)
Herpes zoster ophthalmicus	5(15.6)	1(3.4)	0(0)	6(7.1)
Kaposi sarcoma	2(6.3)	0(0)	0 (0)	2(2.4)
Conjunctiva Mass	8(25)	6(20.7)	2 (8.7)	16(19.0)
Molluscum contangiosum	0(0)	1(3.4)	1 (4.3)	2(2.4)
Keratitis	6(18.8)	10(34.5)	7 (30.4)	23(27.4)
Iridocyclitis	4(12.5)	3(10.3)	1 (4.3)	8(9.5)
Cataract	5(15.6)	8(27.6)	12 (52.2)	25(29.8)
TOTAL	**32(100)**	**29(100)**	**23(100)**	**84(100)**

(Chi-square = 15.3, *p*=0.54)

Except for keratitis and cataract that seemed to affect eyes of patients regardless of CD4 count level, other manifestations commonly affected eyes of patients with the CD4 count of <200. However this difference was not statistically significant (p=0.54). In the group of patients with lowest CD4 count, conjuctival mass and keratitis were the leading diagnoses. While complicated cataract was the leading diagnosis among eyes of patients of CD4 count >350.

Proportion of eyes with conjunctiva mass, herpes zoster and iridocyclitis decreased with increasing CD4 count while proportion of cataract increased with increase in CD4 count.

Table 14: The distribution of Posterior segment ocular manifestation by level of CD4 Count among 31 eyes

	CD4 count level			
Posterior segment ocular manifestation	<200 counts n (%)	200-350 conuts n (%)	>350 counts n (%)	Total n(%)
HIV Retinopathy	16(88.9)	1(50)	4 (36.4)	21(67.7)
CMV Retinitis	1 (5.6)	0 (0)	0 (0)	1(3.2)
Chorioretinitis	0 (0)	0 (0)	2 (18.2)	2(6.5)
Toxoplasma retinochoroiditis	1 (5.6)	1 (50)	5 (45.5)	7(22.6)
Total	**18(100)**	**2 (100)**	**11 (100)**	**31(100)**

(Chi-square = 11.3, *p*=0.42)

HIV retinpathy was the leading pathology among patients with lowest CD4 counts while toxoplasmosis retinochoroiditis predominated in patients with CD4 counts >350.

Table 15: The distribution of Neuro ophthalmology ocular manifestation by the level of CD4 Count among 79 eyes

	CD4 counts level			
Neuro- ophthalmic manifestation	<200 counts n (%)	200-350 counts n (%)	>350 counts n (%)	Total n(%)
Optic atrophy	9 (45.0)	19(67.9)	26 (83.9)	54(68.4)
Papilloedema	6 (30.0)	4 (14.3)	3(9.7)	13(16.5)
Papillitis	5 (25.0)	5 (17.9)	2 (6.5)	12(15.2)
Total	**20 (100)**	**28(100)**	**31(100)**	**79(100)**

(Chi-square = 6.78, *p*=0.04)

The proportion of eyes with optic atrophy increased with increasing CD4 counts while that of pappilitis and papiloedema decreased with increased in CD4 counts. The relationship was statistically significant at *p*=0.04

DISSCUSSION

The prevalence of OM in this study was 41.9% among the study population. The prevalence of OM was lower in patients on ARV medication (28, 18.3%) than those not on ARV where it was three times higher (96, 67.1%). A small proportion of patients (24, 8.1%) had more than one OM condition. The magnitude found in this study correlates with a study done in in Cameroon[17] (43%). The prevalence was slightly higher than other studies done NCBI Ethiopia (23.5)[45], Nepal[7] (39.8%) Karnataka (India)[33] (37.6%), Korea[8] (28.5%), Mali (33.3%)[9.] This could be related the proportion of patients who were on ARV in those studies. Patients on ARV medication in the present study were about 51%. The prevalence in the current study is also lower than a previous study in Tanzania[10](70%), Nairobi[12] (77%) Ethiopia[11] (60%), Dakar[18](52.3),Maharashtra (India) [19] (68.5%), and Senegal (52%).[18]

The age range of study population was 21 years to 73 years with a mean age of 38.65 (±0.74) years. The prevalence of OM was higher in the age group of 31-52. This was a reflection of the high proportion of the same age group in the study population which comprised of 85 (68.6%) patients. The age distribution could be explained by the mode of spread of HIV in Tanzania. Heterosexual infection is the commonest mode and this age group is the most sexually active

Females were more than males and constituted 165 (56%). The prevalence of OM was higher in females (71, 57.3%) than males (53, 42.7%), but the difference was not statistically significant with p-value of 0.09. This finding was similar to studies done in Nepal[7], Nairobi[12], Nigeria[9], and Dekar[12]. This finding could be attributed to a higher proportion of females in the study population. Females also accept their status more easily than males hence they seek health care more often.[39]

The results show that 117 (39.5%) of patient were aware of the effect of HIV on eyes while 179(60.5%) were not aware. The age group between <30 and >50 and females were most

aware than other age groups and males. This may be due to the fact that there are more females than males in the study population, but it could also mean that females seek care more readily thereby are more informed than their male counterparts. The finding calls for awareness creation among the community, health providers and HIV patients on the risk of OM among patients with HIV to enable patients to have early diagnosis and referral thereby preventing permanent ocular damage.

Visual acuity was normal in 288 (48.6%) eyes, while 210 (35.5 %) eyes had moderate visual impairment, 82 (13.9%) severe visual impairment and 12 (2 %) were blind by WHO standards. This shows that OM are a significant cause of visual impairment. However patient VA was worse in eyes of affected by Neuro –ophthalmology followed by posterior segment and then anterior segment OM. Causes of lower VA in anterior segment were cataract, iridocyclitis and keratitis while in posterior segment it was CMV retinitis and toxoplasmosis and in neuro-ophthalmology low vision was mainly due to optic atrophy.

About 70(23.6%) patients had bilateral involvement of eyes mostly cataract and optic atrophy. These findings are almost similar to those found in other studies done in Ethiopia[11], Cameroon[13] and in India[33]. Most of the posterior segment manifestation like toxoplasmosis and HIV retinopathy vision was moderately involved as macula area was spared except one patient with unilateral toxoplasmosis scar involving the macula.

Studies have shown that CD4 T lymphocyte counts are a reliable predictor of ocular complications of HIV infections .[4] The current study found a higher proportion (73.3%) of OM among patients with CD4 count less than 200 cells/ml.[3] (p=0.04). The prevalence of OM increased with decreasing CD4 cell count. These findings are similar to those in Mumbai India[3],Cameroon[17]Nepal [7], Senegal [18],Korea[8] and Ethiopia[11] However results can also be biased a CD4 count were not done at time of ocular examination, such that within six months, CD4 counts of a particular patient might have changed.

In the present study, ocular manifestations were more common in the anterior segment (84, 14.2%, followed by the neuro-ophthalmic (79, 13.3%) and then posterior segment (31, 5.5%) (Table 7). This is in contrast to studies in other places where posterior segment OM were the commonest ([9,11,12,17,19 33,38)]. Again this could be explained by the current study population having about half of the study population being on ARV medication therefore better CD4 cell counts. A previous study had shown that anterior segment OM were found in patients with relatively higher CD4 cell counts.[5,6]

Studies have shown a protective effect of ARV medication on OM [9],[3] Among the anterior segment OM, apart from cataract, keratitis, keratoconjuctivitis sicca and iridocyclitis whose proportions were higher among patients with ARV, the proportion of all other OM were lower in the group on HIV medication than those not on medication (Table 9). Therefore, ARV medication had reduced the occurrence of OM. Further analysis showed that most of the cataracts occurred in patients who were aged more than 55 years. This could probably mean that senile cataracts might have been made worse by HIV infection thereby making cataracts to be the leading OM in patients with higher CD4 cell count. On the other hand studies in Nigeria[9] and Cameroon[17] had shown an increase in iridocylitis in patients on ARV. The present study found active iridocyclitis in 5(19.2%) eyes with anterior segment manifestation, mainly in those patients on ARVs. The higher proportion of keratitis among the patients in both groups could probably mean that ARV medication had no protective effect on development of Keratitis. Findings were consistent with studies in Kenya[43]and USA[44]. Conjunctiva mass (probably squamous cell carcinoma) was the leading OM among those not on ARV. This means patients not on ARV are likely to loose their eyes if they do not seek care for management of this tumour. Findings in the current study are similar to those in Nigeria [9]and Cameroon[17]. Herpes Zoster Ophthalmicus accounted for 8.6% of eyes of patients not on ARVs, most of them had eyelid involvement, this finding suggest that ARV medication has a role in reactivating varicella zoster virus. It can also occur in patients with low

immunity due to any cause like severe illness apart from HIV related. Similarly a study done in India 15% of the patient were affected not on ARV,8.5% in Senegal[18]

Almost all posterior segment OM, (29/31, 93.5%) affected eyes of patients not on ARV medications. HIV retinopathy was the commonest OM that affected 21/31 (67.7%) eyes with posterior segment OM and 20/21 (68.9%) eyes of patients not on ARV group. Likewise Toxoplasma retinochoroidis affected 6/29 (20.7%) eyes of patients with posterior segment OM who were not on ARV. The finding shows the protective effect of ARVs on occurrence of posterior segment OM. It also calls for awareness creation for early care seeking behaviour among HIV patients because posterior segment OM commonly cause visual loss and eventually blindness even with treatment.

Evidence from studies shows that the prevalence of OM increases with a decrease in CD4 cell count. In this study, the proportions of a few anterior segment OM increased with decreasing CD4 cell count although the relationship was not statistically significant Table12, p-value 0.54).

Among the diagnoses, all other OM occurred commonly in patients with CD4 counts of less than 200 except for keratitis, conjuctival mass and cataract. Eighteen out of 31 (58%) eyes affected with posterior segment OM were in patients whose CD4 counts were less than 200 (table13). In neuro- ophthalmology group, proportions of all OM were higher in patients with lowest CD4 counts except for Toxoplasma retinochoroiditis. This finding similar to studies done in India [6], Kenya[12], Dakar[18] .

Results show only one (3.2 %) patient with CMV retinitis whose CD4 count was less than 200cell/mm3. Findings in other studies range from <1% to 20%, in Ethiopia[11], Burundi[33], USA[44],Togo[27], Camerron[17] Gambia[41],Nigeria[9] These varied findings in the prevalence of CMV retinitis could be explained by the study design, the sample size and the effects of ART on the CMV virus. There is a substantial decline in the incidence of CMV retinitis from the pre-HAART era. [41]

In this study, the proportion of eyes with optic atrophy increased with increasing CD4 counts while that of pappilitis and papiloedema decreased with increasing CD4 counts. The relationships were statistically significant at p=0.04). The prevalence of neuro-opthalmology OM is similar to studies in Ethiopia[11] and Nepal[7]. The increase in optic atrophy with increasing CD4 count may suggest other pathology apart from heavy HIV load and lower CD4 cell counts. Optic atrophy in HIV patients may be related to compression, infiltration, infection, vaso-occlusion or inflammation and nutritional deficiency.

Most patients with papiloedema fell in the group of patient with CD4 count of <200 cell/mm3. However, there was a weak relationship of increasing OM with decreasing CD 4 cell counts. The commonest causes of papiloedema in HIV patient is cryptococal meningitis which leads to increased intracranial pressure. However, no other specific causes for neuro-ophthalmologic findings could be established in the present study. This is similar to other studies from comparable settings where limited diagnostic capacities often prevent establishing exact causes.[12]

CONCLUSIONS

The study has found that the prevalence of ocular manifestations in HIV/AIDS patients as seen at Muhimbili National Hospital HIV clinic is high. Most OM occurred in patients who were not on ARV and whose CD4 counts was less than 200 cells per cm^3. Cataract, keratitis and conjunctival mass were the leading anterior segment OM while HIV retinopathy, toxoplasmosis and optic atrophy were the commonest posterior segment and neurophthalmic manifestations respectively. The main causes of blindness were cataract, HIV retinopathy and in optic atrophy.

RECOMMENDATIONS

It is recommended that routine ocular screening of all patients with HIV be established to enable identification of patients with OM, early diagnosis and appropriate treatment. Patients with lower CD4 counts should be prioritized for screening where eye personnel are inadequate. Creation of awareness to both patients and health personnel on importance of early health seeking behaviour and referral for ocular exam of patients with HIV should be emphasized.

LIMITATION

The study additionally relied on CD 4 counts tested within 6 months. CD4counts might have changed during data collection. Being a hospital based study at a referral hospital in Tanzania, highly selected group of patient was studied hence results from this study may not reflect the situation in the community.

REFERENCES

1. WHO/UNAIDS/UNICEF. *Global HIV/AIDS Response:Epidemic update and health sector progress towards Universal Access* . 2011.

2. UNAIDS. *UNAIDS 'UNAIDS report on the global AIDS epidemic'.* 2010.

3. UNAIDS. World AIDS Day Report: Results; 2012.

4. Copeland, Robert et al: Review of ocular manifestations of HIV, Ophthalmology 2005.

5. Pathai S, Deshpande A,Gilbert C,Lawn D S. Prevalence of HIV-associated ophthalmic disease among patients enrolling for antiretroviral treatment in India: A cross-sectional study. *BMC Infect Dis.* september 2009, Vol. 9, p. 158.

6. Biwas J,Joseph A,Raizada S,Kumamsamy N,Salomon S. ophthalmic manifestations of human immunodeficiency virus (HIV) infection in india. *IJO.* 1999, Vol. 47, 2, pp. 87-93.

7. Lamichhane G, Shah DN, Sharma S, Chaudhary M, Ocular manifestations in HIV/AIDS cases in nepal. *pub med.* jan-jun 2010, Vol. 2, pp. 45-50.

8. Jin Kim S, Jun Park S, Gon Yu H, Joong Kim N,Chang Jang H,Don Oh H. Ocular manifestations of acquired Immunodeficiency Syndrome in Kore. *JKMS.* may 2012, Vol. 27, 5, pp. 542-546.

9. Kahinde A V,Samalia E, Eni R N. ocular aids: experience at Guiness Ophthalmic Unit. *AJOL*. 2005, Vol. 7, 3.

10. Soumendra Sahoo Department of Ophthalmology, Melaka Manipal Medical College, Jalan Batu Hampar, 75150 Bukit Baru,TMJ

11. Assefa Y,Yohannes G,Melese A. Ocular Manifestations of HIV/AIDS patients in Gondar. *ethiop.H.Health Dev.* 2006, Vol. 20, 3, pp. 166-169.

12. N, Dr.LISTO. Ocular manifestation of HIV/AIDS At MOI Ampath clinic. 2008.

13. S, Sahoo. HIV/AIDS related ocular manifestations. *Malys J Med Sci.* 2010, Vol. 17, 1, pp. 12-16.

14. Padhan D,Manji KP,Mtanda AT. Ocular manifestation in children with HIV infection. *J.*

15. Shah, S. U.; Kerkar, S. P.; Pazare, A. R .Evaluation of ocular manifestations and blindness in HIV/AIDS patients on HAART in a tertiary care hospital in western India British Journal of Ophthalmology;Jan2009, Vol. 93 Issue 1, p88.

16. Poninder K,DP Vats, Sanjay M, ,,Sagarika p CD4 counts: a strong indicator of retinal and ocular lesions in HIV disease, Medical Journal Armed Forces India, october 2011 Volume 67, Issue 4 , P 354-357.

17. Ebana Mvogo C, Ellong A, Bella AC, Lumah A Chu Jokoh. Ocular complications of HIV/AIDS in Cameroon: Is there is any correlation with the level of CD4 Lymphocyte: Bull soc Belge Opthalmo,2007: Vol (305):7-12(MOI)

18. Ndoye N.B, Sow PS, Ba EA, Ndiaye MR, Wade A, Coll-seck AM. Ocular manifestatios of AIDS in Dakar. Dakar med 1993; Vol 38(1):97-100

19. Biswas J, Madhavan HN, George AE, et al. Ocular lesions associated with HIV infection in India: a series of 100 consecutive patients evaluated at a referral center. Am J Ophthalmol 2000; 129:9–15.

20. Cunningham ET Jr, Margolis TP. Ocular manifestations of HIV infection. N Engl J Med 1998; 339:236–44.

21. Tschachler E, Bergstresser PR, Stingl G. HIV related skin diseases. The Lancet 1996; 348:659–63.(11)

22. Palestine AG, Palestine RF. External ocular manifestations of the acquired immunodeficiency syndrome. Ophthalmol Clin North Am 1992; 5:319–24.

23. Kaufman HE. Treatment of viral diseases of the cornea and external eye. Prog Retin Eye Res 2000; 19:69-85

24. Margolis TP, Milner MS, Shama A, et al. Herpes Zoster Ophthalmicus in Patients With Human Immunodeficiency Virus Infection. Am J Ophthalmol 1998; 125:285–91.

25. Palestine AG, Palestine RF. External ocular manifestations of the acquired immunodeficiency syndrome. Ophthalmol Clin North Am 1992; 5:319–24.(22)

26. Lucca JA, Farris RL, Bielory L, Caputo AR. Keratoconjunctivitis sicca in male patients infected with human immunodeficiency virus type 1. Ophthalmololgy 1990; 97: 1008–10

27. Hemady RK. Microbial keratitis in patients infected with the human immunodeficiency virus. Ophthalmology 1995; 102:1026–30.

28. Chan CM, Theng JT, Li L, Tan DT. Microsporidial keratoconjunctivitis in healthy individuals: A case series. Ophthalmology 2003; 110:1420-25.

29. Parra JC, Lopis MDL, Cordoba J, et al. Acute iridocyclitis in a patient with AIDS diagnosed as toxoplasmosis by PCR. Ocul Immunol Inflamm 2000; 8: 127–30.

30. Browning DJ. Posterior segment manifestations of active ocular syphilis, their response to a neurosyphilis regimen of penicillin therapy, and the influence of human immunodeficiency virus status on response. Ophthalmology 2000; 107:2015–23.

31. Kuo IC, Kapusta MA, Rao NA. Vitritis as the Primary Manifestation of Ocular Syphilis in Patients with HIV Infection. Am J Ophthalmol 1998; 125:306-11.

32. Moraes HV. Ocular manifestations of HIV/AIDS. Curr Opin Ophthalmol 2002;13:397-403. Ruhswurm ID, Kiss B, Rainer G, et al. Ocular blood flow in patients infected with human immunodeficiency virus. Am J Ophthalmol 2001; 132:720–26.

33. Miller NR. Walsh and Hoyt`s clinical neuro-ophthalmology. 4th ed., Vol. 5, Part 2. Baltimore: Williams & Wilkins, 1995:4107–56.

34. Cunningham ET Jr, Short GA, Irvine AR, et al. Acquired immunodeficiency syndrome associated herpes simplex virus retinitis: clinical description and use of a polymerase chain reaction-based assay as a diagnostic tool. Arch Ophthalmol 1996; 114:834–40.

35. Markomichelakis NN, Canakis C, Zafirakis P, et al. Cytomegalovirus as a cause of anterior uveitis with sectoral iris atrophy. Ophthalmology 2002; 109:879–82.

36. Morinelli EN, Dugel PU, Riffenburgh R, Rao NA. Infectious multifocal choroiditis in patients with acquired immune deficiency syndrome. Ophthalmology 1993;100: 1014 21.

37. Shami MJ, Freeman W, Friedberg D, et al. A multicenter study of pneumocystis choroidopathy. Am J Ophthalmol 1991;112:15-22.

38. DA, Jabs. Ocualr manifestation in HIV patients in John Hopkins School of medicine in USA. *pub med.* 1995, Vol. 93, pp. 623-83.

39. Saudor EV, Millman A, Croxson TS. Herpes Zoster Ophthalmicus in patients at risk for the acquired immunodeficiency syndrome (AIDS). Am. J. Ophthalmology. 1986; 101:53 – 55.

40. Ah-Fat Fg, Balterburg M. Opthalmic complications of HIV/AIDS . Postgrad Med J.1996 Dec; 72(854):725-30.(moi)

41. T/Giorgis A, Melka F,G/Morion A. Opthalmic manifestations of AIDS in Armed Forces General Teaching Hospital, Addis Ababa. Ethiop Med J. october 2007: vol 45(4):327-34

42. Ndoye N.B, Sow PS, Ba EA, Ndiaye MR, Wade A, Coll-seck AM. Ocular manifestatios of AIDS in Dakar. Dakar med 1993; Vol 38(1):97-100

43. Chisi SK, Kollman, Karimurio J. Conjunctival Squamous Cell Carcinoma in patients with human immunodeficiency virus infection at two hospitals in Kenya. East Africa Med Journal. 2006 May: Vol 83(5): 267-70

44. Guech-Ongey M, Engels EA, Goedert JJ, Biggar Rj. Elevated risk for squamous cell carcinoma of the conjunctiva among adults with AIDS in the United States. International Journal of Cancer. June 2008: Vol 122(11): 2590-3

45. Sisay Bekele, Yeshigeta Gelaw and Fasil Tessema, BMC Ophthalmol. 2013; 13: 20. May 27, 2013,Ethiopia.

APPENDIXES

Appendix I: Questionnaire (English Version)

A) DEMOGRAPHIC DATA.

File No.:……..

Date of birth…….

Age…….. ☐

Sex:

1. Male
2. Female.

Occupation……..

Tel .....

Have you ever been treated for eyes in past ?

1.Yes 2. No ☐

If yes what was the problem.....

Do you feel you have any problems in the eyes?

1. Yes 2. No ☐

Are you on ARV`s?

1.Yes 2.No ☐

If yes since when?

1.< 6 months

2.>6 months ☐

What was your last CD4 count when you started ARV`s?

1. <200cells/mm3
2. 200-350cells/mm3
3. >350cells/mm3

Whats your lattest CD4 count?

1. <200 cells/mm3
2. 200-350cells/mm3
3. >350cells/mm3

B) EYE EXAMINATION

Visual acuity:

1. ≥6/6 – 6/18
2. <6/18 – 6/60
3. <6/60 – 3/60
4. <3/60- NPL

Intraocular pressure (IOP)

Anterior segment manifestation:

1. Herpes zoster opthalmicus.
2. Kaposi sarcoma.
3. Conjustival mass
4. Molluscum contangiosum
5. Keratoconjunctivitis sicca
6. Keratitis
7. Iridocyclitis
8. Orbital cellulitis

9. Cataract
10. Eyelid cellulitis
11. Orbital tumor
12. Others.....

Posterior segment manifestation:

1. HIV retinopathy
2. Cytomegalovirus retinopathy
3. Chorio retinitis
4. Syphilis chorioretinitis
5. Toxoplasma retinochoroiditis
6. Cryptococcal choroiditis
7. Acute retinal necrosis
8. PORN
9. Others.....

Neuro ophthalmology manifestation:

1. Optic atrophy
2. Papilloedema
3. Papillitis
4. Others.....

Appendix II: **Informed Consent Form (English Version)**

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF MEDICINE,

Department of ophthalmology

INFORMED CONSENT FORM

ID-NO | | | | | | | | | | | |

Consent to participate in a research study

- Greetings. I a m Dr Mustafa Yusufali, a postgraduate student, doing a masters of medicine degree in ophthalmology at Muhimbili University of Health and Allied Sciences. Iam doing research with the objective of looking for prevelance of ocular manifestation of HIV patient in association with CD4 count among patients attending HIV clinics at Muhimbili National Hospital, Dar es Salaam

Purpose of the study: To determine the prevalence and pattern of ocular manifestations in adults patients with HIV/AIDS attending HIV at Muhimbili National Hospital, Dar es Salaam

Participants of the study

All adult patients with HIV and whose CD4 count done with past 6 months .Participants will have ocular examinations whereby non invasive procedures will be used.

Confidentiality

All the participants who will join the study their names will not be required but will be identified by use of number. The information obtained during data collection will be kept under strict locked environment where it is only the researcher will have access and will be destroyed after the dissertation have been submitted and accepted for the award of my postgraduate degree.

Risk

No harm is expected to occur because of joining in the study.

Benefits

The results of this research will help to improve the quality of care of these patients and early diagnosis will help to prevent blindness.

Right to withdrawal

Joining in this study is completely your choice. You can withdrawal at any particular moment even after signing the consent form. You can even refuse to respond to any question in the questionnaire or review guide.

Whom to contact

In case of any concern or question about the study you can contact the researchers, Dr Mustafa Yusufali ,Dr Milka Mafwiri ,Dr Padhan at Muhimbili University, P.O. BOX 65001, Dar es Salaam. You can also contact Prof M. Aboud the Chairperson of the Muhimbili University Senate Research and Publications Committee, P.O.BOX 65001, Dar es Salaam, for any matters concerning ethical violation of the study.

I ……..have read the contents in this form. My questions have been answered and I agree to participate in this study.

Signature of participant……

Signature of researcher/research assistant…….

Appendix III: Informed Consent Form (Swahili Version)

Salaam, mimi ni Dr Mustafa Yusufali, mwanafunzi wa shahada ya uzamili ya udaktari, Idara ya macho, chuo kikuu cha Afya Muhimbili. Nafanya utafiti kuangalia kiwango cha upotevu wa chembe chembe za kioo cha jicho wakati wa upasuaji wa mototo wa jicho, hospitali ya taifa Muhimbili.

Lengo la utafiti

Kuagalia idadi ya watu waliona ukimwi kuwa na tatizo ya macho kwenye, hospitali ya taifa Muhimbili.

Usiri

Majina ya washiriki wa utafiti huu hayatahitajika badala yake zitatumika namba za utambuzi. Habari zote zitakazo kusanywa wakati wa utafiti zitatumika kwa wahusika wa utafiti tu na zitaharibiwa baada ya ripoti ya utafiti kuwa imekubalika kwa ajili kutunukiwa shahada ya uzamili.

Washiriki wa utafiti

Wagonjwa wote wenye umri wa miaka 18 na zaidi wameshirikishkwa na waliopima CD4 count kati ya miezi sita..

Madhara

Hakuna madhara yanayotarajiwa kwa washiriki wa utafiti.

Faida

Matokeo ya utafiti huu yatasaidia kuboresha huduma za macho kwa wagonjwa walioambukizwa ukimwi na walio na tatizo ya macho kugunduliwa mapema ili kuokoa jicho na jamii kwa ujumla.

Haki ya kujitoa

Ushiriki katika utafiti ni wa hiyari, mshiriki yoyote ana haki ya kuamua kujitoa katika utafiti wakati wowote kujitoa hakutaathiri kiwango cha huduma kwa mgonjwa.

Mawasiliano

Kama kuna shida yoyote au maswali kuhusu utafiti huu unaweza kuwasiliana na watafiti Dr Mustafa Yusufali, Dr Milka Mafwiri and Dr. Padhan Dilawar wa Chuo Kikuu ch Muhimbili S.L.P. 65001, DSM. Pia unaweza kuwasiliana na Prof M. Aboud mwenyekiti wa kamati ya utafiti na machapisho Chuo Kikuu cha Muhimbili, S.L.P.65001, DSM.

Mimi ……. nimesoma na kuelewa maelezo yaliyo kwenye fomu hii na maswali yangu yamejibiwa na ninakubali kushiriki kwenye utafiti huu.

Sahihi ya mshiriki……..

Sahihi ya mtafiti/mtafiti msaidizi…….