A SURVEY OF EYE DISEASE IN A HIGH RISK HIV GROUP – COMMERCIAL SEX WORKERS IN MAJENGO NAIROBI, KENYA.

A DISSERTATION PRESENTED IN PART FULFILLMENT FOR THE DEGREE OF MASTER OF MEDICINE (OPHTHALMOLOGY) UNIVERSITY OF NAIROBI.

BY

DR. OSCAR M. ONYANGO

MB.ChB. (NRB)

2004.

DECLARATION

This is my original work and has not been presented for a degree in any other university.

SIGNED.....DATE.....31/8/22

DR. OSCAR M. ONYANGO

APPROVAL

This dissertation has been submitted for the examination with our approval as university supervisors.

Dr. Jefitha Karimurio

MB.ChB. (Nrb), M.MED Ophthal. (Nrb) CEH (London)

Lecturer

Department of Ophthalmology,

University of Nairobi

SIGNED.....DATE.....4/8/2004.....

Dr. Stephen Gichuhi

MB.ChB. (Nrb), M.MED Ophthal. (Nrb)

Lecturer

Department of Ophthalmology,

University of Nairobi.

SIGNED.....DATE.....3/8/04.....

DEDICATION

This dissertation is dedicated to my loving and beautiful wife Carol and my ever-inquisitive son, Louis, who both gave me encouragement throughout the degree course.

ACKNOWLEDGEMENT

I wish to acknowledge with appreciation and gratitude the following:

- ✓ My supervisors: Dr.J Karimurio and Dr.S Gichuhi for their guidance, healthy critique and close interest in this dissertation.
- ✓ The doctors, nurses, and lab staff of the Majengo Microbiology clinic for their assistance in recruitment of the CSWs in this study and availing the necessary laboratory records whenever required.
- ✓ To Mr. Joseph Kyumwa of Globe Pharmacy Limited, Mr. Alfonse Kingori of Pan Pharmaceuticals and Mr. Martin Thion'go of MacNaughton Limited: hearty gratitude for the drug supplies during the study.
- ✓ Dr.Jaoko of the Department of Microbiology, University of Nairobi who was the actual brainchild of this study.
- ✓ Mr. Fred Oyugi my statistician, who assisted in data analysis; a few times into the night.

CONTENTS **PAGE**

LIST OF ABBREVIATIONS

AIDS – Acquired Immunodeficiency Syndrome

CMV – Cytomegalovirus

CSW – Commercial sex worker

HIV – Human Immunodeficiency Virus

IV – Intravenous

KNH – Kenyatta National Hospital

AHRTAG - Appropriate Health Resources and Technologies Action Group

HPV – Human Papilloma Virus

U.V light – Ultra violet light

HCV – Hepatitis C Virus

HAART- Highly Active Antiretroviral Treatment

HIV+ve- Human immunodeficiency virus -positive

ABSTRACT

Introduction: HIV infection is an important cause of morbidity and mortality worldwide. It has several associated eye afflictions, many leading to blindness. The study was done to determine the prevalence and magnitude of eye disease in a group at high risk for HIV: the Majengo commercial sex worker (CSW) cohort. Previous studies done have not examined high risk groups. This study was done to determine the prevalence of such effects and see if high risk people differ from the normal population.

Method: A cross sectional survey was done in the CSW clinic at Majengo, Nairobi. This is an open cohort of CSWs on follow-up by the department of Microbiology, University of Nairobi. The study period was between November 2003 and December 2003.

Results: There are over 600 CSWs on regular follow-up at the Majengo clinic. 151 subjects aged between 21 years and 56 years were examined.107 were Kenyan, 40 Tanzanian, 3 Ugandan and 1 Rwandese. 72 were HIV +ve and 79 were HIV –ve. Only 13.9 % of the HIV+ve CSWs examined were on HAART. The prevalence of general eye disease in the HIV+ve and HIV negative subsets was 86.1% and 69.6% respectively. . The prevalence of HIV related eye illnesses in the HIV+ve CSWs was 18.1% with choroidal lesions being the most common. Profound immunodeficiency characterized by a CD_4 count less than 50 was observed in 4 CSWs. While 3 of these CSWs were assymptomatic, one had a retinal hemorrhage and tortuous blood vessels suggestive of HIV retinopathy.

Discussion: Studies done in non-high risk groups found prevalence of HIV related eye illness ranging between 30-80%. The lower prevalence in the C.S.W cohort can be attributed to the fact that some members of this cohort have special immunity to HIV as characterized by HIV specific cytotoxic T-lymphocytes and genital mucosal antibodies. Thus, a close follow-up is needed to document ocular findings in these CSWs at regular intervals.

INTRODUCTION AND LITERATURE REVIEW

The first known case of HIV infection was described in 1981.[1]

Modes of infection with the virus are all well documented now:

- Heterosexual and homosexual transmission, this is responsible for the highest number of new cases in Africa.
- Transfusion of infected blood or blood products.
- Needle-prick injuries especially health workers in hospitals.
- Use of HIV contaminated surgical equipment in invasive procedures e.g. use of non sterilized instruments in dental extractions.
- Sharing of HIV contaminated needles by IV drug addicts
- Vertical transmission through placental circulation between expectant mother and fetus.

The likelihood of HIV infection following exposure is affected by certain risk factors: [2]

- Type of exposure. Needle stick injuries, infected fluid splash to mucus membranes in the eyes and mouth are both commonly encountered.
- Type of body fluid. Blood, semen and vaginal secretions are the body fluids associated with the highest risk of HIV transmission. Urine, saliva, feces, tears and sweat have a low transmission risk unless visibly contaminated with blood.
- Quantity of blood. Exposure to larger amounts of blood from a HIV infected person increases risk of transmission.
- Disease status of HIV infected source patient. Exposure to body fluids from HIV patients who have late stage HIV infection increases risk. This is due to the fact that late stage disease is associated with higher HIV viremia.

Based on modes of infection transmission, susceptible groups have thus been identified: [1]

(a) Multiple sexual partners of uncertain HIV status.

Commercial sex workers and their clients are the most vulnerable group here (both male and female). Chief predictor of sexual transmission of HIV is the level of plasma viremia.

(b) Patients who require repeated transfusion of whole blood or blood products e.g. in haemophiliacs in whom HIV infection may occur together with HCV infection. [3]

(c) Occupational transmission of HIV as seen in health care workers and laboratory workers. The risk of HIV infection following accidental skin puncture from a needle or sharp object contaminated with HIV infected blood is about 0.3%

(d) Maternal-fetal/infant transmission.

HIV infection can be transmitted to the fetus in utero or to the infant perinatally during delivery. Most cases are believed to occur perinatally based on the appearance of HIV specific IgA within six months after birth. a positive viral culture, the appearance of HIV antigenemia weeks to months after delivery and the evidence that caesarian section results in decreased transmission of HIV to the infant.

(e) Alcohol and illicit intravenous drug abuse that predispose to unsafe sexual behaviour (both hetero and homo) lead to an increased risk of HIV infection.

Thus, any undue over exposure to any of the above factors with subsequent increased likelihood of HIV infection is termed as high risk transmission.

Commercial sex occurs in some form all over the world [4]. In some situations there are obvious exchanges of sexual services for money. In other instances, payment may take

the form of gifts. Sex workers are women, men and transgendered people of all ages, nationalities and ethnic backgrounds. The primary motivating factor for the decision to work in the sex industry is almost always economic: it universally pays more than other occupations available to many women, migrants or sexual minorities particularly those with little education.

The Majengo Commercial Sex Workers are an open cohort who have been on follow-up by the department of Microbiology, University of Nairobi since 1985. Over 2000 CSWs are registered as part of the cohort but only about 600 are on regular follow-up due to their migratory nature. Almost 85% of the CSW on regular follow – up are HIV +ve.

The Majengo (CSW) have been on follow – up since 1985 and have been instrumental in the understanding of HIV infection in Africa. [5]. Due to their high risk sexual behaviour majority are now infected with HIV. Different group descriptions have been attached to the CSW depending on period between infection and HIV seroconversion; [1]

(Median time from primary HIV infection to the development of AIDS in the untreated individual is approximately 10 years.)

I. Long time survivors. These are individuals who remain alive for 10-15 years after the primary infection. Many such individuals have significant immunodeficiency and have experienced opportunistic diseases. Some of them have CD_4 counts <200 and remain stable at this level for many years. Mechanisms of this state are postulated to be legion: beneficial effects of HAART, prophylaxis against opportunistic infections, less virulent nature of HIV strain in the individual.

Mechanisms of this state are postulated to be legion: beneficial effects of HAART, prophylaxis against opportunistic infections, less virulent nature of HIV strain in the individual.

II. Long term non-progressors. These are individuals who have been infected with HIV for periods greater than 10 years and whose CD_4 counts remain in the normal range and have been stable over years. Such individuals have also never been on HAART. They are also characterized by low levels of plasma viremia; low number of HIV infected cells and generally normal immune function.

III. Highly exposed, persistently seronegative. This sub-group constitutes a very small number of CSW at Majengo and are postulated to have unique cytotoxic T – Lymphocytes (CTL)and genital mucosal antibodies amongst other protective mechanisms that confer them a degree of immunity against HIV infection. Such individuals are HIV negative for more than 3 years despite active sexual activity with multiple sexual partners.

Of the studies done at the Kenyatta National Hospital, Nyaga in 1995 [6] got a prevalence of ocular manifestations in HIV positive children of 31%. Awan did a similar prevalence study on an adult population at the same hospital in 1990 and found a prevalence of 66% [7].

Studies done in other parts of the world have shown varying statistics as regards prevalence of ocular manifestations of HIV infections. Chiou found a prevalence of

100%. A retrospective study was carried out at the University of Sao Paolo, Brazil by Matos [11] and concluded that 80% incidence of ocular manifestation was present in HIV positive patients.

None of the above studies was carried out on a high risk HIV group. All the patients in the above studies were HIV positive on routine follow-up at their respective clinics or hospitals.

AIDS (Acquired Immunodeficiency Syndrome) was first described in 1981 in USA when 5 previously healthy homosexual men were reported to be suffering from PCP (Pneumocystis Carinii Pneumonia). The cause of AIDS was previously called human T – Cell lymphotrophic virus type III – HTLV III or also lymphadenopathy associated virus – LAV but now is known as Human Immunodeficiency Virus.

So far, the disease still has no cure. Current treatment modalities include:

(a) Use of anti – retroviral drugs.

(b) Nutritional support of the infected individual.

(c) Counseling of patients and their immediate family.

(d) Treatment of opportunistic infections.

Research is also looking for a vaccine that can help prevent infection by the virus. Over 20 vaccines are on trial worldwide.

Manifestations of HIV have a direct correlation with the absolute CD_4 counts

- counts > 500 -Asymptomatic
- Count 250 – 500 -Tuberculosis and candidosis
- Count 150 – 250 - Cryptococcal infection. Karposi's sarcoma. lymphoma
- Count 75 – 125 -Pneumocystis Carinii. toxoplasmosis
- Count < 50 -Cytomegalovirus infections.

Ocular symptoms of HIV infection occur due to several factors. These include: direct viral infection (HIV); concurrent viral infections e.g. cytomegalovirus, herpes zoster, herpes simplex viruses: protozoal infections e.g. toxoplasmosis; fungal infections e.g. candida, cryptococcus; bacterial infections e.g. mycobacterium (typical and atypical); orbital and / or ocular tumors such as squamous cell carcinoma and kaposi`s sarcoma and drug – related toxicity.

Ocular manifestations of HIV infection can be divided into [12]

I HIV – Related Retinopathy

Cotton wool spots are the most common sign of HIV infection and are seen in up to 50% of AIDS patients [13]. They are non – specific lesions also seen in diabetes mellitus. poorly controlled hypertension, and severe anemia. Acute obstruction of pre-capillary retinal arteriole leads to the formation of a nerve fibre layer infarct known as cotton wool spot [14]. It's postulated to be due to direct HIV infection of

retinal vascular endothelium and immuno-complex deposition. Other features include intra–retinal hemorrhages and micro-aneurysms [15].

II Non – Opportunistic Infections Associated with HIV Infection

Certain infectious diseases whose natural history is well known in immuno-competent patients will present with greater severity or will occur with greater frequency in the HIV sero-positive host.

(a) Herpes Zoster

Herpes Zoster is usually a disease of the elderly.

Correlation between severe herpes zoster in young adults and HIV sero-positivity is already well established [16] that today it is considered a marker of HIV infection.

Studies indicate that 50% of patients with herpes zoster ophthalmicus develop ocular lesions, predominantly uveitis [15].

(b) Herpes Simplex Keratoconjunctivitis.

This viral infection tends to be more severe in AIDS patients.

Dendritic corneal ulcers tend to be more peripheral in contrast to central disease in immuno-competent individuals.

(c) Viral Diseases of the Eyelids

These are a common HIV manifestation in the tropics.

The predominant viral aetiology is poxviruses.

They often present as molluscum contagiosum, verrucae and condyloma acuminata; the latter being associated with the human papilloma virus.

Studies show that molluscum contagiosum is a rather frequent infection in HIV positive patients and may serve as an excellent clinical marker for recognizing immunosuppression in HIV infection [17]

(d) Syphilis

Ocular manifestations include uveitis, retinitis, neuro–retinitis, papillitis, optic neuritis and retrobulbar neuritis.

(e) Choroidal Tuberculosis.

There has been a rise in the cases of tuberculosis with the advent of HIV / AIDS epidemic.

III. Opportunistic Infections

These include:

(a) Cytomegalovirus infections of the retina

This is the most common opportunistic infection of the eye and a major cause of visual loss in AIDS patients in USA and Europe.

Its appearance signifies severe systemic AIDS involvement and also indirectly shows a CD_4 cell count of ≤ 50 [15]. Peripapillary CMV infection is an important and often under-reported cause of visual morbidity in patients with AIDS [18]

The frequency of CMV retinitis in African AIDS patients is much lower than that in Europe. Probably due to shorter life expectancy of AIDS patients in developing countries reducing the period of profound immunodeficiency during which patients are most likely to suffer CMV retinitis [12]

(b) Cryptococcal Infection.

This is the most common life threatening fungal pathogen (Cryptococcus neoformans) seen in AIDS patients. It is more common in Africans than Westerners and usually presents with meningitis.

(c) Pneumocystis carinii Choroiditis [15]

The causative agent is an opportunistic protozoal pathogen associated with a lethal pneumonia in AIDS patients.

IV. Tumor Involvement

(a) Karposi's Sarcoma

This may develop on the eyelid, conjunctiva or orbit. Sometimes the tumor may be the sole manifestation of HIV infection. It is estimated to occur in 30% of AIDS patients [15]

(b) Lymphoma of the Orbit.

(c) Squamous cell carcinoma of the conjunctiva.

HIV infection is strongly associated with an apparent increase in the incidence of conjunctival carcinoma in Africa. The interaction of U.V light, HIV, HPV and other factors is still unclear in the pathogenesis of carcinoma. The disease represents another model of multifactorial epithelial carcinogenesis[19] It appears from scarcity of reports that these tumors are uncommon in HIV infected subjects in USA and Europe. Thus, prior to HIV advent, squamous cell carcinoma was more common in equatorial Africa than elsewhere, leading thus to possibility that HIV, HPV, U.V light hasten tumor development.[20]

V Neuro – Ophthalmological Manifestations

These include: Optic Nerve Diseases (Edema, Inflammation, atrophy).

: Retro bulbar Neuritis

: Visual Field Defects

: Cortical Blindness

: Pupillary Defects

: Ocular Motor Nerve Palsies.

Infection with HIV is often accompanied by neurological complications. The most common clinically important neuropathy is painful distal sensory neuropathy. The most severely affected cranial nerves are the trigeminal and the facial. Isolation of HIV from affected nerves suggests a direct role but an immune mechanism is also postulated. Albeit CMV may be associated with a variety of peripheral nerve syndromes, its clinical presentation as a primary demylinating polyneuropathy is rare.[21]

VI Cutaneous Hypersensitivity Reactions

Tuberculosis patients who are HIV positive have a high risk of developing cutaneous hypersensitivity reactions when treated with thiacetazone [22].

An example of such a reaction is the Stevens – Johnson Syndrome.

The ocular manifestations of HIV/AIDS also seem to differ between the developed and the developing world. [23] It's estimated that about 90% of the epidemic is found in developing countries leaving only 10% to the western world.

In the developing world, the patients are sick when they present with HIV infection whereas in the West, they may be healthy till the development of full-blown AIDS and onset of opportunistic infections.

In Africa, the ophthalmologist may contend with herpes zoster infection being the first ocular presentation of HIV infection while his / her counterpart in the West may be faced with more cases of Cytomegalovirus (CMV) retinitis infection, occurring in patients with AIDS who are severely immuno-compromised.

CMV retinitis is believed not to be a major problem in Africa presumably because once the patients develop AIDS; they die of other severe infections like tuberculosis and thus do not survive long enough for CMV to be a problem. This fact may change with the

wider use of anti – retroviral combination treatment and the availability of modern, potent antibiotic, antiviral and antifungal drugs, and the possible prolonging of life.

Ocular inflammation associated with clinical immune recovery has been noted in CMV infected patients on antiretroviral treatment and is referred to as immune reactive uveitis. It is characterised by vitritis, optic disc and macula edema. Important clinical complications of this uveitis include cataract, epiretinal membranes and possible retinal detachment.

Immune reactive uveitis is an important cause of visual morbidity in HIV infected patients with CMV retinitis on antiretroviral treatment. .[24]

RATIONALE

Although there is published literature about eye disease in HIV positive populations, none examined a high-risk population.

The Majengo cohort was interesting to study because it was a high risk group with reliable data available on HIV status, CD_4 and CD_8 counts.

OBJECTIVES

Broad objectives:

- To determine the epidemiology of eye disease in the Majengo C.S.W. cohort.

Specific Objectives:

1. To determine the prevalence of eye disease in the Majengo C.S.W. cohort.
2. To differentiate between eye disease in general and known ocular manifestations of HIV infection.
3. To correlate eye disease to
   (a) Duration since sero – conversion
   (b) CD_4, CD_8 counts.
   (c) Age
   (d) Duration as C.S.W

METHODOLOGY

a) Study design: cross-sectional survey.

b) Study period was 4 weeks (November 2003-December 2003).

c) Methodology

i. Study area was the Majengo clinic run by the Department of Microbiology, University of Nairobi

Case definition for eye disease was any CSW with ocular complaints or any definitive ocular finding on examination.

Case definition for HIV related eye illness was any CSW who was HIV +ve and had any of the known HIV related eye illnesses.

ii. Study population

Inclusion criteria = All CSW enrolled and on regular follow-up at the Majengo clinic.

Exclusion criteria = Any CSW with any other cause of immunosuppression except HIV. Also any CSW not enrolled at the Majengo clinic.

iii. Sample Size And Sampling Technique

All consecutive patients fitting the inclusion criteria.

Minimum sample size calculated to be 138 CSW.

This was done taking into account the following:

Sample size: - $n = \frac{t^2 \times P(1-P)}{M^2}$

Where n= Minimum sample size required

t= Confidence level at 95%

P= Estimated prevalence (in this case 10%)

M= Margin of error at 0.5 %

Thus $\frac{1.96 \times 1.96 \times 0.1 \times 0.9}{0.0025} = 138.29$

Techniques of assessing the sampled population included:

- Use of questionnaire to detail ocular complaints, history–taking and clinical findings.
- Visual acuity taken with Snellens' chart (use of pinhole to rule out refractive errors.)
- Examination of anterior segment with pencil light source.
- Dilated pupil for fundus exam with both direct ophthalmoscope and binocular indirect ophthalmoscopy.

- Treatment of diagnosed eye disease on site and referral to KNH Eye clinic of cases needing refraction, photo-documentation and detailed slit lamp biomicroscopy.

Materials

1 Questionnaire

2 Visual acuity chart

3 Pinhole frame

4 Pencil light source

5 Tropicamide and phenylephrine dilating drops

6 Direct and indirect ophthalmoscopes

7 Artificial tear eye-drop preparations, antibiotic eye drops and ointment, steroid eye drops and ointment, anti-histamine eye-drops.

8 Use of department of microbiology questionnaire to check details on HIV status, CD_4 and CD_8 counts.

Data Analysis

The questionnaire was precoded and the data entered in the SSPS database software and analyzed statistically.

Ethical and Medico-Legal considerations

Patients gave informed consent in writing before inclusion into the study.

There was no coercion and they had the option not to participate in the study without jeopardizing their care at the clinic. Patient information was treated with utmost confidentiality.

Patients were informed of the possible need to have further procedures done at Kenyatta National Hospital e.g. refraction, photo documentation etc.

Patients were informed that no material or financial gain was to be expected from the study.

All the ocular drugs used were the ones routinely prescribed at the Kenyatta National Hospital Eye clinic. (See Appendix A)

Results

151 female CSW were enrolled

72 (49.7%) were HIV+ve

107 (70.9%) were Kenyans, 40 (26.5%) Tanzanians, 3 (1.9%) Ugandans and 1 (0.7%) Rwandese.

Age ranged from 21 to 56years

Table 1: General characteristics

		Number	Percent (%)
HIV status	Positive	72	47.7
	Negative	79	52.3
Citizenship	Kenya	107	70.9
	Tanzania	40	26.5
	Uganda	3	1.9
	Rwanda	1	0.7
Age(in years)	20-25	5	3.3
	26-30	22	14.6
	31-35	27	17.9
	36-40	37	24.5
	>40	60	39.7
Duration of Prostitution (in years)	1-5	37	24.5
	6-10	52	34.4
	>10	62	41.1

The HIV status tallied as shown above (Table 1). The subset of Highly exposed persistently seronegative comprised 24 of the HIV negative group.

Kenyans comprised 109 (70.9%) of the CSWs enrolled in this study. The youngest CSW examined was 21 years old , while the oldest was 56 years of age. The median age for the study group was 38 years. Over 60% of the CSW enrolled in the study had been in active prostitution for over 10 years, with the highest duration of prostitution being 40 years. The median prostitution duration was 9 years.

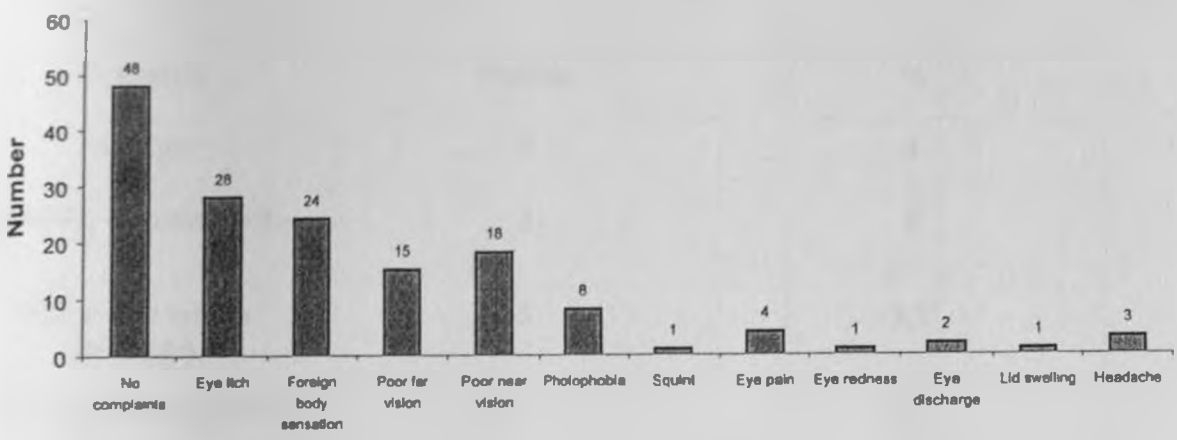
Table2: Duration of prostitution and HIV status

Duration of prostitution(yrs)	HIV Status		Total
	Positive	Negative	
1-5	11(29.7%)	26(70.3%)	37(100%)
6-10	24(46.2%)	28(53.8%)	52(100%)
>10	37(59.7%)	25(40.3%)	62(100%)

χ^2=8.405 df=2 P value=0.015

Duration of prostitution played a role in the level of HIV seropositivity Table 2: 59.7% of the CSWs positive for HIV viremia had worked for over 10 years yet only 29.7% of the seropositive CSWs had been active for less than 5 years

Figure 1:Complaints



Eye complaints were present in 68.2% of the CSW's. The most significant eye complaint was eye itch. This was present in 22.2% of the HIV+ve CSWs and 15.2% of the HIV negative. Foreign body sensation (eye grittiness) was reported by 15.2% of the HIV+ve CSWs and 16.7% of the HIV negative. Poor near vision was reported by 11.9% of all the CSWs reviewed. The prevalence of general eye disease in the HIV+ve and HIV negative subsets was 86.1% and 69.6% respectively. 22.5% of the CSWs did not have any eye disease. 29.4% of these were HIV+ve.

Table 3: Anterior Segment Findings

Diagnosis	Number	%
Allergy	**6**	**4**
Infective Conjunctivitis	**3**	**2**
Refractive errors (pinhole)	**5**	**3.3**
Molluscum contagiosum	**1**	**0.7**
Seborrhoeic dermatitis	**1**	**0.7**
Presbyopia	**49**	**32.5**

The most significant finding pertaining to the anterior segment was presbyopia (32.5%) with allergy following at 4%. 5 (3.3%) CSWs were diagnosed to have refractive errors; two of these were HIV+ve. All cases needing refraction were referred to KNH Eye clinic while the allergy cases were commenced on anti-histamine drops and/or steroid drops, depending on severity. Molluscum contagiosum and seborrhoiec dermatitis were both seen in one CSW respectively. The CSW with seborrhoeic dermatitis was also on follow up for a resolving left lower motor facial nerve palsy. Infective conjunctivitis was of bacterial nature and was found in 3 CSWs. One of these had an associated lid abscess that was successfully drained and systemic antibiotics commenced. The cases with pure bacterial conjunctivitis all received local antibiotic drops.

Figure 2:Anterior Segment Findings

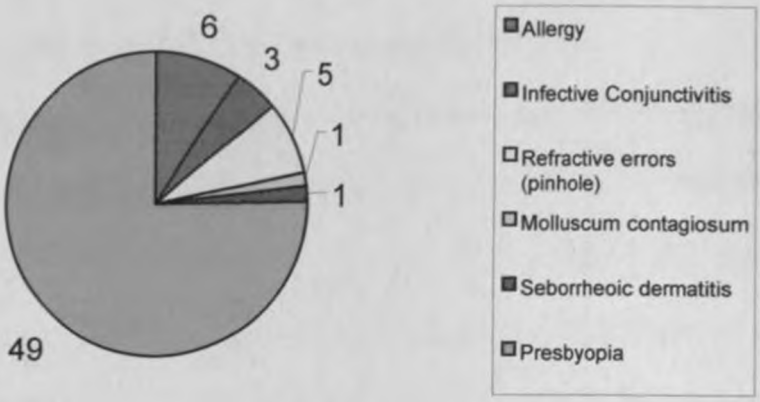


Table 4: Posterior Segment Findings

Finding	Number	Percent (%)
Choroidal lesions	**5**	**3.3**
Cotton wool spots	**4**	**2.6**
Tortuous+Attenuated b/v	**4**	**2.6**
Optic atrophy	**3**	**2**
Retinal hemorrhage	**1**	**0.7**
Vitreoretinal bands	**1**	**0.7**
Maculopathy	**1**	**0.7**
Macula hole	**1**	**0.7**

The most significant posterior segment findings were Choroidal lesions (3.3%), cotton wool spots (2.6%) and vascular changes (2.6%) Table 4.

Pale discs suggestive of optic atrophy were seen in 2% of the CSW.

The choroidal lesions seen were non-specific with no ocular symptomatology being reported by the CSWs. On further evaluation, these choroidal lesions were not found to be associated with any particular infective or inflammatory process and were thus managed conservatively, with close follow up advised if any ocular symptoms occurred. One CSW found to have retinal vascular changes had also been on follow up for high blood pressure for several years. Thus, HIV being the sole causative factor for this retinopathy was arguable. Fifteen other CSWs were on follow up for recently diagnosed high blood pressure but did not have any retinopathy. One CSW with a pale optic disc also had a squint ipsilaterally and reported blunt ocular trauma in childhood and subsequent poor vision in the same eye. The other 2 cases with optic atrophy were both HIV+ve and could have been suffering from sequelae of HIV related optic neuritis.

Table 5: CD4 Count

CD4 Count	Frequency	Percent
≤ 200	22	14.6
>200	126	83.4
Total	148	98.0

Only 14.6% (22) of the CSWs examined had CD_4 counts less than 200 and were arbitrarily referred to as being severely immunocompromised. The lowest CD_4 count seen in the HIV +ve CSWs was 36 and the median CD_4 count was 303. 4 CSWs had CD_4 counts <50 with one of these having retinal vascular changes suggestive of HIV retinopathy. The CSW with the lowest CD_4 count did not have any HIV related ocular features.

Table 6: CD4/CD8 Ratio

Ratio	Frequency	Percent (%)
≤1	**73**	**48.3**
>1	**74**	**49.0**
Total	**147**	**97.4**

A CD_4/CD_8 ratio of less than 1 was found in 48.3% of the CSWs. A ratio of more than 1 was found in the remainder. The lowest ratio in the HIV+ve subjects was 0.03 with a median of 0.26.

Table 7: Duration of prostitution and HIV eye disease.

		HIV related eye disease		
		Yes	No	Total
Duration Prostitution	> 5yrs	8	106	114
	<5 yrs	5	32	37
Total		13	138	151

- 13 CSWs were found to have HIV related eye illness. 8 of these had prostitution duration of > 5 years while 5 had been active for < 5 years. HIV related eye illness comprised of: molluscum contagiosum, seborrhoeic dermatitis, vitreoretinal traction bands, cotton wool spots, retinal hemorrhages, and tortuous attenuated retinal blood vessels. The prevalence of HIV related eye illness in the HIV+ve CSWs was 18.1%.

Table 8: Risk Factor(s) for HIV related eye disease

Risk Factor	ODDS ratio	95 % Confidence interval	P-value
$CD_4 \leq 200$	1.011	0.231 – 4.427	0.989
CD_4/CD_8 ratio≤1	9.064	1.718-47.826	0.009
Duration of Prostitution ≤5years	0.300	0.074-1.220	0.93
Age ≤ 38 years	1.455	0.398-5.324	0.571

Classification Table[a]

			Predicted		
			HIV related eye disease		Percentage Correct
	Observed		Yes	No	
Step 1	HIV related eye disease	Yes	0	13	.0
		No	0	134	100.0
	Overall Percentage				91.2

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	5.0% C.I.for EXP(B	
								Lower	Upper
Step 1	CD4	.010	.754	.000	1	.989	1.011	.231	4.427
	RAT	2.204	.849	6.748	1	.009	9.064	1.718	47.826
	PROS	-1.204	.716	2.830	1	.093	.300	.074	1.220
	AGE2	.375	.662	.321	1	.571	1.455	.398	5.324
	Constan	.410	2.024	.041	1	.840	1.507		

a. Variable(s) entered on step 1: CD4, RAT, PROS, AGE2.

Table 8 lists the risk factors for contracting HIV related eye disease. The most stastically significant factor was a CD_4/CD_8 ratio of less than 1.

Table 9: Duration of positivity by HIV Related eye disease

Duration of positivity	HIV related eye disease		Total
	Yes	No	
< 5yrs	1	6	7
>5 yrs	1	10	11
Total	2	16	18

Out of the 72 HIV +ve CSWs, only 18 seroconverted after joining the Majengo cohort study group (Table 8). The remainder joined the open cohort already positive for HIV viremia. Thus, of this 18, only 2 had HIV related eye illness and there was no direct correlation to duration of seropositivity as one had been positive for less than 5 years (4 years)while the other had been positive for more than 5 years(14 years).

Table 10: HIV related eye disease and ARV use

		ARV		
		No	Yes	Total
HIV related disease	Yes	11	2	13
	No	130	8	138
Total		141	10	151

Out of the 151 CSWs enrolled only 10 were on antiretroviral treatment. Two of these were found to have HIV related eye disease, namely molluscum contagiosum and seborrhoeic dermatitis. The latter case also had a left facial lower motor palsy which she reported was resolving on treatment instituted at the clinic.

DISCUSSION

Studies carried out on HIV+ve patients on routine follow-up at their respective clinics demonstrated prevalence rates ranging between 30-80%. However, the Majengo CSW cohort gave a variation to this: the prevalence of HIV related eye illness in these CSWs was 18.1%. (Table 7) This cohort is believed to have special immunity to HIV via the expression of HIV-specific cytotoxic T lymphocytes and genital mucosal antibodies. Thus, this explains the low prevalence of HIV related ocular morbidity. [5]

A study carried out by Shimizu et al examined hemophiliacs as a high risk HIV group and found concurrent HIV and HCV infection.[3] No ocular examination was done.

The Majengo CSWs are on follow up for their unique feature of apparent resistance to HIV infection and/or apparent variation in HIV infection progression.[1,5]

Two studies carried out at KNH found prevalence rates of HIV related ocular illness of 31% in HIV+ve children and 66% in HIV+ve adults. [1,7] Both groups of patients were on follow up in the pediatric and medical wards for systemic illnesses associated with HIV infection. Thus, all these patients had different socioeconomic backgrounds unlike the Majengo CSWs.

Cotton wool spots are reported to be the most common sign of HIV infection (50% HIV +ve patients) once other causes are ruled out[13] The fact that only 4 out of the total 13 (31%) CSWs with HIV related eye illness had this retinopathy, further underscores the fact that these CSWs have altered immunity patterns. A similar low finding was made by Matos et al who did a retrospective study of 1100 HIV +ve patients.[11] He found that

cotton wool spots were present in only 10% patients. No explanation was given for this unusually low figure.

Husak et al examined 39 HIV +ve patients and reported that molluscum contagiosum lesions were a rather frequent infection in HIV viremia and could serve as a marker for recognizing immunosuppression in HIV infection.[17] The Majengo study group comprised of 151 CSWs and only one of the HIV+ve CSWs suffered from molluscum lesions. This CSW was on anti retroviral treatment. She was severely immunocompromised as characterized by a CD_4 count of 258 and ratio of 0.25.

Muhammed B reported that among HIV infected individuals, skin disease was a significant cause of morbidity.[24] In his study, he reported that 5.5% of the HIV +ve police officers he examined had seborrhoeic dermatitis. He concluded that the average CD_4 count in patients with this type of dermatitis was 206.

Only one CSW had seborrhoeic dermatitis. She was on antiretroviral treatment and had a CD_4 count of 401 and ratio of 0.17. The difference in cell counts in this case can be attributed to the fact that the CSW was on anti retroviral treatment while the HIV+ve police officers were not.

In spite of the lowest CD_4 count in the Majengo study being 36, no retinal CMV lesions were seen. Chiou et al followed up 274 HIV infected patients and found that CMV retinitis was the most common opportunistic infection in 20.8% of them.[8] There was no CD_4 count reported for this study. The appearance of CMV retinitis signifies severe immunosuppression and indirectly shows a CD_4 count <50.[15] 83.4% of the CSWs in this study had CD_4 counts more than 200 (Table 5) hence the low likelihood of CMV infection. Their special immunity against HIV can also be postulated to play a role.

CONCLUSION

- The prevalence of HIV related eye disease was 18.1%.
- The prevalence of general eye disease in the HIV+ve and HIV negative CSWs on follow up at the Majengo clinic was 86.1% and 69.6%.
- The altered immune patterns seen in this special cohort may explain the low prevalence of HIV related eye illness in the CSW.[4]
- Use of a slit lamp biomicroscope would have assisted in diagnosis of anterior segment conditions such as uveitis. Peripheral retinal conditions such as CMV retinitis would also have been diagnosed with the assistance of a 3- mirror contact lens.
- Routine eye exams are needed for this special cohort despite the low prevalence of HIV related eye diseases because with the ever-changing pathogenecity of the HIV, ocular symptomatology could become more prevalent.

RECOMMENDATIONS

- Routine eye examinations at the Majengo clinic would provide continuous information on the incidence of eye diseases of this special cohort and give an insight on any changing disease patterns.
- A comparison cross sectional study of eye disease in another high risk HIV group e.g. intravenous drug addicts would go a long way in assessing eye disease patterns of HIV.
- Early and appropriate treatment for any eye complaints in the CSWs is advisable considering some of the blinding sequalae of chronic ocular inflammation.
- A similar prevalence study on the high-risk homosexual male community would provide a comparison for the Majengo cohort.

REFERENCES

1. . Bennett GL, Mandell JE, Dolin R

   The Immunology of HIV infection in: Principles and practice of Infectious diseases;5th edition.

   Philadelphia. Churchill Livingstone. Pg. 1374-1397. 2000

2. Bell DM

   Occupational risk of HIV infection in healthcare workers: an overview.

   Am.J. Med 1997(102): 9-15.

3. Shimizu S, Chen KR, Tagami H, Hanabusa H.

   Mucocutaneous manifestation in Japanese HIV positive Hemophiliacs.

   Dermatology. 2000 (201): 321-5

4. A Handbook:

   Making sex work safe. Pg 11-12; published by network of sex work projects in collaboration AHRTAG, London, U.K. 1997

5. Plummer F, Bwayo G, Kiama C, Kimani J, et al

Resistance to HIV-1 infection among highly exposed C.S.W in Nairobi.

Immunology Letters1999 (66): 27- 34.

6. Nyaga PT

A prevalence study of ophthalmic manifestations of HIV infection in children as seen at KNH.

M.Med dissertation, University of Nairobi, 1995.

7. Awan HR.

Prevalence of ocular manifestation of AIDS at K.N.H

M.Med dissertation, University of Nairobi, 1990.

8. Chiou SH, Liu CY, Hsu WM, Chan YJ, et al

Ophthalmic findings in patients with acquired immunodeficiency syndrome.

Journal of Microbiology Immunology and infection (Wei, mian yu gan ran za zhi). 2000 (3): 45-8.

9. Lund OE, Klaus V, Scheirffarth OF

AIDS and the eye

Fortchritte der Ophthalmologic 2000 (87): 94-100

15. Kanski J.

Clinical Ophthalmology 4th edition Butterworth – Heinemann, Oxford Press, 1999.

16. Cole EL, Womack LW, Liesengang TJ

Herpes zoster ophthalmicus and acquired immunodefiency syndrome. Arch Ophthalmol. 1984(102): 1027 – 1029.

17. Husak R. Garbe C. Orfanos C.E.

Mollusca contagiosa in HIV infection. Clinical manifestation, relation to immune status and prognostic value in 39 patients. Hautarzt. 1997(48): 103-9.

18. Gross JG, Sadun AA, Wiley CA, Freeman WR

Severe visual loss related to isolated peripapillary retinal and optic nerve head cytomegalovirus infection.

AM.J. Ophthalmol.1989 (108): 691-698.

19. Waddell KM, Lewallen S, Lucas SB, Atenyi-Agaba C, et al

Carcinoma of the conjunctiva and HIV infection in Uganda and Malawi. Br J. Ophthalmol. 1996 (80): 503-508.

15. Kanski J.

Clinical Ophthalmology 4th edition Butterworth – Heinemann, Oxford Press, 1999.

16. Cole EL, Womack LW, Liesengang TJ

Herpes zoster ophthalmicus and acquired immunodefiency syndrome. Arch Ophthalmol. 1984(102): 1027 – 1029.

17. Husak R. Garbe C. Orfanos C.E.

Mollusca contagiosa in HIV infection. Clinical manifestation, relation to immune status and prognostic value in 39 patients. Hautarzt. 1997(48): 103-9.

18. Gross JG, Sadun AA, Wiley CA, Freeman WR

Severe visual loss related to isolated peripapillary retinal and optic nerve head cytomegalovirus infection. AM.J. Ophthalmol.1989 (108): 691-698.

19. Waddell KM, Lewallen S, Lucas SB, Atenyi-Agaba C, et al

Carcinoma of the conjunctiva and HIV infection in Uganda and Malawi. Br J. Ophthalmol. 1996 (80): 503-508.

20. Ateenyi-Agaba C.

Conjunctival squamous cell carcinoma associated with HIV infection in Kampala, Uganda.

Lancet. 1995 (345): 695-696.

21. Casanova- Sotologo P, Casanova- Camillo P, Casanova-Carillo C.

Diseases of the peripheral and visual nervous system during infection with HIV.

Rev. Neurol. 2003 (37): 481-485.

22. Nunn P.

Cutaneous hypersensitivity reactions due to thiacetazone in HIV- 1 seropositive patient treated in TB.

Lancet 1991 (337): 627 – 630.

23. Lightman S.

HIV/AIDS the differing ocular manifestations in developed and developing countries.

Community Eye Health1995 (8): 17.

24. Muhammed B.

Prevalence and pattern of skin diseases in relation to CD4 counts among HIV infected police officers in Dar-es-Salaam.

Trop. Doct. 2003 (33): 44-48.

APPENDIX A

CONSENT BY C.S.W FOR EXAMINATION

EXPLANATION

NAME OF INVESTIGATOR: DR.OSCAR ONYANGO

CONTACT ADDRESS: BOX 434, 00202, KNH, NAIROBI.

Commercial sex work has a high HIV transmission risk due to the multiplicity of the sexual partners. HIV infection leads to depressed immunity that is characterized by several ailments that ultimately lead to death. Coupled to these are eye diseases that cause debilitation and even blindness. The study purpose is to determine the presence of any eye disease and its magnitude amongst the Majengo C.S.W. cohort. Any eye disease diagnosed will be treated at the Majengo clinic and any case requiring more specialized eye treatment will be sent to the KNH eye clinic for further management.

Participation in the study is completely voluntary with no financial or material gains expected. Every C.S.W will give informed consent through signing a consent form.

Visual acuity will be taken for far and near vision with designated charts. The eyes will be dilated with tropicamide eye drops to facilitate effective fundoscopy. Use of the dilating drops may cause increased light sensitivity and mild reduction in vision, which is reversible within 3 – 4 hours. Suspicious eye growths will be photographed at the Majengo clinic.

Confidentiality of records shall be maintained.

The investigator shall be at the Majengo clinic throughout the study period.

There are no significant risks of drug toxicity during the study excluding the mild transient ocular discomfort post instillation of mydriatic eye drops. The study will go a long way in assessing the magnitude and pattern of eye disease amongst the C.S.Ws at the Majengo clinic. This will assist in planning for any future routine ocular examinations.

APPENDIX B

STUDY: SURVEY OF EYE DISEASE IN A HIGH RISK HIV GROUP:

COMMERCIAL SEX WORKERS IN MAJENGO, NAIROBI – KENYA

QUESTIONNAIRE

A. PERSONAL DETAILS

1. NAME: _____ INDEX NO: _____

2. AGE: _____

3. CITIZENSHIP (NB: KENYA/UGANDA/TANZANIA) 4. Residence in Nairobi:___

5. Date of Examination: _____

Elisa for HIV: +ve _____ -ve_____First HIV +ve date_____

6. Present CD4 counts: _____ Previous CD4 counts:_____

Present CD8 counts: _____Previous CD8 counts:_____

Absolute count (%):_____ Absolute Count (%)_____

Date: _____

7. Seroconversion period: _____

8. How long have you been a CSW How much did you earn last month?

_____ _____

9. Ever used Anti – Retroviral Drugs Yes N☐ ☐

10. Any history of major illness in the past 1 year? Yes N☐ ☐

If YES specify the disease

_____

B. OCULAR DETAILS

		RE	LE
1.	Ocular complaints	_____	_____
2.	Visual Acuity	_____	_____
	Use of Pinhole	_____	_____
3.	Lids	_____	_____
4.	Conjunctiva	_____	_____
5.	Cornea	_____	_____
6.	Anterior Chamber	_____	_____
7.	Iris	_____	_____
8.	Pupil	_____	_____
9.	Lens	_____	_____
10.	Fundus	_____	_____
11.	Cranial Nerve Palsy	_____	_____
12.	Anterior Segment Photo	_____	_____

Yes ☐ No ☐

STUDY: A SURVEY OF EYE DISEASE IN A HIGH RISK HIV GROUP:
COMMERCIAL SEX WORKERS IN MAJENGO. NAIROBI – KENYA
CONSENT FORM

I _____(3 NAMES)

OF_____

(RESIDENCE – LOCATION. CITY, COUNTRY)

P.O.BOX_____

HEREBY CONSENT FOR INCLUSION IN THIS STUDY.
I AM INFORMED THAT THE INFORMATION OBTAINED WILL BE HANDLED IN STRICT CONFIDENCE AND I DO FURTHER CONSENT TO ANY OTHER PROCEDURES WHICH ARE NECESSARY IN THE STUDY AS HAS BEEN EXPLAINED TO ME BY:

DOCTOR'S NAME & SIGNATURE:
_____

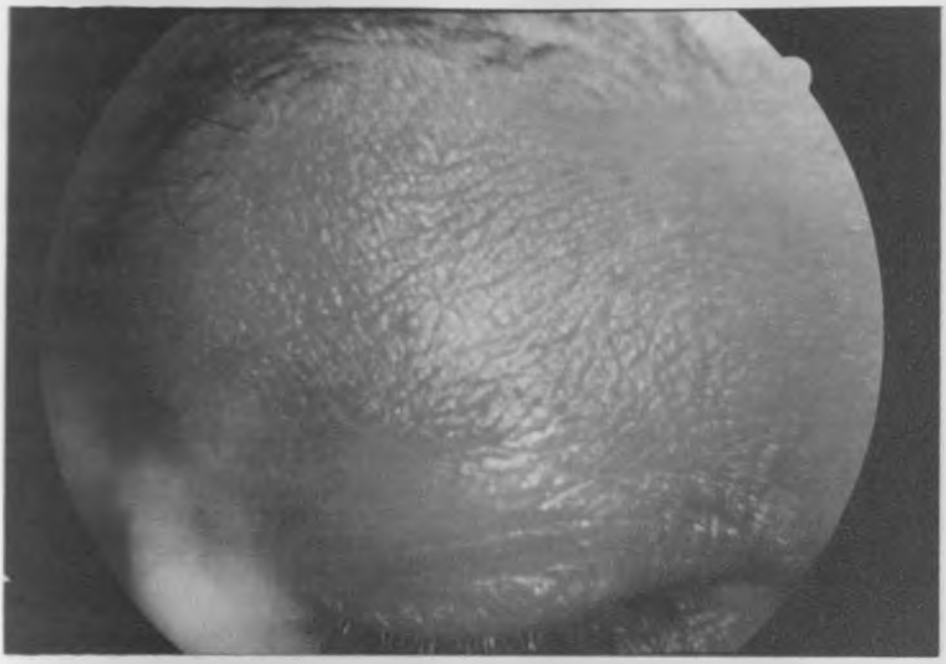
DATE: _____

PATIENT'S SIGNATURE: _____

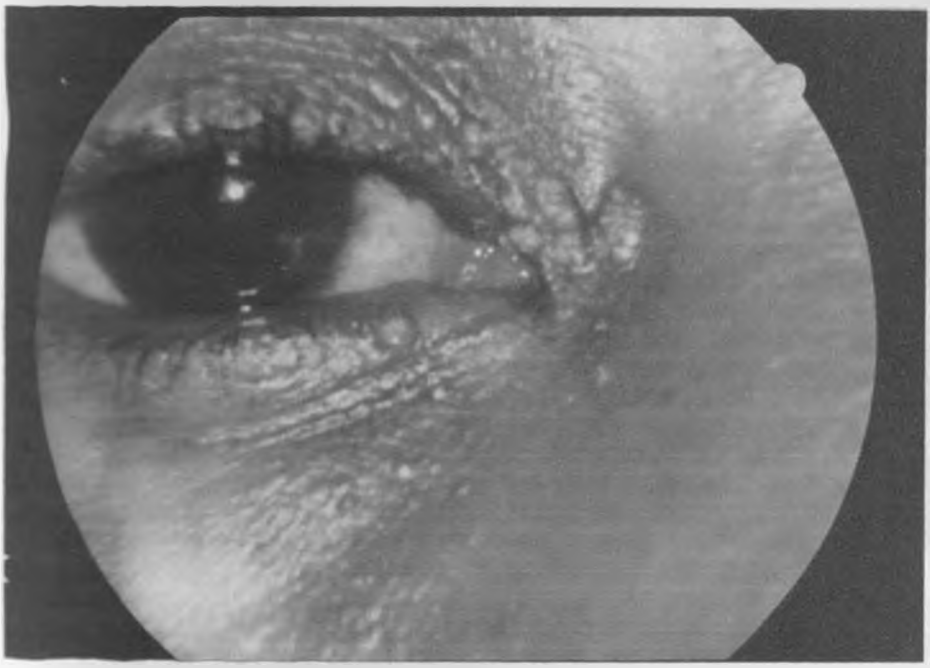
DATE: _____

WITNESS SIGNATURE: _____

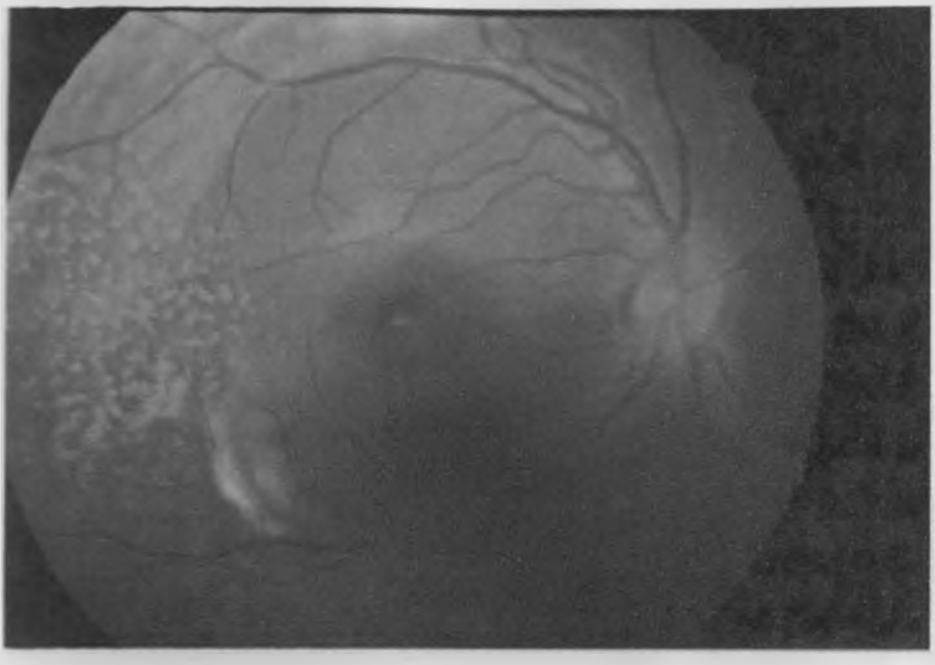
DATE: _____

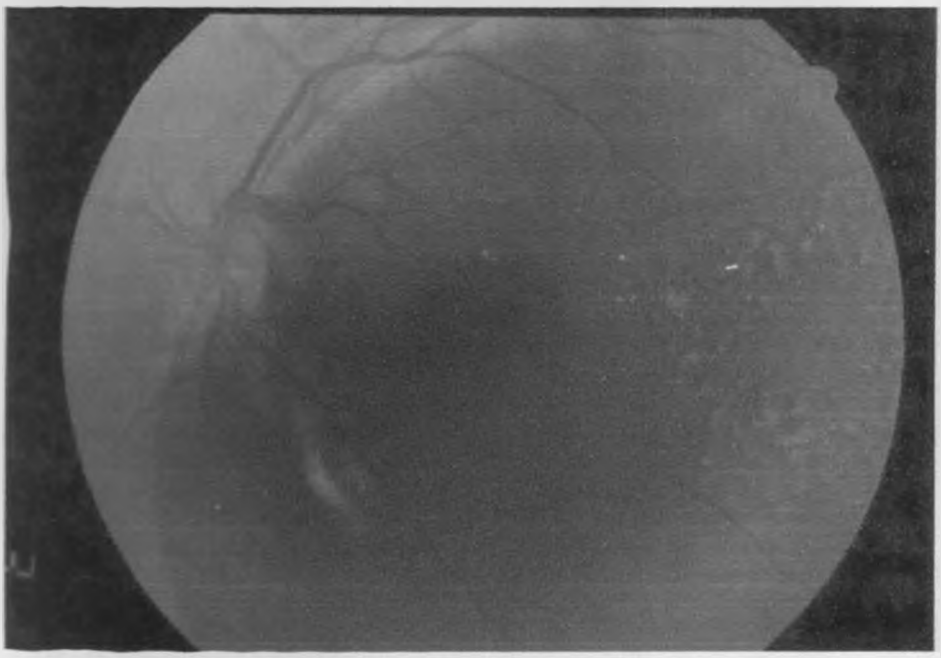


SEBORRHOEIC DERMATITIS.



MOLLUSCUM CONTAGIOSUM.





CHOROIDAL LESIONS.
(shadows are artifacts)

PERIPAPILLARY VITREORETINAL BANDS.

(shadows are artifacts).