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College of Ophthalmology of Eastern, Central and Southern Africa (COECSA)



Who we are

The College of Ophthalmology of Eastern, Central and Southern Africa (COECSA) is a registered specialized virtual college whose aim is to address the chronic shortage of ophthalmologists in Eastern, Central and Southern Africa as well as improve the quality of eye care services in the region. COECSA seeks to work in tandem with regional and global initiatives and this includes; supporting international commitments including MDGs, WHO Vision 2020: the Right to Sight; WHO AFRO Road Map for scaling up HRH; 4th EAC Development Strategy; national eye care plans in the region, and national development plans.



Where we work

Currently, COECSA works in nine (9) countries including **Kenya, Uganda, Tanzania, Rwanda, Burundi, Ethiopia, Zambia, South Sudan** and **Malawi**. It shall progressively seek to establish its presence in all 14 countries of Eastern, Central and Southern Africa (ECSA).

What we do

- ❖ Contribute to the human resource for health through quality training in ophthalmology;
 - Support M.MED Ophthalmology training - scholarships
 - Subspecialty training
 - Short competency-based courses
 - Curriculum development
 - Infrastructure development
- ❖ Set standards for professional ophthalmic practice;
 - Award Fellowships
 - Accreditation of training institutions
- ❖ Facilitate continuing professional development;
 - Award CPD Points
- ❖ Contribute to health policy development;
 - Engage in policy reviews and policy advocacy
 - Promote research which advances ophthalmology in the region; and,
 - Offer research training
 - Award research grants
 - Provide technical support in research
- ❖ Create a forum for the ophthalmic practitioners to promote the profession and exchange skills and knowledge.



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EDITORIAL

The COECSA research repository

We would like to introduce to you the proposed College of Ophthalmology of Eastern, Central and Southern Africa (COECSA) Research Repository, a digital archive that will contain various research papers done in the Eastern, Central and Southern Africa (ECSA) region, with a particular focus on Masters' theses. There are several medical training institutions in the ECSA region that train a good number of ophthalmologists; it can be estimated that an average of 20-30 individuals graduate each year. These fresh ophthalmologists carry out various research projects as a requirement for graduation. Even though most of their thesis work is brilliant, very little of this work gets a peer reviewed publication. A brief visit to any of these universities will quickly confirm that most of the dissertations end up on university library shelves collecting dust and are therefore not readily accessible for use within and without the region. Often times, young researchers simply mention "*no literature available*" when asked to look up local literature on a particular subject. This is rather unfortunate as the information in these research papers is vital to residents who are still in training and those in practice.

Local literature is invaluable in understanding the disease dynamics in a local setting and greatly contributes to patient care and policy. It is essential that even as we review published works in various regions, we also look at the work that has been done locally. This will improve the knowledge available on the burden of eye care conditions in our region, provide an avenue for international researchers to access local data and in general get the information out there so that effective evidence based interventions can be carried out where

necessary. It will also be easier to understand areas where more research is needed.

We seek to contribute to solving this problem with the COECSA research repository which will make literature from the ophthalmologists working in the region, readily available and usable. Starting with the University of Nairobi and Mbarara University of Science and Technology, we shall systematically collect all masters' theses available in the department libraries and index them to: name of author, year, title, key words, abstract and PDF downloads in an open access format. By simply searching the database, anyone will be able to access this information and even contact the authors of the study if they so wish. We shall then scale this to all other institutions within the ECSA region.

This will be a valuable tool because it will make the information more accessible both locally and internationally. The repository will be continually growing, and completing residents will be requested to provide PDF versions of their dissertations to update it. COECSA enables continuing professional development in the region and encourages research to thrive and this is one more step towards that goal. We are excited to partner with you in making this a reality and call upon your support.

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Magnitude of delay in presentation and management of retinoblastoma patients at the Kenyatta National Hospital, Kenya

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ABSTRACT

Background: Retinoblastoma is the commonest intraocular childhood malignancy in the world and is curable when detected early. Delay in presentation and management is seen as a major contributor affecting outcome.

Objective: To determine the magnitude of delay in the presentation and management of retinoblastoma patients at the Kenyatta National Hospital.

Methodology: A cross sectional hospital based study done from November 2012 to April 2014 at the Kenyatta National Hospital. Data was collected using a semi structured questionnaire from the parents/guardians of retinoblastoma patients who gave consent.

Results: Ninety-one parents/guardians of 64 patients participated. Sixty point nine percent took more than 5 months from onset of symptoms to presentation at the referral centre while 46.1% took more than 1 month from onset of symptoms to first visit to a health facility. Ten point nine percent of patients took more than 2 weeks before starting definitive management at the referral centre.

Conclusions: Majority of the patients presented late to the referral centre while most of the health care providers referred the patients early. Augmentation of public awareness on retinoblastoma would make the primary caregivers more aware of early symptoms of the disease.

Keywords: Retinoblastoma, Childhood malignancy, Delay, Magnitude, Kenyatta National Hospital

INTRODUCTION

Retinoblastoma is the commonest intraocular childhood malignancy in the world and is curable when detected early. It is a rare tumour with malignant transformation of primitive retinal cells before final differentiation¹.

In developing countries, retinoblastoma is detected at more advanced stages and has a poorer prognosis compared with developed countries². Kenya has an incidence of 1 in 17030 live births, comparable with worldwide incidence of 1:14000 to 1:20000 live births³. The mean age at presentation for unilateral disease is 35.9 months and 26 months for bilateral disease in Kenya³ while in the US the mean ages are 24 months and 12 months respectively⁴. The mean delay in first presentation to a health provider was 6.75 months with 4.5% of the cases reporting within 1 month. A mean delay of 1.69 months was noted after referral³. Five years survival rates of less than 50% have been reported in developing countries. This is low as compared to developed countries where survival rates are more than 90%⁵.

This study assessed the time taken by primary caregivers of retinoblastoma patients in seeking health care at different stages from onset of the initial symptoms to presentation at the referral centre and subsequent initiation of treatment. To our knowledge, no similar study has been done previously in Kenya.

MATERIALS AND METHODS

A descriptive cross sectional hospital based study at the Kenyatta National Hospital eye ward and eye clinic, was

carried out on retinoblastoma parents/guardians from November 2012 to April 2014. Ethical approval was granted from the Kenyatta National Hospital – University of Nairobi Ethics Board. A list of 66 patients admitted with retinoblastoma from January 2012 to September 2013 was made using admission records in the eye ward; contact details of the caregivers were also collected from the admission records; 2 patients had no contact details.

Data was collected using a pretested semi-structured questionnaire, with both open and closed ended questions, from the parents/guardians of the retinoblastoma patients. Hospital records were used to get information on the clinical and histological staging of the disease. Both parents/ guardians were interviewed separately and were also contacted via phone, if not available at the time of the interview.

Delay in presentation and treatment were defined in terms of⁶: (1) *Overall lag time* as timing between onset of symptoms and presentation at the referral centre for definitive management; (2) *Lag 1* from onset of symptoms to first consultation with a health worker (parental delay); (3) *Lag 2* from 1st contact with health worker to point of referral for definitive management (health worker delay); (4) Time interval from referral by the health provider to presentation at the centre for definitive management; (5) Duration from presentation at the referral centre to start of definitive management. Overall lag time of 5 months and more was taken as delay. Delay from referral by a health worker and presentation at the referral centre of more than 1 week was used. Delay in treatment was defined as more than 2 weeks from the first presentation at the referral centre to start of definitive management.

Data was analysed using STATA version 11. Descriptive statistics were used to summarise and describe the data. An alpha value of 0.05 was used for all significance tests. All analysis regarding the patient and the caregivers were restricted to the primary caregivers.

RESULTS

In total 64 patients participated in the study with 91 parents/guardians interviewed. Eleven patients had single parents, 27 patients had both parents available and 26 patients had only the available parent interviewed. This was due to various reasons which included refusal to give consent (n=2), out of the country (n=2), not picking their phones (n=8), wrong contact details (n=10). Those who had a deceased child (n=4) due to retinoblastoma consented to only one parent to take part in the study. The male to female ratio amongst the study patients was 1.5:1 (p=0.03); this was statistically significant (Table 1). The median age at onset of symptoms for bilateral disease was 3.5 months (SD 7.76) and 20.5 months (SD 21.0) for unilateral disease. The most common symptoms from the onset were leukocoria (92.2%), redness (34.4%), proptosis (31.3%) and poor vision (23.4%).

The median age at first presentation to the referral centre for bilateral disease was 14.7 months (SD 12.2) and 30.5 months (SD 19.9) for unilateral disease with the mean age for bilateral disease at 23.6 months (SD 14.7) and 43.2 months (SD 18.6) for unilateral disease. The difference was statistically significant (p <0.001) (Table 1).

Table 1: Summary statistics of the study patients (n=64)

Characteristics	No. (%)
Gender	
Male	38 (59.4)
Female	26 (40.6)
Age at 1 st presentation to referral centre (months)	
<12	18 (28.1)
12 – 24	17 (26.6)
25 – 36	9 (14.1)
37 – 48	9 (14.1)
49 – 60	6 (9.4)
61 months and above	5 (7.8)
Laterality	
Unilateral	43 (67.2)
Bilateral	21 (32.8)
Family history	
Present	4 (6.3)
Absent	60 (93.7)

The mean time interval between onset of symptoms and first visit to a health facility (lag 1) was 4.7 months (SD 7.2) median of 2 months (range 0.25 -36 months). The mean lag 1 time for those with bilateral disease (n=21) was 2.6 months (SD 5) while for unilateral (n=43) was 5.3 months (SD 6.9). The difference in the means was not statistically significant (p-value= 0.11) (Table 2).

Table 2: Time interval from onset of symptoms to first visit at the health facility (lag 1) (n=64)

Time interval (months)	No. (%)
<1	15 (23.4)
1 – 2	15 (23.4)
2 – 3	7 (10.9)
3 – 4	5 (7.8)
4 – 5	5 (7.8)
5 – 6	2 (3.1)
6 – 9	3 (4.7)
9 – 12	5 (7.8)
>12	7 (10.9)
Total	64 (100)

The mean time interval between first contact with health worker and referral (lag 2) was 1.8 months (SD 2.8), median of 0.5 months (range 0-11months) (Table 3).

Table 3: Time interval from initial contact with health worker to referral (lag 2) (n = 64)

Time interval (months)	No. (%)
<1	34 (53.1)
1 – 2	11 (17.2)
2 – 3	3 (4.7)
3 – 4	3 (4.7)
4 – 5	3 (4.7)
5 – 6	3 (4.7)
6 – 9	2 (3.1)
9 – 12	4 (6.3)
>12	1 (1.6)
Total	64 (100)

The mean delay between referral and presentation at the referral centre was 7.3 weeks (SD 16) and the median delay was 0.5 weeks (range 0.1-77 weeks) (Table 4). The mean overall lag time for those with bilateral disease (n=21) was 7.0 months (SD 1.6) while for unilateral disease (n=43) was 8.5 months (SD 1.3). The difference in the means was not statistically significant (p-value= 0.48).

Table 4: Duration between referral and presentation to referral centre (n=64)

Time interval (weeks)	No. (%)
≤1	41 (64.1)
1 – 2	4 (6.3)
2 – 3	1 (1.6)
3 – 4	5 (7.8)
4 – 8	0 (0)
8 – 12	0 (0)
12 – 16	1 (1.6)
16 – 20	3 (4.7)
20 – 24	1 (1.6)
24 – 52	3 (4.7)
>52	5 (7.8)
Total	64 (100)

* Delay was defined as >1week from referral to presentation to referral centre.

Mean delay between referral and presentation to referral centre for unilateral disease was 5.25 weeks (SD 11.7) while for bilateral disease, it was 11.4 weeks (SD 21.8) with p-value of 0.15. The mean overall lag time was 8.1 months (SD 7.8) with a median of 5 months (range 0.4 - 45 months) (Table 5). Out of the 64 patients, 60.9% took more than 5 months from initial symptom to presentation at the referral centre for definitive management (Table 5).

Table 5: Overall lag time (n=64)

Time interval (months)	No. (%)
<1	3 (4.7)
1 – 2	7 (10.9)
2 – 3	10 (15.6)
3 – 4	3 (4.7)
4 – 5	2 (3.1)
5 – 6	7 (10.9)
6 – 9	6 (9.4)
9 – 12	9 (14.1)
>12	17 (26.6)
Total	64 (100)

Table 6: Clinical stage of the disease (n=64)

Stage of the disease	Frequency (%)
Clinical stage at diagnosis	
Extraocular	25 (39.1)
Intraocular	39 (60.9)
Clinical stage at start of treatment	
Extraocular	24 (37.5)
Intraocular [∞]	38 (59.4)
No treatment given*	2 (3.1)

*1 patient with extra-ocular stage of disease was referred to the neighbouring country for management upon request from the guardian; 1 patient with extra-ocular stage of disease declined admission at the time of the study. [∞]1 patient with intraocular disease declined admission initially and came back after the disease had progressed.

The mean time interval before start of treatment was 3.4 weeks (SD 10) with a median of 1 week (range of 0.1-72 weeks) (Table 7).

Table 7: Time interval between presentation to referral centre and start of treatment (n=64)

Time before treatment (weeks)	No. (%)
No treatment given*	2 (3.1)
<1	26 (40.6)
1 – 2	31 (48.4)
2 – 4	1 (1.6)
4 – 24	0
24 – 52	2 (3.1)
>52	2 (3.1)
Total	64 (100)

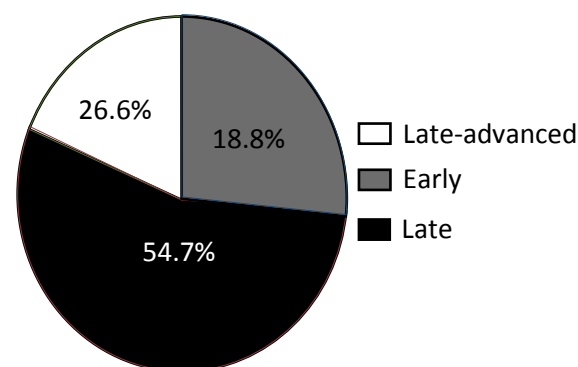
*1 patient declined admission for treatment; 1 patient requested referral to another facility in a neighbouring country

Table 8: Histopathological staging (n=64)

Histopathological staging	Frequency (%)
No enucleation done*	5 (7.8)
pT2-unclassified	2 (3.1)
pT2a	5 (7.8)
pT2b	10 (15.6)
pT3-unclassified	4 (6.3)
pT3a	20 (31.3)
pT3b	11 (17.2)
pT4-unclassified	1 (1.7)
pT4a	3 (4.7)
pT4b	3 (4.7)
Total	64 (100)

*Enucleation was not done due to advanced retinoblastoma. Of these 5, 1 patient was referred to a neighbouring country upon request by the guardian and another declined admission to the hospital

Figure 1: Stage of the disease



DISCUSSION

The median age at onset of symptoms was 3.5 months (SD 7.8) and at first presentation to the referral centre for definitive management was 14.7 months (SD 12.2) for bilateral disease while for unilateral disease, it was 20.5 months (SD 21.0) and 30.5 months (SD 19.9) respectively (Table 1). This shows that patients were brought to the referral hospital 10 months after the initial symptom was noted. Kao *et al*⁷ in Taiwan showed a delay of 2.53 months from first detection of symptoms to subsequent formal diagnosis of the disease.

Leukocoria (92.2%) was the commonest symptom from the onset, with proptosis found in 31.3% of the patients. This was similar to studies done in Kenya, Ghana and Malaysia⁸⁻¹⁰. In the US, ocular inflammation was at 5% with leukocoria and strabismus being the most common presenting symptoms⁵.

The median time between onset of the symptoms to first visit at a health facility (*lag 1*) was 2 months. Goddard *et al*⁶ in the United Kingdom found a median lag 1 of 2.5 weeks. This shows that our patients presented late to a health facility. This could be because the initial symptoms of retinoblastoma tend to be painless and, therefore, children may be taken to hospital when they are not able to see well or when they complain of pain.

In our study, the median delay in referral of patients by the health professionals (*lag 2*) was 0.5 months. This is similar to findings by Goddard *et al*⁶ in the UK who found the lag 2 median to be 2 weeks. The median delay between referral and presentation at the referral centre was 0.5 weeks. This could be because the health workers explained to the caregivers about the seriousness of the diagnosis and referred to the appropriate facility for definitive management.

The overall delay from onset of symptoms to presentation at the referral centre (overall lag time) had a median of 5 months. Gichigo *et al*⁸ found a median time of 10.5 months while Nyamori *et al*³ found a mean of 6.75 months as the overall duration. This shows a progressive improvement of the overall delay over the years in Kenya. This could be attributed to the awareness campaigns focusing on retinoblastoma in the country³.

The study found that 73.7% of the patients had a histological staging of pT3 and worse; early disease (pT2a and b) was found in 26.6% of patients. Gichigo *et al*⁸ found early disease in 28.3% while Nyamori *et al*³ found in 26%. Kashyap *et al*¹¹ in India found 66.4% of enucleated eyes with early disease with focal choroidal, prelaminar involvement and no sclera involvement while 8.6% had advanced disease with residual tumour.

Our study showed that 60.9% of patients took more than 5 months from initial symptoms to presentation at the referral centre and 10.9% of patients took more than 2 weeks before starting treatment. Butros *et al*¹² found 77% of the participants delayed seeking treatment; this was defined as the time from onset of symptoms to presentation to a physician, who subsequently referred the patient to the facility of definitive management.

CONCLUSIONS AND RECOMMENDATIONS

More than 50% of the patients presented late in our study. The longest delay interval was the parental delay, from onset of symptoms to presentation at the first health facility. Most health care providers took a short time to refer the patients to a facility of definitive management. For almost all of the patients, treatment was started within 2 weeks of being admitted to the referral centre.

There is a persistent need for continued medical education to the primary health workers on early detection of retinoblastoma and appropriate referral to an eye care specialist.

Augmentation of public awareness on retinoblastoma, especially in the mother and child health clinics, would allow the primary care givers and primary health workers to be more aware of symptoms of retinoblastoma. This will help reduce the delays

that occur as a result of parents' ignorance and delayed referrals by clinicians.

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Incidence of neonatal conjunctivitis at Mbarara Regional Referral Hospital, South Western Uganda

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ABSTRACT

Objective: To determine cumulative incidence of neonatal conjunctivitis (NC) in babies delivered at Mbarara Regional Referral Hospital (MRRH), establish the responsible microorganisms and their sensitivity to available antibiotics and determine factors associated with neonatal conjunctivitis among these babies.

Methods: A prospective cohort study where babies delivered at MRRH whose mothers stayed in Mbarara municipality were recruited within 24 hours after birth and weekly follow up was done until the occurrence of NC, or lost to follow up or administrative censoring at 28 days. Neonates who developed conjunctivitis had a conjunctival swab taken for microbiology.

Results: Out of 438 babies recruited, 45 (10.3%) were lost to follow up while 49 (11.2%, 95% CI 8.4 – 14.5) developed neonatal conjunctivitis by 28 days. Isolated pathogens were *Staphylococcus aureus* 23 (67.65%), *Klebsiella pneumoniae* 7 (20.59%), *Neisseria gonorrhoeae* 3 (8.82%) and *Streptococcus pyogenes* 1 (2.94%). In 15 (30.6%) of 49 cultures done there was no growth. Isolates tested had only 18% sensitivity to tetracycline. However there was 100% sensitivity to gentamycin and oxacillin, while slightly lower sensitivity was achieved for ceftriaxone (76%), ciprofloxacin (68%) and chloramphenicol (61%). Not receiving prophylaxis within 24 hours after birth [adjusted OR 4.85 CI (1.17 – 20.19)] and neonatal admission to Neonatal Intensive Care Unit (NICU) after delivery [adjusted OR 6.03 CI (1.09 – 33.32)] were independently associated with higher odds of developing NC.

Conclusions: The incidence of NC was unexpectedly high. Admission to NICU and lack of prophylaxis within 24 hours were risk factors for developing NC.

Key words: Neonatal, Conjunctivitis, Cohort, Incidence

INTRODUCTION

Neonatal conjunctivitis (NC) is one of the causes of avoidable childhood visual impairment and blindness, a priority in the Vision 2020 program. Global incidence and prevalence of NC has markedly reduced since the introduction of Crede method of prophylaxis in 1881 and control of sexually transmitted infections (STI). In developed countries the incidence of NC has reduced to about 0.04%¹ however, in developing countries incidence of NC is as high as 16%. Several organisms have been isolated from newborns with NC, all which show different antibiotic susceptibility patterns according to the geographical regions and whether community or hospital acquired conjunctivitis^{2,3}. Some of the factors associated with NC include maternal factors like poor antenatal care hence poor screening and treatment for STI including maternal HIV/AIDS⁴ and prolonged labor^{5,6}. Neonatal factors like prematurity⁸ and low birth weight, ocular

trauma during delivery, congenital dacryostenosis, and congenital nasal lacrimal duct obstruction are frequently associated with NC as well as inadequate use of ocular prophylaxis immediately at birth^{4,8,9} and hospital/NICU admission^{3,10}.

At Ruharo Eye Centre (REC) and Mbarara Regional Referral Hospital (MRRH) eye clinic in South Western Uganda, NC accounts for about 80% of neonatal consultations and 90% of neonates admitted for ocular conditions and often with late presentation to hospital (Hospital Records, 2011). The resulting childhood blindness is associated with high early childhood morbidity and mortality^{8,11}. Again associated with loss of educational opportunities for the children and socioeconomic strain on family while taking care of the sick and visually impaired children in the already resource limited setting. Therefore our objectives were to determine cumulative incidence of neonatal conjunctivitis in babies delivered at MRRH, establish

the responsible microorganisms and their sensitivity to available antibiotics and determine factors associated with neonatal conjunctivitis among these babies so as to implement suitable interventions.

MATERIALS AND METHODS

Study design: This prospective cohort study was performed at the maternity ward of MRRH, a Tertiary and Teaching Hospital for MUST. The maternity service is equipped to carry out deliveries and has a neonatal intensive care unit (NICU) staffed by a paediatrician. The protocol for this project was approved by the university Institutional Ethics Review Committee (MUST-IRC No: 03/03/13) and the Uganda National Council of Science and Technology (UNCST; HS-1458).

We enrolled healthy babies delivered at MRRH during the study period, whose mothers resided in Mbarara Municipality and consented to the study while all neonates that had any ocular malformation at birth were excluded. Recruitment was done every day between 7:00am and 10:00am on the maternity ward (postnatal and post operation ward). The birth registry was used to identify all mothers who had delivered within the last 24 hours. The structured questionnaire was then administered to the mother and the newborn's eyes examined. Mothers' contact addresses (physical and telephone numbers) were noted and first follow up visit/examination of all neonates carried out between Day 5 and Day 8 irrespective of notice/call from the mother. Subsequently, follow-up phone calls were made on day 14, day 21 and day 28 to all mothers whose babies had not developed any of the three signs (eye redness, eye discharge or lid swelling). For any baby with one or more of the signs found during the follow up visit or phone call or upon alert from the mother, ocular examination was done and conjunctival swab was taken off. Empirical treatment with 1% Tetracycline eye ointment (TEO) and erythromycin syrup was initiated for all symptomatic babies¹² and for the cases where *N. gonorrhoeae* was suspected and/or isolated further treatment was initiated. **Microbiological procedures:** After taking conjunctival swabs, spot inoculation was made on chocolate agar plates that were transferred in an anaerobic jar /carbon dioxide chamber to the university microbiology laboratory for continued culturing in 5% carbon dioxide at 35°C and examined daily. They were discarded after 7 days if no growth noted.

From the conjunctival swab specimen, instant gram staining and Giemsa staining were done. Sensitivity testing was performed using the conventional agar disk diffusion method in accordance with the Clinical and Laboratory Standards Institute¹³. The antibiotics tested included; Gentamycin (10µg), tetracycline (30µg),

chloramphenical (30µg), ciprofloxacin (1µg), ceftriaxone (30µg), erythromycin (15µg), penicillin G (20µg), ampicillin (10µg), amoxicillin (20µg), and oxacillin (1µg). Bacitracin was used for *Streptococcus pyogenes* only.

Statistical analysis: The questionnaire derived data was entered into Microsoft Excel software package (Excel Version 2007) and missing entries were corrected daily. Using the same Excel spread sheet, we generated the follow up dates and follow-up due date reminders. Data from the Microsoft Excel spread sheet were exported to STATA software package (Version 11.0) for further analysis. Descriptive and analytical statistics was performed on the variables of interest. Data were tabulated and presented with odds ratio, p-values and confidence intervals.

Tabulation was used and the proportion of children who developed NC during the follow up period reported. We summarized the microbiology information to present the most common causes of NC that were isolated and sensitivity patterns of the most common organism determined. Tabulation of frequencies and the proportions for the different organisms isolated and their susceptibility to antibiotics have been reported. The factors associated with NC were assessed with logistic regression. We performed univariate analyses first to assess the unadjusted association of various predictors. Predictors that had p-values <0.2 and those with known association from literature reviews, were identified and for inclusion into the final multivariable adjusted model whether their p-value were significant or not. The p-value of 0.2 was chosen because it was more inclusive and took care of possible negative confounders. The regression diagnostics (Link test and logistic goodness of fit test) were performed. From the regression diagnostics, there was no evidence of lack of fit (p=0.177). The associated factors are reported in the table with the respective odds ratio (OR), 95% confidence interval (CI) and the P-values.

RESULTS

Descriptive data (baseline characteristics, Table 1)

Neonate: Of 438 babies enrolled, 230 (52.5%) were males. The median birth weight was 3.2 kg (minimum 1.4 – maximum 4.8) and only 59 (13.5%) received tetracycline prophylaxis within 24 hours of birth. Thirty five (8.0%) of neonates were less than 37 weeks of gestation. At the time of recruitment, 4 (0.9%) of babies had lid swelling, 2 (0.5%) had eyelid discharge and 1 (0.2%) had conjunctival redness. Nine babies (2.0%) were admitted to NICU before mothers were discharged from post-natal ward.

Mother: The mother's median age was 24 years (minimum 14 – maximum 41) years and 164 (37.4%) were para-1 mothers. Also, 99 (22.6%) had at least one episode of urogenital infection (Table 1). Seventy two (16.4%) mothers had premature rupture of membranes and 66 (15.1%) had prolonged labor. Overall, 338 (77.2%) mothers had vaginal delivery.

Table 1: Antenatal predictors (n=438)

Variable assessed	Frequency (n)	(%)
Marital status		
Single	12	2.7
Married	420	95.9
Windowed	2	0.5
Separated or divorced	4	0.9
Mother's education		
No formal	22	5.0
Primary	162	37.0
Secondary	159	36.3
Tertiary	95	12.7
Distance from hospital		
Less than 2 km	65	14.8
2 km to 4 km	299	68.3
More than 4 km	74	16.9
Gestation age(weeks of amenorrhea WOA)		
Less than 37	35	8.0
37 to 42	368	84.0
More than 42	35	8.0
Ante natal care attendance		
Never attended	3	0.7
Once	27	6.2
2 to 4 visits	281	64.2
More than 4	127	29.0
HIV status of mother		
Unknown	6	1.4
Negative	363	82.9
Positive not on HAART	15	3.4
Positive on HAART	54	12.3

HAART =Highly Active Anti-Retro-Viral Therapy

Cumulative incidence: A total of 438 babies were recruited. Forty five (10.3%) were lost to follow up while 49 [11.2%, 95% CI (8.4 – 14.5)] neonates developed clinical NC by day 28.

Microorganism and the sensitivity patterns: Of the 49 babies with clinical NC whose culture results were available, 34 (69.4%) had positive cultures, 14 (28.6%) had no growth and one (2.0%) had contamination. Of those with positive cultures, 23 (67.7%) were *Staphylococcus aureus*, 7 (20.6%) *Klebsiella pneumoniae*, 3 (8.8%) *Neisseria gonorrhoea* and 1 (2.9%) *Streptococcus pyogenes*.

Sensitivity patterns of microorganisms to the antibiotics: Sensitivity test was performed in all the 34 isolates. There was 100% sensitivity to gentamycin and oxacillin. Slightly lower sensitivity was recorded for ceftriaxone (76%), ciprofloxacin (68%) and chloramphenical (61%). All the bacteria were resistant to penicillin G. *Staphylococcus aureus* the most isolated organism was less susceptible to the commonly used topical antibiotics chloramphenical (52%) and erythromycin (45%) yet resistant to tetracycline (91%). *Neisseria gonorrhoeae* (3 isolates) and *Streptococcus pyogenes* were all 100% sensitive to ciprofloxacin, chloramphenical, and gentamycin. Bacitracin was used for *Streptococcus pyogenes* only and was 100% sensitive. *Klebsiella pneumoniae* was sensitive to chloramphenical (100%), tetracycline (71%) but resistant to erythromycin (67%).

Associated factors: Univariate associations with developing of NC were determined (Table 2) and all predictors that had p-values less than 0.2 were included in the multivariate model (Table 3).

Table 2: Univariate associations with NC

Variables	Categories of variables	Crude OR (odds ratio)	95% CI (confidence intervals)	P-value
Mother's age		1.03	0.97 – 1.10	0.343
Marital status	Single	1.00	0.18 – 11.18	0.740
	Married	1.42		
	Separated/divorced	Omitted		
	Widowed	Omitted		
Mother's formal education status	Never	1.00		
	Primary	0.94	0.26 – 3.46	0.930
	Secondary	0.61	0.16 – 2.32	0.470
	Tertiary	0.83	0.21 – 3.26	0.789
Distance from hospital	Less than 2km	1.00		
	2km to 4km	1.75	0.66 – 4.63	0.261
	More than 4km	1.06	0.31 – 3.65	0.928
Parity	Para 1	1.00		
	Multi para	1.27	0.67 – 2.38	0.463
Gestation age (weeks of amenorrhea)	37 to 42 WOA	1.00		
	Less than 37	1.33	0.49 – 3.62	0.577
	More than 42	0.75	0.22 – 2.55	0.642
Antenatal care attendance	Never	1.00		
	Once	0.16	0.01 – 2.63	0.199
	2 to 4 times	0.20	0.12 – 2.33	0.200
	More than 4 times	0.37	0.03 – 4.32	0.431
Urogenital infection	Yes	1.34	0.63 – 2.86	0.453
Mother's HIV status	Negative	1.00		
	Unknown	1.62	0.18 – 14.2	0.665
	HIV positive not on HAART	2.02	0.55 – 7.46	0.292
	HIV positive on HAART	0.82	0.31 – 2.19	0.698
Mode of delivery	Vaginal delivery	0.72	0.37 – 1.38	0.312
Prolonged labor	Yes	1.31	0.60 – 2.85	0.494
PROM	Yes	1.56	0.75 – 3.21	0.231
Prophylaxis to baby's eyes	No	2.58	0.78 – 8.58	0.122
Sex of baby	Female	1.41	0.78 – 2.56	0.259
Baby's birth weight		0.59	0.34 – 1.03	0.063
Baby admission in NICU	Yes	4.16	1.01 – 17.21	0.049

ANC =Ante Natal Care, HIV=Human Immune deficiency Virus, HAART =Highly Active Anti-Retro-Viral Therapy, NICU =Neonatal Intensive Care Unit

Table 3: Multivariate associations

Variables	Categories of variables	Adjusted OR (odds ratio)	95% CI (confidence intervals)	P-value
Distance from hospital	Less than 2km	1.00		
	2 to 4km	2.28	0.77 – 6.74	0.136
	More than 4km	1.46	0.38 – 5.58	0.582
Antenatal care attendance	Never	1.00		
	Once	0.04	0.01 – 0.82	0.037
	2 to 4 times	0.05	0.01 - 0.78	0.034
	More than 4 times	0.12	0.01- 1.75	0.120
Mother's HIV status	Negative	1.00		
	Unknown	2.84	0.29– 27.82	0.369
	HIV positive NOT on HAART	1.59	0.40 – 6.29	0.506
	HIV positive on HAART	0.67	0.23 – 1.91	0.453
Mode of delivery	Vaginal delivery	0.70	0.34 – 1.43	0.331
Prophylaxis to baby's eyes	No	4.85	1.17– 20.19	0.030
Baby birth weight		0.56	0.31 – 1.01	0.053
Admission in NICU	Yes	6.03	1.09– 33.32	0.039

HIV = Human Immune deficiency Virus, HAART = Highly Active Anti-Retro-Viral Therapy, NICU = Neonatal Intensive Care Unit

DISCUSSION

Cumulative incidence: The incidence was unexpectedly high with 49 [11.2%, 95% CI (8.4 – 14.5)] of babies in this study developing NC compared to the study in neighboring Kenya which reported 2.1%¹⁴ yet in industrialized countries this proportion is as low as 0.04%¹. This variation could be attributed to poor attendance of ANC, non-routine application of topical prophylaxis at birth⁹ and the type of prophylaxis offered perinatal. As observed in this study, tetracycline was routinely used at MRRH while povidone iodine was used in the Kenyan study. Studies have shown 2.5% povidone iodine solution to have no resistance across all spectrum of bacteria as well as viruses compared to the topical antibiotics^{9,15}.

Microorganisms and susceptibility pattern: In this study the most common microorganisms isolated were; *Staphylococcus aureus* (67.7%), *Klebsiella pneumonia* (20.6%) and *Neisseria gonorrhoea* (8.8%). This pattern was observed in the study done in Kenya⁹ which found 39.7% of all infected babies had staphylococcus, 5% had *Neisseria gonorrhoea* and majority 50.5% had *Chlamydia trachomatis*. Also, *Neisseria gonorrhoea* must always

be suspected clinically when a lot of discharge is present and treated immediately pending microbiology results since it is associated with rapid progression to ocular complications.

Also, from our study, we found 28.6% negative cultures and this could possibly have been sterile (non-infectious) or due to the effect of prophylaxis or chlamydial conjunctivitis which could not be confirmed on Giemsa staining microscopy (which has very low sensitivity) hence it needed either direct immune florescent (DIF) stain or special tissue media (McCoy cell cultures) or DNA-PCR assays all of which were too expensive to be done during this study^{8,16}. However to cover for possible chlamydial conjunctivitis oral erythromycin syrup was empirically given to all babies with clinical NC.

Klebsiella pneumoniae was isolated among the neonates admitted in NICU. Chen and Starr³ study found the Gram negative conjunctivitis the commonest among babies that were admitted in NICU. *Staphylococcus aureus* was the most isolated bacteria was resistant to tetracycline (91%) the routinely used drug for prophylaxis but sensitive to the oxacillin (100%), ceftriaxone (74%) and ciprofloxacin (74%) both of which are relatively expensive. However *Klebsiella pneumoniae* was sensitive

to tetracycline (71%) and chloramphenicol (100%), this trend was also observed by Chen and Starr³ study in New York, among neonates admitted in NICU.

Associated factors (Tables 1, 2 and 3): A number of predisposing factors that could be associated with the observed high incidence of NC at MRRH were studied. Mothers attending ANC at least once were found to be protective while not applying prophylaxis to babies' eyes within 24 hours of birth and neonatal admissions in NICU were independently associated with increased odds of developing NC. Other factors included low birth weight, unknown maternal HIV status, not being on HAART for known HIV positive mothers and staying more than 2 km from hospital had more odds of developing NC though were not statistically significant.

From this study babies that did not get prophylaxis had about 5 fold odds of developing NC compared to those that got tetracycline prophylaxis (p-value = 0.030). This finding is not surprising considering the introduction of Crede method of silver nitrate prophylaxis demonstrated a marked reduction in global incidence of NC^{1,8,11,15}. The routine wiping of baby's eyes lids soon after delivery and prophylaxis reduces the chances of developing NC. Considering that 3 (6.1%) of the 49 babies that developed NC had got the prophylaxis shows that some prophylaxis are better than others demonstrated by the spectrum of microbial susceptibility to the drugs. In Kenya, the use of 2.5% povidone iodine even resulted in very low NC incidence^{9,15}.

Attending ANC is associated with urogenital/STI screening and treatment as well as HIV testing and HAART initiation which contributes to primary prevention of NC^{4,17} which explains the study findings that babies of mothers who attended ANC at least once had less odds (adjusted OR 0.04, p-value 0.037) of developing NC compared to those who did not attend at all. Babies admitted in NICU were 6 times more odds of developing NC compared to those not admitted [adjusted OR 6.03, p-value 0.039, 35% CI (1.09 – 33.32)]. A study done in New York among babies admitted in NICU found that these babies had low birth weight and were more prone to gram negative conjunctivitis including *Klebsiella pneumoniae*³. Low birth weight is frequently associated with prematurity and often need admission in NICU resulting in prolonged hospital stay. Also these babies' ocular defence mechanisms are not fully developed hence at more odds of developing hospital NC than those not admitted. Surprising results from the study found that gestation age, mode of delivery; PROM and prolonged labor that are some of the known maternal predisposing factors were not statistically significant^{1,5,6} and this could be attributed to the small sample size.

This study did have limitations. Only MRRH was selected for the study amongst all health units offering ante natal, natal and post natal care services because it is the biggest tertiary hospital in South Western Uganda yet isolates may differ from place to place. We recommend further studies to establish whether isolates from other centres are similar to what we isolated at MRRH. Also, only Gram staining, Giemsa staining microscopy and culture and sensitivity methods were used because the other diagnostic techniques that are either faster or have higher sensitivity and specificity were very expensive. This was a diagnostic limitation specifically for *Chlamydia trachomatis* which required direct immune fluorescent (DIF) stain, special McCoy cell culture or DNA PCR for its identification, growth, and confirmation.

CONCLUSIONS

The incidence of NC was unexpectedly high. While the commonest causative organism was *Staphylococcus aureus*, clinicians must be alert of *Neisseria gonorrhoea* that is associated with rapid progression to severe ocular complications hence the need for immediate intervention to save the babies eyes. Sensitivity test demonstrated that ciprofloxacin, ceftriaxone and gentamycin could be used as empirical monotherapy for treating NC at MRRH. Attending ANC more than once was protective against NC. However, admission to NICU and not receiving prophylaxis within 24 hours were independently associated with developing NC.

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Refractive errors among school children in Addis Ababa, Ethiopia

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ABSTRACT

Objective: To determine the prevalence of refractive errors among school children aged 6-18 years in the city of Addis Ababa, Ethiopia.

Methods: A cross sectional study of refractive errors examined 1800 students in four randomly selected elementary schools during March, 2014. Subjects were selected by multistage random sampling. The children were examined by a team of ophthalmic nurses, optometrists and an ophthalmologist who performed visual acuity testing, cycloplegic refraction and slit lamp examination. Visual impairment was defined as V/A $\leq$ 6/12.

Results: A total of 1800 (695 boys and 1105 girls) students were included in the study with a response rate of 99.4%. Refractive errors in either eye were 71 (4.0%) (95% CI 3.9-4.0). Of these myopia $\leq$ 1.0D was found to be higher 19 (26.7%) cases followed by astigmatism $>\pm 1.5$ D in 12 (17%) cases. Being female and the presence of other eye diseases increases the odds of refractive error.

Conclusion and recommendation: The prevalence of refractive errors in school children is significant in Addis Ababa, highlighting the need for school screening and optical intervention programs.

Key words: Refractive errors, Visual impairment, School children, Ethiopia

INTRODUCTION

Uncorrected refractive errors are the main cause of low vision and the second cause of blindness. Although refractive errors (myopia, hyperopia and astigmatism) can be easily diagnosed and corrected with spectacles or other refractive corrections to attain normal vision^{1,2}, they affect the whole spectrum of the population irrespective of age, gender, and ethnic group. Uncorrected refractive errors have severe consequences for the individual, family and society. Myopia in particular, can have an impending negative impact on career choice, ocular health, and sometimes self-esteem. School-aged children constitute a special vulnerable group, where uncorrected refractive error may have a remarkable impact on learning capability and educational potential, as well as economic cost to the family and government²⁻⁵.

The World Health Organization (WHO) estimated 153 million people with visual impairment due to uncorrected refractive errors, of whom eight million are blind and 145 million have low vision. Among the 153 million, 13 million are children and 45 million working age adults, 90% of these are living in low and middle-income countries^{1,3}. The impact of blindness due to refractive errors in children can be considered in terms of blind person-years and would place a greater socio-economic burden on society^{2,5} more than the impact of cataract blindness in old age. Ethiopia is one of the developing countries in Africa, with poor health service

coverage especially eye health care and is believed to have one of the world's highest rates of blindness. Although over 80% of blindness and visual impairment is avoidable⁶, refractive error is the second leading cause of low vision (33.4%) and blindness (7.8%) in Ethiopia. In a study done in Debarke and Kola Diba towns of northern Ethiopia, the prevalence of visual impairment due to refractive errors in school children was 7.6 %².

According to a study in India, refractive error was found in 13.09% of the children, out of which 5.72% were boys and 7.36% were girls⁷. In comparison to urban and rural India, prevalence of uncorrected refractive error was 5.46% in urban and 2.63% in rural children⁸.

According to a study done in Geta Hospital Nepal in 2007, among students checked for refractive error, it was found in 32.0%⁹. In Saudi Arabia according to the study done in primary school children, the overall prevalence of refractive errors was 13.7%, higher among females¹⁰. In Brazil, in school children the prevalence of uncorrected refractive error was 4.82%¹¹. In northern Ethiopia, in school children the prevalence rate of visual impairment due to refractive errors was 7.6%, myopia was observed to be the most dominant state of refractive error (i.e. 98%)². The study, which was done in rural central Ethiopia primary schools, revealed that uncorrected refractive error is a common cause of visual impairment among school children accounting for 9.5%¹². In another study, which was done in Gondar town

northwestern Ethiopia, all forms of refractive errors were more common among females than males. Moreover, the overall prevalence of refractive error was 9.4%. The high prevalence of refractive errors among school children indicates the need for regular school-screening programs. Hence we assessed the prevalence of refractive error and factors associated with refractive error among school children in Addis Ababa.

MATERIALS AND METHODS

Study area: Addis Ababa is the capital city of Ethiopia with a population of more than 3 million. The city has ten sub cities and 730 primary schools. A cross-sectional study was conducted in four public primary schools of Arada and Gullele sub cities of Addis Ababa, Ethiopia.

Sample size determination: The sample size was calculated using the formula for estimation of a single population proportion. The sample size was determined by assuming refractive error proportion of 9.4% taken from a study done on prevalence of refractive error among school children in Gondar town¹³ giving any particular outcome to be within 2% marginal error and 95% confidence interval of certainty. The actual sample size for the study was computed using one-sample population proportion formula as indicated below. A design effect of 2 for multistage sampling, thus the sample size was: $n = (z/\alpha/2)^2 P(1-P)/d$, $n = (1.96)^2 \times 0.094(1-0.094)/(0.02)^2 = 818$.

A design effect of 2 for multi stage sampling, and 10% non-response rate and the final sample size was 1800.

Sampling procedure: A multistage sampling technique was used. Four schools in two sub cities were selected randomly out of 22 government primary schools in Addis Ababa. The number of students for each school was assigned according to the proportion to size of students in the respective schools. Proportional allocations of samples were made for each sex in each school. A simple random sampling by computer generated random numbers was finally used to identify study subjects from each of the grades. Day time students who are physically and psychologically healthy for eye examination were included in the study.

Operational definitions

Presence of significant refractive error: Visual acuity less than and equal to 6/12 in one or both eyes and when the visual acuity is improved with spectacle.

Myopia: Vision is better for near than far objects and also

needs corrective lenses with spherical equivalent of -1.00 Diopter (D) or greater in one or both eyes.

Hyperopia: Vision is better for distant than near objects, and needs corrective lenses with spherical equivalent of +2.00 D or more in one or both eyes.

Astigmatism: Vision < 6/12 and that need a cylindrical power of 1.50 D or greater.

Data collection procedure: Pretested, structured questionnaire were used to collect data. Visual acuity was measured in the school compounds in well-lighted class rooms using the Snellen E chart. Pinhole and cycloplegic refraction were performed by an optometrist for those who had visual acuity less than and equal to 6/12. An ophthalmologist did slit lamp examination for those children with poor vision not corrected by spectacle.

Quality control: To assure quality of the study, two nurses and two optometrists were recruited and trained on data collection procedure. Pretesting of the questionnaires was conducted on 80 students in different schools. All completed questionnaire were examined for completeness and consistency during data collection, management, storage and analysis. The data were entered and cleaned by the principal investigator before analysis. The principal investigator of the study supervised the overall activity.

Data analysis: The data collected were entered into Epi info version 3.5.3 and exported to SPSS. They were cleaned and coded using SPSS version 20.0 for analysis. Descriptive analysis was applied to describe variables. Association of predictor variable with the dependent variable (refractive error) was computed using logistic (bivariate and multivariate) regression. Crude and adjusted Odds ratios were computed for each explanatory variable to determine the strength of association with outcome variable and to control the effect of confounding factors. P value < 0.05 was considered statistically significant.

Ethical consideration: Ethical clearance was obtained from Research and Ethics Committee of Debre Markos University and from Ministry of education. Verbal ascent from students and written informed consent from family was obtained. All study-related information was kept confidential with the study investigators only. Students found to have refractive errors or eye problems got further management and follow up.

RESULTS

Socio-demographic characteristics: There were 1800 participants (38.6% male and 61.4% female) aged 6 to 18 years from four randomly selected schools, with a response rate of 99.4% (Table 1).

Table 1: Sociodemographic characteristics of school children in Addis Ababa, Ethiopia, April 2014

Variables	Characteristics	Frequency	(%)
Age (years)	5-9	312	17.3
	10-14	1154	64.1
	15-18	334	18.6
Sex	Male	695	38.6
	Female	1105	61.4
Grade in school	1-3	584	32.4
	4-6	637	35.4
	7 and 8	579	32.2
Educational performance in rank	1 st -10 th (excellent)	432	24.0
	11 th -20 th	515	28.6
	21 st -30 th	379	21.1
	>31 st	356	19.8
	Not known	118	6.6
Address (sub city)	Arada	563	31.3
	Gullele	1187	65.9
	Others	50	2.8
Ethnicity	Amhara	775	43.1
	Oromia	461	25.6
	Gurage	290	16.1
	Tigray	73	4.1
	Silte	58	3.2
	Wolaita	51	2.8
	others	92	5.1
Religion	Orthodox	1463	81.3
	Muslim	275	15.3
	Protestant	58	3.2
	Others	4	0.2
Total		1800	100

Visual acuity without correction: Among the 1800 students, a majority of students had normal visual acuity (6/6 and 6/9) for the right eye (95%) and for the left eye (95.3%) (Table 2).

Table 2: Visual acuity without correction among school children in Addis Ababa Ethiopia, April 2014

Variable	Unaided visual acuity of right eye		Unaided visual acuity of left eye	
Characteristics	Frequency	(%)	Frequency	(%)
6/6	1423	79.1	1379	76.6
6/9	286	15.9	336	18.7
6/12	43	2.4	35	1.9
6/18	8	0.4	19	1.1
6/24	10	0.6	8	0.4
6/36	9	0.5	5	0.3
6/60	0	0.0	5	0.3
3/60	10	0.6	7	0.4
<3/60	10	0.6	6	0.3
Light perception	1	0.1	0	0.0
Total	1800	100	1800	100

Visual acuity with pinhole correction: Visual acuity was repeated with pinhole correction for 100 students who had visual acuity less than and equal to 6/12. Among which approximately half (48%) of students had normal visual acuity for the right eye and 53.6% for the left eye. Thirty-six percent of students had visual acuity less than or equal to 6/12 for the right eye and 16% of which had no improvement with pinhole. Thirty-two percent of students left eye had visual acuity less than or equal to 6/12 and 14.1% of students were unable to be corrected with pinhole for the left eye (Table 3).

Table 3: Visual acuity with pinhole correction among school children in Addis Ababa, Ethiopia, April 2014

Characteristics	Visual acuity of right eye with pinhole		Visual acuity of left eye with pinhole	
	Frequency	(%)	Frequency	(%)
6/6	9	9.0	16	16.2
6/9	39	39.0	37	37.4
6/12	11	11.0	11	11.1
6/18	7	7.0	6	6.1
6/24	5	5.0	5	5.1
6/36	4	4.0	3	3
6/60	7	7.0	5	5.1
3/60	2	2.0	2	2.0
No improvement	16	16.0	14	14.1
Total	100	100	99	100

Visual acuity with best-corrected vision: The children found with some visual problem had to undergo the second phase of eye examination. Forty-four (69.9%) of them had best visual acuity 6/6 and 6/9, the rest 18 (28.6%) had best corrected vision less than and equal to 6/12 and 1 (1.6%) had no improvement for right eye. Forty one (68.3%) had best corrected vision 6/6 and 6/9, 18 (30%) had best corrected vision less than and equal to 6/12 and 1 (1.7%) had no improvement for the left eye (Table 4).

Table 4: Best corrected visual acuity (BCVA) among school children in Addis Ababa, Ethiopia, April 2014

Characteristics	BCVA of right eye		BCVA of left eye	
	Frequency	(%)	Frequency	(%)
6/6	33	52.4	30	50.0
6/9	11	17.5	11	18.3
6/12	10	15.9	12	20.0
6/24	2	3.2	5	8.3
6/36	4	6.3	1	1.7
6/60	2	3.2	0	0.0
No improvement	1	1.6	1	1.7
Total	63	3.5	60	3.3

Other eye problems and history of spectacle use: Other eye problems (childhood common allergic diseases) were mentioned by 215 participants among them 73 (34%) had received treatment and 142 (66%) had not received any treatment. Out of the total study participants, 41 (2.3%) were wearing spectacles.

Prevalence of refractive error: The prevalence of refractive errors (i.e., visual acuity less than or equal to 6/12) in either eye or both was 4% (i.e., 71 out of 1789).

Types of refractive error: Among 71 students who had refractive error; 19 (26.7%) had myopia, 12 (17%) had astigmatism, 10 (14%) myopic astigmatism, 6 (8.4%) hyperopia, and 3 (4.2%) hyperopic astigmatism on both eyes respectively. The remaining 21 (29.6%) had different types of refractive errors on both eyes (Table 5).

Table 5: Types of refractive errors among school children in Addis Ababa, April 2014

Type of refractive error	Right eye		Left eye	
	Frequency	(%)	Frequency	(%)
Myopia	23	31.9	22	31
Hyperopia	7	9.7	6	8.5
Astigmatism	15	20.8	14	19.7
Myopic Astigmatism	10	13.9	11	15.5
Hyperopic Astigmatism	5	6.9	4	5.6
Amblyopic	7	9.7	3	4.2
Normal	5	6.9	11	15.5
Total	72	100	71	100

Management plan: Among the participants, the majority (96.5%) did not require any further management, 3.4% were given spectacles and the rest were referred to an ophthalmologist.

Factors associated with refractive errors: Bivariate analysis showed a statistically significant association of age, sex, other eye diseases and history of ocular injury with refractive error. Being in the age group of 15-18 years increases the odds of having refractive error with [COR 2.32 (1.001-5.383)]. Being female increases the odds of having refractive error with [COR 1.906(1.107-3.281)]. Not having other eye diseases decreases the odds of having refractive error with [COR 0.258(0.153-0.434)] and not having history of ocular injury decreases the odds of having refractive error with [COR 0.319(0.140-0.727)]. After controlling for the effects of potentially confounding variables using multivariate logistic regression analysis; sex and other eye diseases were found to be statistically significant predictors of refractive error. Being female increases the odds of refractive error with [AOR1.744(1.006-3.025)] and not having other eye diseases decreases the odds of refractive error with [AOR312(.180-.540)]. Age and ocular injury, which has showed statistical significant association with refractive error in bivariate analysis, did not show the same significant association in the multivariate analysis. According to our study, sex and other eye diseases remained to be statistically significant predictors of refractive error (Table 6).

Table 6: Factors associated with refractive error among school children in Addis Ababa, Ethiopia, April 2014

Variable	Characteristics	Refractive error		COR(CI)	P-value	AOR(CI)
		Yes	No			
Age (years)	5 - 9	8(2.6%)	304(97.4%)	1.00	0.310	1.00
	10 -14	44(3.8%)	1103(96.2%)	1.516(.706-3.254)	0.338	1.457(.675-3.147)
	15 - 19	19(5.8%)	311(94.2%)	2.322(1.001-5.383)	0.133	1.924(.820-4.517)
Sex	Male	18(2.6%)	675(97.4)	1.00		1.00
	Female	53(4.8%)	1043(95.2%)	1.906(1.107-3.281)	0.048	1.744(1.006-3.025)
Other eye disease	Yes	23(10.8%)	189(89.2%)	1.00		1.00
	No	48(3.0%)	1529(97.0%)	0.258(.153-.434)	<0.001	0.312(.180-.540)
History of ocular injury	Yes	7(10.8%)	58(89.2%)	1.00		1.00
	No	64(3.7%)	1660(96.3%)	0.319(.140-.727)	0.134	0.509(.211-1.232)

DISCUSSION

This study was conducted to assess refractive error and associated factors in Addis Ababa school children. The prevalence of refractive error was 4%. The prevalence of refractive error in this study is comparable with other studies done in Iran 3.8%⁵, Brazil 4.82%¹¹ and Saudi Arabia 4.5%¹⁰. The prevalence of refractive error is low compared with the studies done in Asian countries such as India 13.9% , Pakistan 11.4% and Nepal 32%⁷⁻⁹. This might be due to differences in genetic susceptibility to refractive errors that vary among different races.

In studies done in Africa, the prevalence of refractive errors is found to be lower than this study. Like the studies done in Nigeria which reported a prevalence of 2.2%, and 1.97% respectively^{4,14}. The prevalence in Kenya was a bit higher 5.2%¹⁵. This difference could be due to use of different measurement cut-off points and involvement of different age groups. Studies done in Kola Diba (7.6%), Debarq town (9.5%) and central Ethiopia (9.4%) shows a higher prevalence of refractive error 7% -9%^{2,12,13} compared to this study. This might be due to target population difference and participation of different age group students.

Spectacle use of 2.3% is comparable with the study done in South Africa 2.7%¹⁶, and higher than the study done in rural Central Ethiopia 0.26%¹². The reason could be socio-economic factors; one is spectacles are not accessible at affordable price for the majority, the other is in rural Ethiopia individuals with refractive error dislikes the social stigma associated with wearing spectacles.

From participants diagnosed as having refractive error, myopia was the common cause of visual impairment in school age children (26.7%). Many studies like Debarq, Kola Diba, rural central Ethiopia, Gondar (31.6%) , Kenya and other places are evidence for this finding^{2,12,13,15}. The prevalence of refractive error was high among females, like in central Ethiopia and Gondar studies^{12,13}. Presence of other eye diseases is associated with refractive error.

It would be early and difficult to reach a firm conclusion based on our data, this needs well designed study to explain the cause and effect relationship. As age increases, the prevalence of refractive error increased^{12,13}. This fact was entirely supported by the findings of our study, but cannot show significant association with refractive error in multivariate analysis this could be target population differences which needs further large studies to be verified.

CONCLUSIONS

Refractive error is a common problem in school children. The problem is common among females. Myopia is the commonest type of refractive error. Gender and presence of other eye diseases are found to be significant predictors of refractive error.

RECOMMENDATIONS

The results of this study indicates the need for a regular visual screening program for school children that can help early detection of refractive error. Further large studies are recommended to explore more on the association of age, other eye diseases and ocular injury to refractive error.

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Prevalence of dry eye syndrome in diabetic patients attending Kenyatta National Hospital, Kenya

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ABSTRACT

Objective: To determine prevalence and ocular findings of dry eye syndrome in adult diabetic patients at Kenyatta National Hospital (KNH) in Kenya.

Methods: A descriptive cross sectional study that was carried out among diabetic patients attending diabetic outpatient clinic and diabetic eye clinic at the KNH during October 2013-May 2014. All diabetic patients aged 18 years and over were requested to participate. Data on demographic profile, symptomatology, duration of diabetes and medication use of participants was documented. They were subsequently examined and underwent non-invasive tests to determine presence of dry eye syndrome (DES). Data collected was analyzed using the Statistical Package for Social Scientists (SPSS) version 21.0. Descriptive statistics such as frequencies, tables, mode, median and mean were used to summarize the data. Relationship between frequency, presence of dry eye syndrome and age, sex, duration of diabetes was assessed.

Results: Prevalence of DES was 49.8% (CI 0.001-0.568), was more common among females (M:F 1:2.2) and increased with age ($p=0.001$, peak age 56-65 years) and duration of diabetes ($p=0.000454$, peak duration after 15-19 years). There was significant association between DES and symptomatology ($p<0.00001$), but not between DES and ocular signs ($p=0.81$) nor DES and TBUT ($P=0.082$) nor DES and Schirmer test ($p=0.454$).

Conclusion and recommendation: There is high prevalence of DES among diabetics. Greater emphasis should be placed on symptoms when making a diagnosis of DES.

Keywords: Dry Eye Syndrome, Diabetes, Tear break-up time

INTRODUCTION

The term dry-eye syndrome (DES) has been defined as a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear-film instability with potential damage to the ocular surface¹. Physiologic conditions such as age, female sex² and hormones have been identified as contributing factors to DES. According to De Roeth³, with increasing age there is decrease in aqueous tear secretion and this may cause the irritative symptoms of DES. The incidence of symptoms related to DES was lower among post-menopausal women receiving oral oestrogen therapy in a study on more than 700 women in Germany: the more time that elapsed since entrance to menopause the more some symptoms increased without oestrogen therapy⁴.

Diabetes mellitus (DM) is a syndrome of chronic hyperglycaemia due to relative insulin deficiency, resistance or both. DM is usually irreversible and its late complications result in increased morbidity, reduced life expectancy and major health costs. Ocular manifestation of DM can occur as cataract or blurred vision because of reversible osmotic changes due to hyperglycaemia⁵. Neuropathy could result in ocular palsies and also alter

corneal innervation and sensation which could result in DES⁶. In a study to determine whether diabetics indeed have problems with dry eye symptoms, 52.8% complained of dry eye symptoms against 9.3% of controls. Fifty seven percent of type 1 diabetics were found to suffer from DES⁷. The Beaver Dam study also found an association between diabetes and DES⁸ and that by Alves Mde *et al*⁹ provides data that shows diabetic patients have tear secretion deficiency, peripheral neuropathy and hyperglycaemia that lead to corneal epitheliopathy and consequent hyperosmolarity which can be related to DES.

Reduction in quality of life is inevitable when symptoms of dry eye occur^{10,11}. These symptoms range from mild transient irritation to persistent dryness, burning, itchiness, redness, pain, ocular fatigue and visual disturbance. In the United States alone, approximately 7–10 million Americans require artificial tear preparations, with consumers spending over US \$100 million/year¹².

This study determined the prevalence of DES among adult diabetic patients attending Kenyatta National Hospital and the association between diagnosis and symptomatology.

MATERIALS AND METHODS

This was a cross-sectional study conducted in the medical outpatient clinic and the eye clinic at the Kenyatta National Hospital, Nairobi, from October 2013 to May 2014. All diabetic patients aged 18 years and above presenting to the Kenyatta National Hospital diabetic clinic were eligible for the study and were requested to participate. Some studies found that prevalence of DES increases with age^{2,3}. Eighteen years was selected as the lower limit to determine whether the trend is similar in the diabetic population. Informed consent was obtained from all those who agreed to participate.

The patient demographic characteristics (age and gender) were noted, as were the duration of diabetes, presence of other systemic conditions and use of medication. The participants were questioned as to the frequency of DES symptoms (gritty sensation, burning sensation, redness, itchiness, crusting on lashes, lids stuck together in the morning). The questions related to symptoms were based on the six item questionnaire validated by a large population based study in the United States¹³. An ocular examination was then carried out; best corrected visual acuity, slit lamp examination, Schirmer's test and Tear break-up time. A diagnosis of DES was made if the patient reported presence of at least one of the symptoms often or always and had either one or both of the diagnostic tests being positive.

Primary data collection was done on a pre-designed questionnaire that was administered via the open source electronic survey tool LimeSurvey. Data was managed and manipulated via the LimeSurvey interface. Data analysis was done using the Statistical Package for Social Scientists (SPSS) version 21.0. Analysis of frequency and distribution of the six symptoms of DES in the study population was done. The relationship between DES and independent variables (duration of diabetes, age, sex) was also assessed.

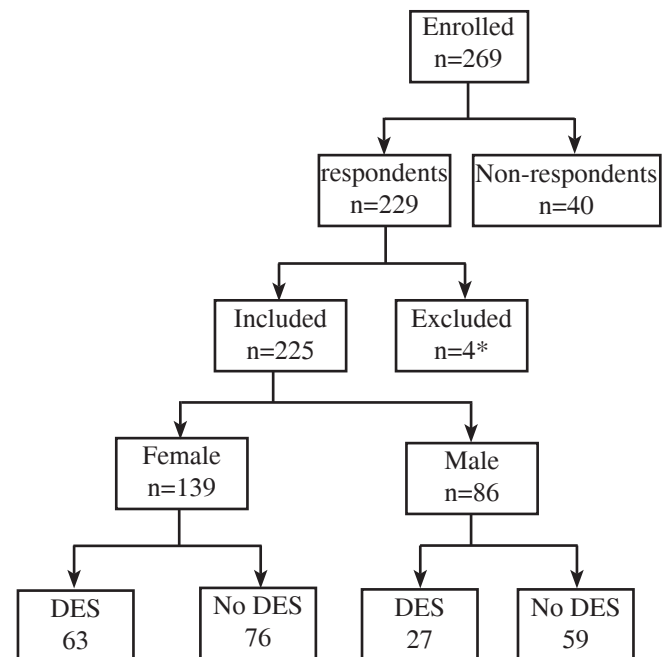
Ethical approval was obtained from the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee. All patients found to have DES were commenced on treatment.

RESULTS

The response rate for the study was 83.64%. The study results are based on 225 respondents. Four hundred and

forty nine eyes were examined (one patient had a single eye). The diagnosis of DES was made using the initial criteria with the inclusion of those on ocular lubrication: having symptoms but with negative tests. The assumption made was that the diagnostic tests were only negative as a result of the lubrication, therefore they were presumed to have had DES.

Figure 1: Participation flow chart



*40 declined to consent, 2-underage, 2-declined to complete

Overall, the majority of respondents were female and the majority of respondents were in the age group 56 to 65 years. Of the respondents who had DES 34.2% were female, ($p=0.022$, CI 0.01-0.03) while 15.6% were male. Prevalence of DES was determined as 49.8% and was generally found to increase with age ($p=0.001$).

The most commonly reported symptom was itchiness, reported by 56.4% of respondents and the least reported symptom was lids stuck together in the mornings (24.4%). While the most frequently observed sign was frothy discharge in 67 eyes (7.47%). The diagnostic tests used in this study were Schirmer's and Tear break-up time (TBUT). Schirmer test had a mean result of 17.98 mm (SD 10.43) while that of TBUT was 6.89 seconds (SD 2.88). The majority of respondents who had DES were those who had had diabetes for between 6 months to 5 years. The longer one had diabetes the more likely to have DES ($p=0.000454$).

Table 1: Baseline characteristics (n= 225)

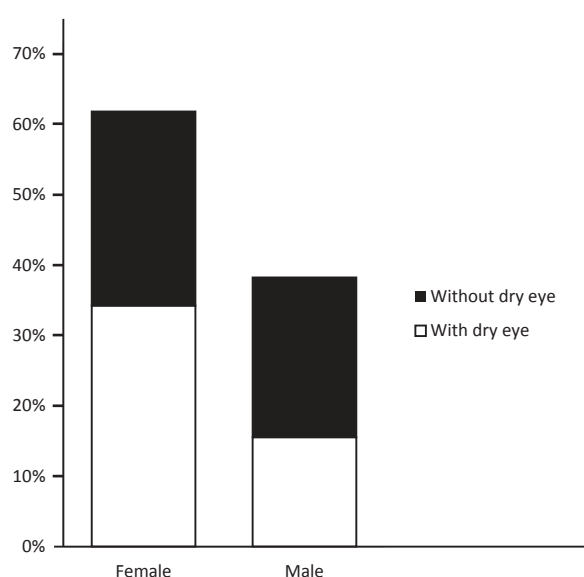
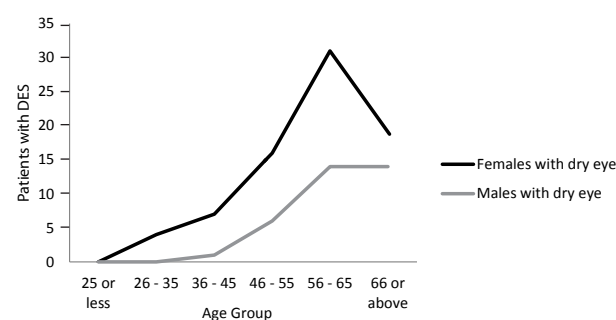
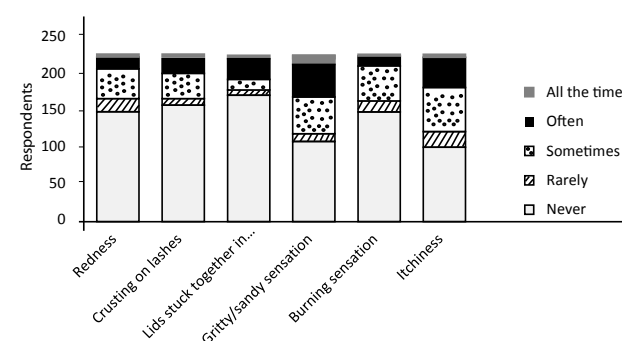
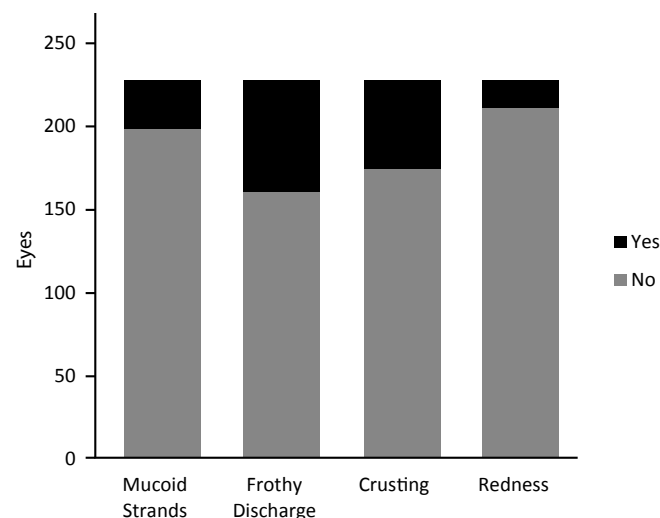
Demographic data	Respondents	(%)
Age group (years)		
25 or less	3	1.33
26 - 35	12	5.33
36 - 45	28	12.44
46 - 55	47	20.89
56 - 65	74	32.89
66 or above	61	27.12
Total	225	100
Sex		
Female	139	61.78
Male	86	38.22
Total	225	100

Table 2: Prevalence of DES eye syndrome (n=225)

	Respondents	(%)
With dry eye	112	49.8
Without dry eye	113	50.2
Total	225	100

Table 3: Best corrected visual acuity in 449 eyes

Visual acuity	No. of eyes	(%)
Less than 3/60	24	5.35
3/60 - 6/60	11	2.45
6/36 - 6/18	78	17.37
Greater than 6/18	336	74.83

Figure 2: Prevalence of dry eye syndrome according to sex (n=225)**Figure 3:** Distribution of dry eye syndrome by age and sex**Figure 4:** Symptom report (n=225)**Figure 5:** Signs observed (n=225)**Table 4:** Frequency of DES in association with duration of diabetes

Duration of diabetes and dry eye syndrome			
	With dry eye	Without dry eye	(%)
Less than 6 months	5	12	29.41
6 months - 5 years	29	36	44.62
6 - 9 years	24	24	50.00
10 - 14 years	24	23	51.06
15 - 19 years	16	6	72.72
20+ years	14	12	53.84
Total	112	113	

Table 5: Schirmer test and TBUT statistics

Test Statistics			
		[Reading in mm] Schirmer Test	[Reading in Sec] Tear Break Up Test
N	Valid	449	441
	Missing	1	9
Mean		17.98	6.89
Median		17.00	7.30
Mode		35	10
Std. Deviation		10.430	2.887
Range		34	14
Minimum		1	1
Maximum		35	15

Table 6: Symptoms, signs and tests correlations (p-values)

		Number with symptoms	Diagnosed with DES by Shirmers Test	Diagnosed with DES by TBUT	Number with signs	Diagnosis of dry eye syndrome made
Number with symptoms	P value		0.018040	0.535287	0.348068	0.00001
Diagnosed with DES by Shirmers Test	P value	0.018040		0.000028	0.316304	0.454909
Diagnosed with DES by TBUT	P value	0.535287	0.000028		0.41740511	0.082349
Number with signs	P value	0.348068	0.316304	0.417405		0.811596
Diagnosis of dry eye syndrome made	P value	0.000000	0.454909	0.082349	0.811596	

DISCUSSION

The mean age of patients in this study was 57.27 years (SD 13.1) while the median was 59 years and the range of 20 to 86 years of age. The majority of respondents were in the 56 to 65 year age group (mode 60 years). Female respondents predominated (61.78%) but it was not statistically significant ($p < 0.10$) and therefore did not introduce any bias into the study.

A total of 449 eyes were examined (one patient had a single eye) and the majority had a visual acuity better than 6/18 (74.83%); few eyes (5.35%) had poor visual acuity of worse than 3/60. The incidence of blindness is similar to that seen in other studies (3.6% and 5.5% in Barbados and Nigeria respectively)⁶ even though these others used cumulative incidence.

The prevalence of DES among diabetic patients in our study was 49.8%. Manaviat *et al*¹⁴ found a prevalence of 54.3% among their diabetic population in Iran, while

Seirfart and Stempel⁷ in Germany found a prevalence of 52.8%. Kaiserman *et al*¹⁵ found a prevalence of 20.6% whereas in a more recent study by Najafi *et al*¹⁶ the prevalence was 27.7% in India. Therefore the prevalence found in this study is comparable with other studies in diabetic populations. The differences in prevalence between the studies could be explained by a number of factors; the countries in which the studies have been carried out have different racial demographics and there may be racial differences with regard to DES. The different methods employed to determine DES could also be a factor. Notably our results are closer to those studies^{7,14} that employed questionnaires and tests similar to this study.

There is a wide range in prevalence of DES, from 5.5%¹⁷ to 14.4%⁸ and a hospital based study in India found a prevalence of 18.4%². In Kenya the prevalence of DES was 43.8%¹⁸ in a hospital based study. Our study demonstrates a higher prevalence of DES among the diabetic population in an indirect comparison with previously done studies and is in keeping with other studies^{7,15}.

Of our respondents who had DES, the females were the majority at 34.22% ($p = 0.022$). This is comparable with other studies^{2,4,19} that show females are more likely to have DES. There was a demonstrable increase in DES with age which again is comparable to other studies^{8,20}. In our study there was a decline in those with DES in the age group 66 years and above noted among the females, while among the males there was a plateau. This is a similar pattern to that seen by Moss *et al*⁸ and also by Parkar¹⁸. A partial, though not entirely satisfactory, explanation could be due to the relatively fewer numbers of respondents in this age group.

The most commonly reported symptom in this study was itchiness (56.4% of respondents) while the least reported was eyelids stuck together in the morning. The study by Chia *et al*²¹ also found that itchiness was the most commonly reported symptom in the general population.

In this study very few (4.9%) respondents reported never having had any of the six symptoms. We found 95.1% of our study population had experienced one or more of the six symptoms as compared to 15% in the Salisbury eye evaluation study. However the latter was carried out in the general population whereas this study was in the diabetic population and had a small sample size relative to the Salisbury eye evaluation study. Fifty seven point seven percent of participants in the Blue Mountains Eye Study²¹ reported at least one of the symptoms of dry eye, again the difference may be due to the size and population used in the study. If we take symptoms reported often or all the time only we find 19.33%, which is comparable to 27.5% found in Indonesia¹². The relation between symptomatology and DES was highly significant ($p < 0.00001$); these findings make it evident that patient symptoms should be a major consideration in diagnosis of DES^{6,22}.

This study found a prevalence of 20.4% of at least one of the symptoms of dry eye as compared to 5.5% in the Melbourne Visual Impairment Project¹⁷. This may show that there is greater prevalence of symptoms in the diabetic population as compared to the general population.

The most commonly observed sign was frothy discharge seen in 7.47% of eyes examined while the least was redness in 1.78%. The relationship between ocular signs and DES was not significant ($p=0.81$), which is similar to studies done in the general population that show low or no association^{23,24}.

There was statistical significance between symptomatology and Schirmer test ($p=0.018$) but not with TBUT ($p=0.53$). This is unlike the results in a study by Nichols *et al*²⁵ which suggested a poor relation between a variety of dry eye tests and symptoms. The results of our study suggest that Schirmer test would be a better diagnostic test to use in our setting as opposed to the current practice of using TBUT. However, it may be prudent to carry out a randomized control study first as this study is a descriptive study with no direct controls. Using Schirmer test alone, prevalence of DES is found to be 37% while using TBUT alone it is 85%. The relation between DES and both Schirmer test and TBUT was found not to be significant ($p=0.454$, $p=0.082$ respectively).

The relationship between ocular signs and diagnostic tests was also not significant ($p=0.316$ Schirmer, $p=0.417$ TBUT). Our study looked at four specific signs and this may account for the difference with the study by Begley *et al*²² that showed moderate correlation with symptoms and lower correlation with signs.

The duration of diabetes among our respondents ranged from one month to more than 20 years, with the majority of those with DES being in the group aged 6 months to 5 years. The majority of these respondents were in the age group 56 to 65 years, which was the age with the highest frequency of DES. Also this group had less use of ocular lubrication. Our findings showed that the longer one had diabetes the more likely one was to have DES, and this was statistically significant ($p=0.000454$); which was similar to findings by Manaviat *et al*¹⁴ who found a statistically significant association ($p=0.01$) between duration of diabetes and DES.

CONCLUSIONS

In this study the prevalence of dry eye syndrome in diabetic patients was found to be 49.8% and was found to be greater among females. There was also a demonstrable increase in prevalence of DES with age and duration of diabetes.

The most common symptom was itchiness and there was a high correlation between symptoms and diagnosis of DES suggesting that patient symptoms should be of greater influence than clinical tests.

Primary care physicians should be made aware of the significance of symptoms of DES and encouraged to prescribe appropriate lubrication.

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Patients' satisfaction with outreach eye care service provided in South West Ethiopia

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ABSTRACT

Background: Nowadays, assessing patient satisfaction is an integral part of monitoring and evaluation of health service delivery and quality assurance. Patient satisfaction with the outreach based eye care service in Ethiopia has not been studied.

Objective: This study was conducted to determine the overall patient satisfaction and its factors and predictors in Southwest Ethiopia.

Methods: A cross-sectional study was conducted on 411 sampled ophthalmic patients who received eye care service during regular ophthalmic outreach programs of Jimma University from January-December, 2013. Overall patient satisfaction was measured using a validated patient satisfaction questionnaire (PSQ-18). The physical facility of the outreach sites were assessed by complementary questions. Mean satisfaction scores were calculated and compared among variables using ANOVA test. Multivariate analysis and linear regression models were tested and were considered significant if $P < 0.05$.

Results: Majority, 402(97.8%) of the study subjects were satisfied and the overall mean satisfaction score of the study subjects was 4.7(SD±0.5) out of 5. This was statistically different among subgroups of age ($P=0.000$), education level ($P=0.007$) and occupation type ($P=0.000$) but not with sex ($P=0.393$), religion ($P=0.059$) and marital status ($P=0.124$). Age was the only independent factor for the overall satisfaction ($P=0.007$). Among components of patient satisfaction, the highest mean was in communication 4.63(SD±0.6) followed by technical quality of health care providers 4.60(SD±0.6). The interpersonal manner of health care providers had the lowest mean score 3.3(SD±1.6). Each of the components (technical quality, interpersonal manner, communication, financial aspect, time spent with care providers, accessibility and convenience, physical facility) were significantly associated with overall satisfaction ($P < 0.05$). All these components except physical facility and financial aspect were significant linear predictors of overall satisfaction.

Conclusion: The overall patient satisfaction to the regular outreach eye care services was very high. Jimma University should therefore continue the program while improving on each domain of satisfaction measures with the focus on interpersonal manner and accessibility and convenience.

Key words: Patient satisfaction, Eye Care, outreach, Ethiopia, Jimma

INTRODUCTION

Patient's satisfaction is an attitude, a person's general orientation towards a total experience of health care¹. It can be defined as the degree to which an individual regards the health care service or the manner in which it is delivered by the provider as useful, effective, or beneficial^{2,3}. It is achieved when the patients' perception of the quality of care and services received in healthcare setting has been positive, satisfying and meets expectations and therefore is an indicator of quality service⁴.

Patient satisfaction has been considered an important area of research since the 1960s⁵. The purpose of doing patient satisfaction studies is not only to reach at the desired clinical outcome and suggest ways to improve patient compliance⁶. Nowadays, assessment of patient satisfaction is an integral part of monitoring and evaluation and quality assurance standard⁷. In addition, patient satisfaction studies help to affirm that patients experience are considered in health care planning⁸.

Patient satisfaction can be measured in terms of structure, process and outcome⁷. Structure refers to the attributes of the organization in delivering the care and the general conditions under which the care is provided.

This may include access, physical setting, cost and convenience. The process may include the technical (knowledge, quality of care and competence of staff) and interpersonal (communication, empathy and education) aspects of the care. The outcome may include the final improvement in health status, knowledge, change in behavior and overall satisfaction of the patients. Based on these, patient satisfaction is shown to depend on personal care given by the provider, availability of medical personnel on a continuous basis^{8,9} outcome of treatment^{9,10}, the way health care is delivered, the type of health care setting, and patient characteristics such as age, gender, education, socio economic status, etc.¹¹⁻¹⁴.

Although patient satisfaction studies have been done in different parts of Ethiopia¹⁵⁻²¹, the studies were either limited to the static health care services or not specific to eye care services. To our knowledge there is no patient satisfaction study on outreach eye care services in Ethiopia. The objective of the study was, hence, to determine the overall patient satisfaction to the outreach eye care services of Jimma University, Department of Ophthalmology and identify factors and predictors of the overall satisfaction of patients.

MATERIALS AND METHODS

A cross-sectional study was conducted from January-December, 2013 on satisfaction of patients who received eye care services in the regular ophthalmic outreach programs of Jimma University, Department of Ophthalmology in the Southwest Ethiopia. The outreach service sites included in the study period were Bonga Gebre Tsadik Shwo and Mizan-Aman hospitals in South Region, and Bedele and Limu Genet hospital in Oromia region of Ethiopia.

The data collection tool comprised of socio-demographic questions validated patient satisfaction questionnaires (PSQ-18)²² and complementary questions on physical facility of the ophthalmic outreach sites²³. The PSQ-18 evaluates technical quality, interpersonal manner, doctor-patient communication, financial aspects, time spent for patient, convenience, accessibility and overall satisfaction.

Patients and caretakers of paediatric age patients were interviewed using Amharic and Oromiffa languages and an interpreter was used whenever required. The data were checked for consistency and completeness, and analyzed using SPSS version 16 software. Associations between overall patient satisfaction and socio-demographic characteristics, type of eye care service, and with the different categories of satisfaction measurement were checked using ANOVA test. Multivariate analysis

was done to test for independent factors for overall satisfaction. Linear regression model was tested for the components of patient satisfaction as predictors of overall satisfaction. Test results were considered significant when $P < 0.05$.

Prior to the study ethical approval was obtained from Jimma University, Department of Ophthalmology and official letter was written to the health facility administration where the outreach eye care services were conducted and informed verbal consent was obtained from the clients and caretakers of paediatric age patients. All clients received appropriate eye care services irrespective of their consent to participate in the study.

This study is subject to a limitation due to the Hawthorne effect since members of the eye care service providers collected the data and the participants might have reported an exaggerated satisfaction level for courtesy. Participants were, however, encouraged to give honest answers.

RESULTS

A total of 411 study participants were interviewed. The mean age of the study participants was 52.2(SD±1.72) years ranging from 9-100 years. Majority of them were males 279(67.9%), married 344(83.7%), illiterate 252(61.3%), Orthodox Christian 219(53.3%) and farmers 261 (63.5%) (Table 1).

Table 1: Distribution of study subjects by their sociodemographic characteristics (n=411)

Variables		Satisfied No. (%)	Uncertain No. (%)	Dissatisfied No. (%)	Total No. (%)
Age group (years)	1-15	11(2.7)	1(0.2)	0(0.0)	12(2.9)
	16-30	47(11.4)	3(0.7)	2(0.5)	52(12.7)
	31-45	66(16.1)	2(0.5)	0(0.0)	68(16.5)
	46-60	165(40.1)	1(0.2)	0(0.0)	166(40.4)
	>60	113(27.5)	0(0.0)	0(0.0)	113(27.5)
Sex	Male	272(66.2)	5(1.2)	2(0.5)	279(67.9)
	Female	130(31.6)	2(0.5)	0(0.0)	132(32.1)
Marital status	Married	339(82.5)	4(1.0)	1(0.2)	344(83.7)
	Single	39(9.5)	3(0.7)	1(0.2)	43(10.5)
	Widowed	8(1.9)	0(0.0)	0(0.0)	16(3.9)
	Divorced/separated	16(3.9)	0(0.0)	0(0.0)	8(1.9)
	Illiterate	250(60.8)	2(0.5)	0(0.0)	252(61.3)
Educational status	Read and write	24(5.8)	0(0.0)	0(0.0)	24(5.8)
	Grade 1-8	77(18.7)	4(1.0)	1(0.2)	82(20.0)
	Grade 9-10	21(5.1)	0(0.0)	0(0.0)	21(5.1)
	College and above	30(7.3)	1(0.2)	1(0.2)	32(7.8)
	Orthodox Christian	215(52.3)	2(0.5)	2(0.5)	219(53.3)
Religion	Protestant Christian	123(29.9)	3(0.7)	0(0.0)	126(30.7)
	Muslim	62(15.1)	2(0.5)	0(0.0)	64(15.6)
	Others	2(0.5)	0(0.0)	0(0.0)	2(0.5)
	Farmer	259(63.0)	2(0.5)	0(0.0)	261(63.5)
	Government employee	45(10.9)	2(0.5)	0(0.0)	47(11.4)
Occupational status	Self employee	29(7.1)	0(0.0)	1(0.2)	30(7.3)
	House wife	24(5.8)	1(0.2)	0(0.0)	26(6.3)
	Student	23(5.6)	2(0.5)	1(0.2)	25(6.1)
	Daily laborer	2(0.5)	0(0.0)	0(0.0)	10(2.4)
	Retired	10(2.4)	0(0.0)	0(0.0)	10(2.4)
	Unemployed	10(2.4)	0(0.0)	0(0.0)	2(0.5)
Total		402(97.8)	7(1.7)	2(0.5)	411(100)

Majority 402(97.8%) of the study subjects were satisfied with the outreach eye care service they received and the rest 2(0.5%) were dissatisfied. Among the participants who were satisfied with the eye care service, 165(40.1%) were in the age range of 46-60 years, 272(66.2%) were male, 339(82.5%) were married, 250(60.8%) were illiterate, 215(52.3%) were Orthodox Christians and 259(63.0%)

were farmers (Table 1). Eye care service delivered to the patients in the outreach site included: cataract surgery 201(48.9%), medical treatment 82(20.0%), spectacle prescription 66(16.1%) and eye lid surgery 45(10.9%) (Table 2). Among the study subjects satisfied with the service, 201(48.9%) patients had cataract surgery while 76(18.5%) patients received medical treatment (Table 2).

Table 2: Eye care service delivered to the patients in the outreach site

Service delivered	Satisfied No. (%)	Uncertain No. (%)	Dissatisfied No. (%)	Total No. (%)
Medication prescribed	76(18.5)	4(1.0)	2(0.5)	82(20.0)
Lid surgery	45(10.9)	0(0.0)	0(0.0)	45(10.9)
Cataract surgery	201(48.9)	0(0.0)	0(0.0)	201(48.9)
Other surgery	3(0.7)	0(0.0)	0(0.0)	3(0.7)
Spectacle prescribed	64(15.6)	2(0.5)	0(0.0)	66(16.1)
Health education and counseling	6(1.5)	0(0.0)	0(0.0)	6(1.5)
Others	7(1.7)	1(0.2)	0(0.0)	8(1.9)
Total	402(97.8)	7(1.7)	2(0.5)	411(100)

On univariate analysis age group, literacy, and occupation were found to be associated with patient satisfaction levels with p-value<0.05 (Table 1). The overall mean satisfaction score of the study subjects was 4.7(SD±0.5) out of 5. One way Anova's tests showed that the overall

satisfaction score was statistically different among subgroups of age (p = 0.000), education level (p = 0.007) and occupation type (p=0.000) but not with sex (p = 0.393), religion (p = 0.059) and marital status (p=0.124) (Table 3).

Table 3: The overall satisfaction of study subjects by their socio-demographic characteristics (n=411)

Variables	Mean	SD	P value
Age group (years)*	1-15	4.7500	0.000
	16-30	4.4423	
	31-45	4.5882	
	46-60	4.7530	
	>60	4.8319	
Sex	Male	4.6738	0.059
	Female	4.7803	
	Single	4.5349	
Marital status	Married	4.7267	0.124
	Divorced/separated	4.6250	
	Widowed	4.8125	
	Illiterate	4.7817	
Educational status	Read and write	4.7083	0.007
	Grade 1-8	4.5854	
	Grade 9-10	4.5714	
	College and above	4.5312	
Religion	Muslim	4.7031	0.059
	Orthodox Christian	4.6849	
	Protestant	4.7460	
	Others	5.0000	
Occupational status	Farmer	4.7969	0.000
	Government employee	4.5532	
	Self employee	4.4333	
	House wife	4.7200	
	Student	4.3846	
	Daily laborer	4.0000	
	Retired	4.7000	
	Unemployed	4.9000	

* Age group was the only independent socio-demographic factor for overall satisfaction

Table 4: Mean satisfaction score of the study subjects and linear regression model for overall satisfaction in relation to factors to overall patient satisfaction

No.	Variables	Mean (SD)	B	t	P-value	95% CI
1	Overall satisfaction*	4.7080(0.53411)	1	5.573	0.000	0.951-1.987
2	Technical quality	4.603(0.6385)	0.376	7.505	0.000	0.271-0.463
3	Interpersonal manner	3.2968(1.6045)	-0.015	-0.349	0.727	-0.103-0.072
4	Communication	4.6302(0.64352)	0.177	3.692	0.000	0.069-0.226
5	Financial aspect	4.4672(0.73965)	0.055	1.146	0.252	-0.028-0.107
6	Time spent with care providers	4.5985(0.67491)	0.141	2.893	0.004	0.036-0.187
7	Accessibility and convenience	3.7469(1.4379)	0.126	2.948	0.003	0.030-0.150
8	Physical facility	4.4538(0.7116)	-0.026	-0.556	0.579	-0.107-0.060

* constant

In multivariate analysis (stepwise method), age group was the only independent socio-demographic factor for the overall satisfaction ($p=0.007$).

The overall mean satisfaction score of the study subjects was 4.7($SD\pm 0.5$). The highest mean satisfaction score of the study subjects was related to communication 4.63 ($SD\pm 0.6$) followed by technical quality of health care providers 4.60($SD\pm 0.6$). The lowest satisfactions mean score was in the interpersonal manner of health care providers 3.3($SD\pm 1.6$) (Table 4). One way ANOVAs test showed each of the components (technical quality, interpersonal manner, communication, financial aspect, time spent with care providers, accessibility and convenience, physical facility) were significantly associated with overall satisfaction ($P<0.05$). Linearity was tested and technical quality, communication, time spent with health care providers and accessibility and convenience were found to be significant predictors of overall satisfaction (Table 4).

DISCUSSION

The overall patients' satisfaction to the outreach based eye care service in this study was very high (97.8%) as compared to other patient satisfaction studies on general health care done in Jimma University Specialized Hospital and other hospitals in Ethiopia (22-57.1%)¹⁵⁻²¹. These studies were, however, done on static services and were not specific to eye care services. A study done in India on patient satisfaction regarding eye care services showed that 48.1% of outpatients and 97.5% of inpatients were satisfied²⁴.

In our study, the mean overall satisfaction score measured by the PSQ-18 was 4.71 ± 0.5 from a maximum of 5. This is higher than a similar study done in Iran²³ on patient satisfaction of ophthalmic services (4.05 ± 1.1). There was also a study on overall patient satisfaction regarding eye care in Nigeria²⁵ where 93.5% were satisfied; this figure was slightly lower than our finding. Nonetheless, these two studies concentrated on static eye

care services making accurate comparison with our study difficult.

The very high patient satisfaction in our study does not truly imply that the outreach based eye care service is a preferred way of eye care service, at least from gross satisfaction point of view, than the static eye care services as receiver of outreach eye care service are generally expected to have better satisfaction variety of reasons. Outreach based eye care services tends to ensure accessibility, equity, affordability as the service is taken to places/health facilities where rural/semi urban people live nearby; and moreover these patients will be able to save their resources (time, transport cost, accommodation cost money) that the static eye care service (in a distant location) may incur. Variation in the visual demands between rural/semi urban and urban people areas might also contribute to high satisfaction in outreach based services as users of outreach health services are often from rural/semi urban areas at least in Ethiopian context.

In this study, the physical facility mean satisfaction score was 4.45 ± 0.7 which is higher than the finding (4.2 ± 0.9) of the study in Iran²³. This difference might be related to the lower expectation of patients receiving outreach service than those who use the static hospital service.

Interpersonal manner had the lowest mean satisfaction score (3.30 ± 1.6). This is in contradiction to the Iran study²³ which showed that patients were satisfied most with the interpersonal manner (4.6 ± 0.7). This difference might be attributed to the high volume eye care service often given in a limited time during outreach eye care service.

Though several studies done in India and Bangladesh²⁶⁻²⁸ showed that provider behavior, respect, politeness, patient engagement in provider-patient relationship are important and powerful predictors for patient satisfaction, both interpersonal manner and physical facility were not significant predictors in our study.

Gender doesn't seem to determine the satisfaction of patients as depicted in this study. This was also described

by Sitiza and Wood⁷ and the same finding was described in a patient satisfaction study in Iran²³. But this is not a general truth. In a study done in Ibadan, Nigeria²⁹ females had, however, excellent satisfaction (as compared to males) attributable to the emotional buildup of females to overlook unpleasant things.

In our study older age is significantly associated with higher satisfaction. In line with this, studies in Jimma, Ethiopia^{15,16}, Nigeria²⁹, Trinidad and Tobago³⁰ have similarly demonstrated that older age is associated with higher satisfaction. However, the Iranian study reported that age had no influence on patients' satisfaction²³. According to Hall and Dornan³¹ older patients tend to be more satisfied with their health care when compared with younger people; and this was related to lower expectations of the elderly people making them satisfied with whatever minimal care they get as they tend to accept and attribute their illness and any poor outcomes to their age.

Occupation was significantly associated with the overall satisfaction of patients and students had the lowest mean satisfaction in our study. Similar association was found in the Jimma study¹⁶ where satisfaction had significant association with occupation where students and governmental employees had lower satisfaction levels than farmers. Client satisfaction might also be influenced by social situation and is related with patient expectancy of services²³. The low satisfaction with students in our study may, thus, be related to their high expectation due to their demands of high visual acuity for their education and related work. Furthermore, the lower satisfaction of students may be related to their literacy status since literate people were found to have lower satisfaction with significant association with overall satisfaction as shown in several studies done in Nigeria²⁹, Trinidad and Tobago³⁰ and Ethiopia^{15,16}.

Age may be the confounding factor for students and their literacy status as younger people have more access to education than the older people who are usually illiterate/less educated. This partly explains why age group was the only independent socio-demographic factor for overall satisfaction of the patients in our study. However, there is a controversy regarding the importance of socio-demographic characteristics in determining patient satisfaction^{14,23}.

In conclusion, the overall patients' satisfaction to the outreach based eye care service was very high. Technical quality, interpersonal manner, communication, financial aspect, time spent with care providers, accessibility and convenience, and physical facility contributed significantly to the overall patient satisfaction. Of these, technical quality, communication, time spent with health care providers and accessibility and convenience were found to be significant predictors of overall patient satisfaction. The communication and the technical quality of eye care providers had the highest patient satisfaction while patients were least satisfied with the interpersonal manner of the eye care providers. Age group, occupation and literacy status were significantly associated with the

overall mean satisfaction. Jimma University Hospital should continue the regular outreach-based eye care service provision while improving on each domain of satisfaction measures with the focus on interpersonal manner and accessibility and convenience.

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Review of ocular trauma in Tamale Teaching Hospital, Tamale, Ghana

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ABSTRACT

Objective: To establish the epidemiologic characteristics, referral pattern, interventions, visual outcomes and complications resulting in visual impairment/blindness among ocular trauma patients in Tamale Teaching Hospital (TTH) Eye Clinic, Tamale, Ghana.

Materials and Methods: This was a retrospective hospital-based case series in which all new patients of all ages with various eye conditions from 1st January to 31st December 2010 were reviewed from the outpatient/inpatient record books and the sex and age recorded. The files/ folders of patients with ocular trauma were selected and retrieved. The epidemiological characteristics, referral pattern, interventions, visual outcomes and complications resulting in visual impairment/blindness among ocular trauma patients were analysed.

Results: A total of 2,027 records of new patients with various eye conditions were retrieved. Three hundred and sixty one (377 eyes) new ocular trauma patients' files/ folders were analyzed. The Male: Female ratio was 1:1.1 ($p=0.09$) for all new patients with various eye conditions whilst it was 1.8:1 ($p<0.01$) for new ocular trauma patients. Ocular trauma patients were younger than general patients with 20 – 29 years age group having most new patients (27.4%) compared with the over 49 years age group for other new cases (23.4%). Approximately 68.4% of the ocular trauma patients were seen at TTH without a referral. Conjunctival lesions were the commonest finding affecting 124(32.9%) of the ocular trauma patients. The majority of patients 88.1% sustained closed globe trauma, 8.3% had adnexal trauma whilst 3.6% had open globe trauma. The commonest intervention rendered was medical treatment alone to 64.4% of the patients. By the WHO classification, majority 67.4% of traumatized eyes had normal vision, 13.9% were visually impaired and 18.7% were blind. Thus, 110 (32.6%) were visually impaired/ blind in the traumatized eye. The commonest complications resulting in visual impairment/ blindness were corneal opacities/ scars in 33(30.0%) cases.

Conclusion: Majority of ocular trauma patients presented with minor injuries which healed without complications. However, ocular trauma was a major cause of monocular blindness and visual impairment. Ocular trauma also tended to affect a younger age group and especially males compared to other eye diseases.

Key words: Ocular trauma, Epidemiology, Referral pattern, Intervention, Visual outcome, Complication

INTRODUCTION

Ocular trauma can be defined as any injury to the eyeball, adnexa, orbital and/or periorbital tissues. It can be classified into closed globe injuries (contusions and lamellar lacerations), open globe injuries (globe rupture, penetrating injury, intraocular foreign bodies and perforations) and adnexal injuries. It may be due to direct contact with fixed or mobile object, blunt or sharp object, hot object, chemical substances, electrical power sources or radiation^{1, 2}.

Ocular trauma is an important preventable cause of visual impairment and monocular blindness globally. Owens *et al*³ carried out a statistical brief in the United States of America (USA) that compiled information from the Healthcare Cost and Utilization Project (HCUP) on Emergency Department (ED) visits related to eye injuries in 2008. There were about 636,619 ED visits related to eye injuries, a rate of 209 visits per 100,000 populations.

About 3.1% of patients seen in the ED for eye injuries were admitted to the hospital— compared to 8.1% of ED visits for all other types of injuries³. In a ten-year retrospective study done in New Zealand, the annual rate of ocular trauma was 20.5 per 100,000 populations⁴. In the Singapore Indian Eye Study, ocular trauma was reported in 5.1% of the study population, of whom 26.5% required hospitalization⁵. Cao *et al*⁶ in China estimated that the annual incidence rate of hospitalized eye injury was 27.7 per 100,000. Ocular trauma accounted for 165 patients (1.03%) of 15,970 ocular patients seen at an Out Patient Department and Emergency in India⁷. Trauma to the eye is an important cause of visual impairment and monocular blindness. Trauma-related causes of visual impairment were corneal scars (80.0%, 4 eyes) and macula scar (20.0%, 1 eye). Whilst the trauma-related causes of blindness included corneal scars (30.0%, 3 eyes), phthisis bulbi (20.0%, 2 eyes), macular scar (30.0%, 3 eyes), and optic atrophy (20.0%, 2 eyes) as found in the Singapore

Indian Eye Study⁵. In 2012, there was a reduction in visual acuity of 37.7% of subjects following treatment after ocular trauma in South Africa⁸. A retrospective case series done in Kenya by Misa⁹ showed that most injured eyes (81.5%) were blind at admission and 63.8% were blind at discharge.

In Africa, few studies have been published on ocular trauma. In a two year review of 5,416 patients, 220 (4.06%) had at least one form of ocular trauma or the other in Nigeria¹⁰. In another study in Nigeria, 1,508 new patients were seen out of which 149 presented with monocular blindness, giving an incidence of 9.9%. Very few studies have been done in Ghana on ocular trauma especially in the last five years. In a retrospective case series, Gyasi *et al*¹¹ found that ocular injuries (23.2%) were the second most common cause of destructive eye procedures. Eye injuries are a serious burden economically. Ocular trauma is an important cause of visual loss and is frequently preventable⁴. Even though there is high coverage of national health insurance scheme in Ghana; most patients still do not have health insurance and have to pay from their pockets to access health hence the need for preventive measures.

The purpose of this study was to determine the epidemiologic characteristics, referral pattern, interventions, visual outcomes and the complications resulting in visual impairment/blindness among ocular trauma patients in Tamale Teaching Hospital, Ghana. This study shall provide data on the epidemiologic characteristics and outcomes of ocular trauma and may help to facilitate the provision of integrated eye care, formulation and enforcement of safety strategies for the prevention of ocular trauma in Ghana.

MATERIALS AND METHODS

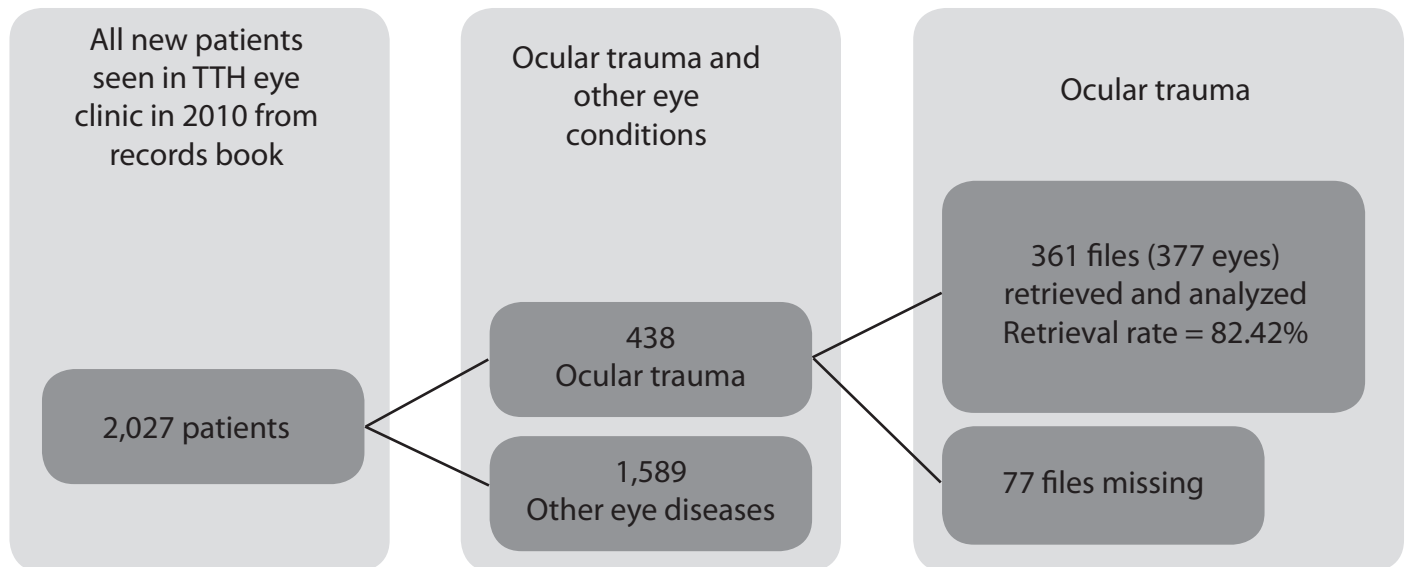
This study was a retrospective hospital-based case series. The study population included all new patients with a diagnosis of ocular trauma, who attended the Tamale Teaching Hospital (TTH) Eye Clinic on out-patient basis or admitted at TTH eye ward from 1st January to 31st December, 2010. Missing records of patients with ocular trauma were excluded. The study setting is a university teaching and referral hospital located in Tamale, Ghana. Ghana's population based on the 2010 Census was 24,658,823 and that of the Northern Region, Tamale, was 2,479,461¹². The Eye Clinic is run by an ophthalmologist, optometrists and ophthalmic nurses. Majority of the patients are from Tamale and are mostly Ghanaian with few foreigners. There are however other public and private eye clinics in the region.

Data collection procedure: Data was collected by liaising with the medical information/record officers working at the records office. All new patients of all ages with various eye conditions from 1st January to 31st December 2010 were reviewed from the outpatient/inpatient record books and the sex and age recorded. The date of attendance/ hospitalization, name, age, and the patient number was obtained from the out-patient attendance record and the in-patient record book in the clinic and the ward, respectively. This information was then used to retrieve all new files at the medical information and records department. The patients' files which met the inclusion criteria were retrieved. The relevant data such as epidemiological characteristics, referral pattern, interventions, visual outcomes and complications of ocular trauma were reviewed, collected and entered into a structured questionnaire on perusal of the medical records. Any additional information or clarification was obtained from the medical staff where necessary.

Data management and analysis: Each questionnaire had a serial number which was the unique key identifier variable and each patient's medical record/file was linked to this serial number. A separate code book was used to store this information including the out-patient and in-patient numbers. Each questionnaire was cross checked for completeness after data collection for each day. The original medical record was used to fill in missing blanks. Data was validated prior to entry. Double entry of questionnaire into computer's Microsoft Excel data base 2010 was done to reduce errors. The data was then exported into STATA version 12 (Stata Corp, College Station, Texas) and analyzed with the help of a statistician. Descriptive analysis was done to determine the frequencies and proportions for the various variables (continuous/categorical) and presented in figures or tables where appropriate. Significant differences and associations were determined by p-values of less than 0.05.

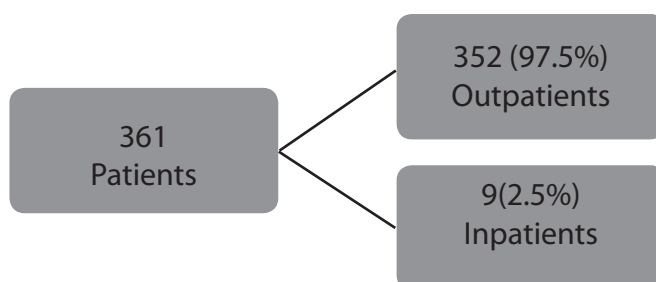
RESULTS

The total number of new patients with various eye diseases that attended the Tamale Teaching Hospital (TTH) Eye Clinic from 1st January to 31st December, 2010 was 2,027 from the outpatient and inpatient record books with 438 of them being of new ocular trauma patients. A total of 361 files for 377 eyes with ocular trauma were found giving a retrieval rate of 82.4%. A flow chart for the data collection is shown in Figure 1.

Figure 1: Flow chart showing the data collection of new patients' records reviewed at TTH Eye Clinic**Table 1:** Demographic characteristics of all new patients in TTH Eye Clinic, Ghana, 2010

Demographic characteristic	All new patients No. (%)	Ocular trauma patients No. (%)
Sex		
Male	971 (47.90)	224 (62.05)
Female	1026 (50.62)	128 (35.45)
Unrecorded	30 (1.48)	9 (2.5)
Total	2027 (100)	361 (100)
Age group		
0 – 9	302 (14.90)	61 (16.90)
10 – 19	327 (16.13)	53 (14.68)
20 – 29	386 (19.04)	99 (27.42)
30 – 39	334 (16.48)	76 (21.05)
40 – 49	204 (10.06)	38 (10.53)
>49	474 (23.38)	34 (9.42)
Total	2027 (100)	361 (100)

The male: female ratio of all patients attending TTH Eye Clinic with various eye conditions was 1:1.1 ($p=0.09$) and that for ocular trauma patients was 1.8:1 ($p<0.01$). Majority of patients with various eye conditions were older than 49 years whilst ocular trauma patients were mainly in the 20 – 29 year age group as shown in Table 1. Most patients were treated on outpatient basis as shown in Figure 2.

Figure 2: Flow chart showing inpatient and outpatient distribution**Table 2:** Characteristics of ocular trauma patients

Characteristics	No. (%)
Occupation	
Child/ Student	127 (35.18)
Manual	100 (27.70)
Farmer	40 (11.08)
Professional	38 (10.53)
Unrecorded	30 (8.31)
Unemployed	22 (6.09)
Retired	4 (1.11)
Total	361 (100)
Place of residence	
Urban	253 (70.08)
Rural	84 (23.27)
Unrecorded	24 (6.65)
Total	361 (100)
Education level	
Unrecorded	137 (37.95)
No formal education	70 (19.39)
Tertiary	63 (17.45)
Pre school	36 (9.97)
Primary	28 (7.76)
Secondary	27 (7.48)
Total	361 (100)

Table 2 shows, ocular trauma occurred commonly among children/ students. Most patients resided in urban areas. The educational level was unrecorded in the majority.

Table 3: Agents causing ocular trauma

Agent	No. (%)
Unrecorded	224 (59.41)
Organic*	60 (15.92)
Other**	58 (15.39)
Metallic***	22 (5.84)
Chemical****	13 (3.45)
Total	377 (100)

*organic (stick, wood, broom stick, branch, twig, insect, goat horn, cow's kick), **other (stone, sand, dust, knife, fist, blow, slap, fall, football, glass, bottle, rubber band, hot flame, air blast), ***metallic (nail, wire, bullet, pellet), ****chemical (acid, alkaline, gun powder shots)

Table 3 shows the agents causing ocular trauma was unrecorded in the majority of ocular trauma patients.

Table 4: Circumstance and place of ocular trauma

Ocular trauma patients	No. (%)
Circumstance of ocular trauma	
Unrecorded	175 (48.47)
Accidental	158 (43.77)
Attack/ Assault	28 (7.76)
Total	361 (100)
Place of ocular trauma	
Unrecorded	236 (65.37)
Home	55 (15.24)
Workplace	25 (6.93)
Farm	18 (4.99)
Road	17 (4.71)
School	10 (2.77)
Total	361 (100)

Table 4 shows, the circumstance and place of ocular trauma was unrecorded in the majority.

Figure 3: Referral pattern of ocular trauma patients (n = 361)

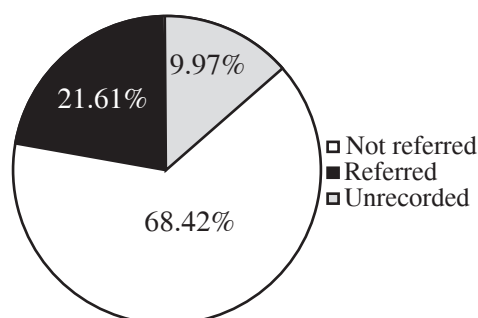
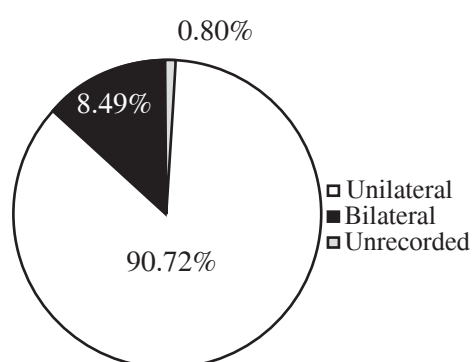


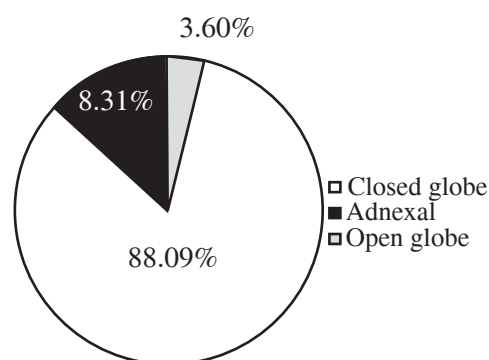
Figure 3 shows out of a total of 361, the majority, 247, of ocular trauma patients were seen at TTH without a referral.

Figure 4: Laterality of traumatized eyes (n = 377)



Unilateral ocular trauma was the commonest, 342, presentation as shown in Figure 4 above.

Figure 5: Distribution of patients by the type of ocular trauma sustained (n = 361)



Majority of ocular trauma patients sustained closed globe trauma, 318. Thirty had adnexal trauma whilst 13 had open globe trauma (Figure 5).

Table 5: Distribution of eyes by adnexa, orbit and globe findings

Ocular findings*	No. (%)
Conjunctival lesion	124 (32.89)
Ocular surface foreign body	85 (22.55)
Corneal epithelial defect/ ulcer	36 (9.55)
Cataract	30 (7.96)
Others**	24 (6.37)
Lid contusion	19 (5.04)
Corneal opacity/ scar	10 (2.65)
Uveitis	10 (2.65)
Lid laceration	9 (2.39)
RAPD	8 (2.12)
Hyphaema	7 (1.87)
Optic atrophy	6 (1.59)
Corneal perforation and uveal prolapse	5 (1.33)
Corneal perforation	4 (1.06)
Total	377 (100)

*Most significant finding, **Others include: Hypopyon, Phthisis bulbi, Endophthalmitis and Vitreous haemorrhage 3 (0.80%) each; Corneoscleral perforation and uveal prolapse, and Dislocated lens 2 (0.53%) each; Ptosis, Orbital fracture, Oculocclusion pupillae, Iridodialysis, Ruptured globe, Chorio retinal scar, Retinal detachment and macula hole, Retinal detachment and Vitro retinal haemorrhage 1 (0.27%) each.

Conjunctival lesions and ocular surface foreign bodies were the commonest findings at presentation following ocular trauma as shown in Table 5.

Table 6: Distribution of traumatized eyes by intervention rendered

Intervention*	No. (%)
Medical treatment alone	243 (64.46)
Removal of ocular surface foreign body	102(27.06)
Lid repair	10(2.65)
Cornea repair	5 (1.33)
Lens washout and primary intraocular lens implant	4 (1.06)
Primary evisceration	4 (1.06)
Uveal abscission and cornea repair	3 (0.80)
Anterior chamber washout	2 (0.53)
Lens washout	2 (0.53)
Lens washout anterior vitrectomy and primary intraocular lens implant	1 (0.27)
Cornea repair lens washout and anterior vitrectomy	1 (0.27)
Total	377 (100)

*most significant intervention recorded

The most common intervention rendered to ocular trauma patients was medical treatment. One hundred and thirty four (35.5%) eyes had surgical intervention of which removal of ocular surface foreign bodies were the commonest as shown in Table 6.

By the WHO classification, majority of ocular trauma patients had normal vision at presentation whilst 110 (32.6%) were blind/ visually impaired in the traumatized eye. Patients who were blind in the affected eye following ocular trauma were more likely to come for follow up compared to those with normal vision ($p<0.01$) as shown in Table 7.

Table 7: Distribution of visual acuity (VA) at presentation and up to 2 years of follow up

WHO classification	VA of eyes at presentation	BCVA at follow-up period (eyes)			
		3 Months	6 Months	1 Year	2 Years
6/6 - <6/18 (Normal vision)	227 (67.36%)	6 (21.43%)	5 (35.71%)	3(27.27%)	3(37.50%)
6/18 - <6/60 (Visual impairment)	41 (12.17%)	7(25.00%)	5 (35.71%)	3(27.27%)	0
6/60 - <3/60 (Severe impairment)	6 (1.78%)	1(3.57%)	0	0	0
3/60 – NPL (Blind)	63(18.69%)	14(50.00%)	4(28.57%)	5(45.45%)	5(62.50%)
Total	337 (100%)	28 (100%)	14 (100%)	11 (100%)	8 (100%)

Table 8: Distribution of traumatized eyes by complications that resulted in visual impairment/ blindness

Eyes	No. (%)
Corneal opacities/ scars	33 (30.00)
Other*	24 (21.82)
Cataract	20 (18.19)
Optic atrophy	14 (12.73)
Secondary glaucoma	11 (10.00)
Uveitis	8(7.27)
Total	110 (100)

*Others include: Hypopyon, Phthisis bulbi, Endophthalmitis and Vitreous haemorrhage 3 (0.80%) each; Corneoscleral perforation and uveal prolapse, and Dislocated lens 2 (0.53%) each; Ptosis, Orbital fracture, Oclusio seclusion pupillae, Iridodialysis, Ruptured globe, Chorio retinal scar, Retinal detachment and macula hole,

Retinal detachment and Vitro retinal haemorrhage 1 (0.27%) each.

Table 8 shows corneal opacities/ scars were the most common complications of ocular trauma resulting in visual impairment/ blindness.

DISCUSSION

In this study a total of 2,027 new patients with various eye conditions were seen out of which 438 were ocular trauma patients but 361 patients' files/ folders consisting of 377 eyes were retrieved and reviewed. The Male: Female ratio was 1:1.1 ($p=0.09$) for all new patients with various eye conditions whilst it was 1.8:1 ($p<0.01$) for new ocular trauma patients. There was no statistically significant difference among males and females attending the eye clinic with various eye conditions but in terms of ocular trauma males were more affected compared to females. This is in keeping with a study in the USA in 2011, where eye injuries were 1.7 times higher for males than females³. Momanyi¹³ also found a higher male to female ratio of 2.5:1 in Kenya. These findings may be due

to the fact that generally males are usually more involved in adventurous activities and manual jobs.

Nearly a quarter, 474 (23.4%) of all new patients with various eye conditions were more than 49 years old, whilst a little more than a quarter 99 (27.4%) of ocular trauma occurred in the 20 – 29 year age group. The minimum age at which ocular trauma occurred was 0.4 years and the maximum age was 80 years. The median age was 26 years with an interquartile range, IQR, of 19 years. These findings are consistent with a study in Kenya where Momanyi¹³ found the most common age group to be 21-30 years (28.4%) and a median age of 24 years. Also in South Africa, young patients between 21 and 30 years old incurred more ocular injuries (31.4%)⁸. Thus, the commonest age group within which ocular trauma occurred was in the prime age and this reduces the productivity of the individual and the families as a whole since such people turn to be the breadwinner of their families. Of concern is the age group 0-9 years, 61 (16.9%) because of the many disability adjusted life years (DALYs) ahead of them and they are also at high risk of developing amblyopia. This is similar to a South African study where 13.8% of patients incurring ocular injuries were children up to the age of 12 years⁸.

The vast majority of ocular trauma patients, 352 (97.5%), in this study were treated on outpatient basis whilst 9 (2.4%) were inpatient/admitted. This is consistent with a study in the USA where about 3.1% of patients with eye injuries were admitted to the hospital³. In this study, clients who had closed globe trauma were more likely to be treated on outpatient basis compared to those with open globe trauma ($p < 0.01$).

In terms of occupation, ocular trauma occurred commonly among children/ students, 127 (35.2%) and manual workers, 100 (27.7%). This is in keeping with a study in Kenya where children/ students were commonly affected, 63 (55%)¹³. Majority, 253 (70.1%) of ocular trauma patients resided in urban areas and a few 84 (23.3%) in rural areas. This may be explained by the fact that the study was carried out in an urban hospital. The agent, the circumstance and the place of ocular trauma was unrecorded in the majority 137 (38.0%) patients, 242 (59.4%) eyes, 175 (48.5%) patients and 236 (65.4%) patients, respectively. This reflects poor records/ clerking of patients and one cannot make any meaningful inferences with regards to these variables.

Majority, 247 (68.4%), of ocular trauma patients were seen at TTH without a referral whilst 78 (21.6%) were referred after first aide and/or treatment at other health facilities.

Unilateral eye trauma was the commonest 342 (90.7%) whilst both eyes were injured in 32 (8.5%) ocular trauma patients due to hot flames, chemical burn, air blast and accidental gun powder shots. This is consistent with a study in South Africa where unilateral injuries were more frequent than bilateral injuries (97.5% versus 2.5%, respectively)⁸. The right eye was most often injured compared to the left, 177 (47.3%) and 165 (44.1%), respectively. This is in keeping with a study in Nigeria where the right eye was involved in 60 (45.5%) subjects, the left eye in 59 (44.7%) cases and bilateral in 13 (9.9%)¹⁴.

Majority of ocular trauma patients sustained closed globe trauma, 318 (88.1%). Thirty (8.3%) had adnexal trauma whilst 13 (3.6%) had open globe trauma. This agrees with studies in Nepal where the commonest type of trauma was closed globe injury 784 (73.3%) and open globe 57 (5.3 %),¹⁵ in New Zealand where 253 open globe injuries (OGI) and 568 closed globe injuries (CGI) ($p < 0.001$) were reported⁴ and in India where closed globe injury was 41 (68.33%) and open globe injury 19 (31.67%)¹⁶.

Visual acuity at first presentation was recorded in 327 (90.6%) of ocular trauma patients. It was unrecorded in 29 (8.3%) of patients under 10 years. Clients from rural areas were more likely to have monocular visual impairment/ blindness, 24 (17.0%) ($p < 0.01$) compared to those who came from urban areas. Nine out of 11 ocular trauma patients who had open globe trauma were immediately blind and none had normal vision on presentation. Two hundred and thirty two (70.1%) patients with normal vision after ocular trauma had closed globe trauma. This is in keeping with a study in Ethiopia where blindness was associated with open globe injury (85.2%, $p < 0.001$) and rural residence (66.7%, $P < 0.001$)¹⁷.

Conjunctival lesions were the commonest, 124 (32.9%), findings in traumatized eyes at presentation followed by ocular surface foreign bodies 85 (22.6%) and cornea epithelial defects/ ulcers 36 (9.6%). In Nigeria, Emem *et al*¹⁰ found that lid /conjunctival injuries were most common 85 (38.6%).

Three (0.8%) patients had endophthalmitis in this study, two were injured by organic matter (goat's horn and stick), and the other agent of trauma was unrecorded. They presented with a visual acuity of no light perception (NPL). Two were open globe and one was closed globe trauma. One had primary evisceration done whilst the other two developed phthisis bulbi.

The most common intervention rendered to traumatized eyes in our study was medical treatment alone, 243 (64.5%), of which topical antibiotics alone/ combination were the commonest, 360 (95.5%), followed by analgesics alone/ combination 170 (40.1%). This is consistent with a study in Ethiopia, where topical antibiotics and analgesics were the most common modality of treatment (63.4%)¹⁷. One hundred and thirty four (35.5%) eyes had surgical intervention of which removal of ocular surface foreign bodies were the commonest, 102 (27.1%).

Four (3.0%) patients had primary evisceration done in our study, the circumstance of ocular trauma was farming/ hunting. All of them presented with a visual acuity of no light perception (NPL). They included three corneoscleral perforations with uveal prolapse and one endophthalmitis.

By the WHO classification, out of 337 traumatized eyes (whose vision was recorded), majority 227 (67.4%) had normal vision. Forty seven (13.95%) were monocularly visually impaired and 63 (18.42%) were monocularly blind immediately after sustaining ocular trauma in this study. Patients who were monocularly blind following ocular trauma were more likely to come for follow up compared to those with normal vision ($p < 0.01$). In a prospective observational study in Ethiopia, out of 254 new patients (265 eyes), about 81

(34.3%) injured eyes were blind and 35 (14.8%) were visually impaired¹⁷. Though, in our study, the accuracy of visual assessment might have been interfered by the failure to record visual acuity in 40 (10.6%) patients.

One hundred and ten eyes (32.6%) were visually impaired/ blind in the traumatized eye. The commonest complications resulting in visual impairment/ blindness were corneal opacities/ scars 33 (30.0%). Corneal opacities were the commonest post-treatment complication 14 (20%) among inpatients¹³ and during follow up (45.6%)⁹ in studies done in Kenya. Thus, corneal opacities/ scars commonly complicates ocular trauma and should be addressed adequately in the management of such patients.

Ocular trauma was a relatively common health problem especially among males in the economically active age group and a significant cause of monocular visual impairment/ blindness in TTH, Tamale, Ghana. Public awareness campaign on preventive measures need to be instituted to reduce the incidence and debilitating effects of ocular trauma as it has the potential of increasing the incidence of poverty in the community and the country as a whole because visual impairment/blindness from trauma has the potential to reduce ones productivity and that of the family as a whole since most affected persons turn to be the breadwinner of their families. Children with visual impairment/ blindness from trauma have many disability adjusted life years (DALYs) ahead of them and they are also at high risk of developing amblyopia.

CONCLUSION

Ocular trauma was 1.8 times higher for males than females and almost half were in the economically active age group. Majority of ocular trauma patients were seen at TTH without a referral. The commonest intervention was medical treatment alone. Removal of ocular surface foreign bodies was the next most frequent intervention. Ocular trauma was a significant cause of monocular visual impairment/blindness though majority of ocular trauma patients had no complications due to ocular trauma.

RECOMMENDATIONS

Proper documentation and record keeping is needed at presentation and follow up for proper management and as a reference for research, medico-legal purposes and compensation claims. There is the need for public awareness campaign on the prevention of ocular trauma as severe cases presents with poor vision with poor prognosis even with appropriate intervention.

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Ocular manifestations among HIV/AIDS patients; a case of Muhimbili National Hospital, Tanzania

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ABSTRACT

Objective: About 70-80% of HIV/AIDS patients develop an ocular complication at some point of their illness, at times causing blindness, ocular damage and even death. This study was conducted to determine the pattern of ocular manifestations of HIV/AIDS and their relationship to Highly-Active-Anti-Retroviral-Therapy and CD4+Tcells-count among HIV/AIDS patients at Muhimbili National Hospital.

Methods: Cross-sectional study among 296 systematically sampled HIV/AIDS patients. Data collection was by history taking, clinical examination, laboratory investigations and review of case notes. Analysis was aided by using SPSS version 17 software. Inferential statistics was performed and a $p < 0.05$ was considered significant.

Results: Of the 296 patients, 165(56%) were females. About 153(51.7%) patients were using Highly-Active-Anti-Retroviral-Therapy, 164(55.4%) and 66(20.3%) had CD4+Tcells-counts of $>350\text{cells}/\mu\text{L}$ and $<200\text{cell}/\text{mm}^3$ respectively. Ocular manifestations affected 124/296 (41.9%) patients. The prevalence of ocular manifestations was significantly higher among those not on Highly-Active-Anti-Retroviral-Therapy (67.1% vs 18.3%, $\chi^2=66.79$, $p < 0.01$) and among patients with CD4+Tcells-count $<200\text{cells}/\mu\text{L}$ (73.3% vs 29.9%, $\chi^2=34.1$, $p < 0.05$). The commonest manifestations among 592 eyes were optic atrophy 5.4(9.1%), cataract 25(4.2%), keratitis 23(3.8%), HIV-retinopathy 21(3.5%) and squamous cell carcinoma of the conjunctiva 16(2.7%).

Conclusion: Despite introduction of HAART, the prevalence of ocular manifestations in Dar-es-Salaam is still high. Further research on optic nerve disorders; awareness creation to inform patients, health personnel and the community; and to screen HIV patients for ocular manifestations are recommended.

Key words: CD4+Tcells, Cataract, HAART, HIV/AIDS, Optic atrophy, Ocular manifestations

INTRODUCTION

Acquired immunodeficiency syndrome (AIDS) has become one of the world's most serious health and development challenges. Currently approximately 34 million people are living with HIV infection and nearly 30 million people have died of AIDS-related causes¹. Majority (97%) of the cases reside in low- and middle-income countries, particularly in sub-Saharan Africa. In Tanzania the prevalence is 5.6% among adults. It is estimated that there are 1,400,000 people living with HIV^{2,3}.

Ocular manifestation/s is among the commonest sequel of HIV/AIDS and can be the first presenting sign of HIV infection⁴. In the eye the disease affects the adnexa, the anterior segment, the posterior segment, the orbit and neuro-ophthalmologic structures. About 70-80% of HIV/AIDS patients develop an ocular complication at some point of their illness⁵. Affected patients also may suffer from HIV related blindness whose prevalence range from 6.9-23%⁶.

Introduction of Highly Active Anti-Retroviral Therapy (HAART) has modified the clinical course of the disease leading to reduction in the prevalence of HIV/

AIDS related complications⁷. In sub-Saharan Africa the prevalence of ocular manifestations vary depending on the setting. Studies conducted before introduction of HAART showed higher prevalence than those conducted after introduction of HAART. Among the reported prevalence in Africa are: 12.3% in Nigeria⁸, 33.3% in Mali⁹ and 21.4% in Gondar- Ethiopia¹⁰, 77% in Kenya¹¹ and 76% in Tanzania¹².

Lower CD4+Tcells counts are associated with higher prevalence and blindness due to ocular manifestations⁴. Anterior segment ocular manifestations have been found to be associated with higher CD4+Tcells count compared to posterior segment ones which seem to be associated with the lowest counts^{5,13}. Studies done in Africa showed a prevalence of ocular manifestations of between 32.8%-91.7% in patients with CD4+Tcell counts of $<200\text{ cells}/\mu\text{L}$ ⁴.

Highly Reactive Anti-Retroviral Therapy was introduced at Muhimbili National Hospital in November 2004. The current criteria for initiation of HAART to a patient are (1). A CD4+Tcell count of $<350\text{ cell}/\mu\text{L}$, and (2) HIV clinical stage 3 and 4. Since then, no studies have been conducted to document the prevalence and types of HIV ocular manifestations in Tanzania and their

relationship with HAART and CD4+Tcells count. It is also not known whether HIV patients are aware of the effects of HIV on their eyes. The study was conducted to describe the pattern of ocular manifestations and their relationship to HAART use and CD4+Tcell counts among HIV/AIDS patients attending the HIV clinic at Muhimbili National Hospital for planning purposes.

MATERIALS AND METHODS

Design: This was a hospital based cross-sectional study conducted for a period of one year from April 2013 to April, 2014.

Setting: This study was conducted at Muhimbili National Hospital (MNH). Data collection was carried out at the HIV clinic; this clinic provides HAART and counselling services to about 100 newly diagnosed and follow-up patients daily from Monday to Friday.

Study population: All adult patients aged 18 years and above who were attending the HIV clinic at MNH for treatment and care were eligible for the study. This age group was selected as it is possible to assess awareness and visual acuity compared to children. They are also the main attendees of the clinic.

Sampling and sample size: Patients were selected using systematic sampling and the estimated sample size to give a precision of 0.05% at a confidence interval of 95% was 290 patients.

Data collection: Patients were selected at the HIV clinic and sent to the eye clinic. Systemic sampling was employed where every 5th patient on the list of 100 patients listed to attend the clinic on the particular day was selected, informed about the study and requested to participate. Those who consented to participate were initially interviewed on awareness about effects of HIV on the eye. Records were reviewed for demographic characteristics and CD 4+Tcell count taken within six months. Ocular examination included best corrected

visual acuity test, intraocular pressure measurements, examination of the adnexa, extra ocular motility, alignment, dilated fundoscopy and cranial nerve function tests. Study instruments included the Snellen literate and illiterate E charts, non-contact tonometer, direct ophthalmoscope, 20 D Volk lens, 90 D Volk lens the Goldman 3 mirror lens, slit lamp biomicroscope and fluorescein dye strips. Brain computerized tomography (CT-Scan), Magnetic resonance imaging (MRI) and blood toxoplasma antibody depending on the need were performed. Eye lid and conjunctival tumours were confirmed by histopathology.

Data analysis: Data were analyzed using SPSS version 17 software. Descriptive statistics were used to summarize and describe the data. The relationship between independent variables and HAART and CD4+Tcell counts was analysed using Chi squared test and a $p < 0.05$ considered to ascertain whether there was a significant difference between variables.

Ethical issues: This study was ethically approved by the Ethics and Research Committee of Muhimbili University of Health and Allied Sciences (MUHAS). Permission to conduct the study was sought from the relevant hospital authorities. Written informed consent was obtained from each participant. Confidentiality and privacy was maintained throughout the study. Data was stored safely and used for the purposes of the study only.

RESULTS

Two hundred and ninety six patients were recruited for the study and all were included in the analysis. The mean age of study participants was 38.6(± 0.7) and the age range was 21-70 years. Majority (216, 73%) of participants were aged between 31-50 years. About 165 (56%), of participants were females. More than 50% of the participants were on HAART. A few of them were aware of ocular manifestations (39.5%).

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

Demographic feature		On HAART			P-value
	Frequency	Yes No. (%)	No No. (%)	Total No. (%)	
Age (years)	<30	10 (62.5)	6 (37.5)	16 (62.5)	0.402
	31 – 40	54 (49.1)	56 (50.9)	110(37.2)	
	41 – 50	61 (57.5)	45 (42.5)	106(35.8)	
	51 – 60	20 (45.5)	24 (54.5)	44(14.9)	
	>60	8 (40)	12 (60)	20(6.7)	
Total		153(51.7)	143(48.3)	296(100)	
Sex	Male	69 (52.7)	62 (47.3)	131(44.3)	0.663
	Female	84 (50.9)	81 (49.1)	165(55.7)	
Total		153(51.7)	143(48.3)	296(100)	

Table 2: The distribution of ocular manifestations by HAART use among the study population

Ocular manifestations	HAART use		Total No. (%)
	Yes No. (%)	No No. (%)	
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)

Out of 296 participants, 124 (41.9%) had ocular manifestations and 70 (56.5%) of them had bilateral involvement. Twenty four (8.1%) patients had more than one condition. Slightly more females (71/165, 43.0%) than males (53/131, 40.4%) were affected by ocular manifestations. Two thirds (85/124, 68%) of patients with ocular manifestations were in the age group between 31-50 years. Ninety six (67.1%) eyes were of patients in the group not on HAART compared to 28/153 (18.3%) affected eyes among those on HAART. Being affected with ocular manifestations of HIV was associated with not using HAART ($p<0.01$)(Table 2) but not associated with age ($p=0.5$) or gender ($p=0.09$).

Table 3: The prevalence of ocular manifestation by CD4+Tcells count among the study population (n=296)

Level of CD4 count (cells/ μ L)	Ocular manifestation		Total No. (%)
	Yes No. (%)	No No. (%)	
<200	44 (73.3)	16 (26.7)	60 (100)
200 – 350	31 (43.1)	41 (56.9)	72 (100)
>350	49 (29.9)	115 (70.1)	164 (100)
Total	124(41.9)	172(58.1)	296 (100)

$X^2=34.13$, $p<0.044$

More than half (164/296, 55.4%) of the study population had CD4+Tcells count above 350 cells/ μ L while 60/296 (20.3%) had lowest CD4+Tcells counts <200 cell/ μ L. Patients with the lowest CD4+Tcells count of <200 cells/ μ L had the highest (44/60, 73.3%) prevalence of ocular manifestations. The association between having ocular manifestation and CD4+Tcells count was statistically significant. ($p<0.05$) (Table 4).

A total of 194(32.7%) eyes were affected by various HIV ocular manifestations. The leading subtypes were neuro-ophthalmologic (79/592, 13.3%), anterior segment

74/592(12.5%), posterior segment (31/592, 5.2%) and adnexal (10/592, 1.6%) affected eyes.

Table 4: Ocular manifestation sub-type among 194 affected eyes and HAART use

Ocular manifestation type	HAART use			P-value
	Yes No. (%)	No No. (%)	Total No. (%)	
Adnexal (n=10)	1(10)	9(90)	10(100)	0.69
Anterior segment (n=74)	25(33.8)	49(66.2)	74(100)	0.01
Posterior segment (n=31)	2(6.4)	29 (93.5)	31(100)	0.54
Neuro- ophthalmic (n=79)	19 (24.1)	60 (75.9)	79(100)	0.04
Total	47(24.2)	147(75.8)	194(100)	

Not using HAART was significantly associated with a higher prevalence of neuro-ophthalmic ($p=0.04$) and anterior segment manifestations ($p=0.01$) respectively (Table 4).

Neuro-ophthalmic ocular manifestations were significantly associated with higher CD4+Tcell counts ($p=0.04$) while adnexal, anterior and posterior segment manifestations were not. Optic atrophy was the commonest manifestation which affected 54/592(9.1%) eyes and was the leading neuro-ophthalmological lesion (54/79, 68%). Other common lesions were cataract (25/592,-4.2%), keratitis (23/592, 3.8%) and HIV retinopathy (21/592, 3.5%) (Table5). There was only one eye affected by CMV retinitis. A third (31/79, 39.2%) eyes with optic atrophy were of patients with higher CD4+ T cell counts of >350 cell/ μ L while only 9/79 (16.7%) eyes were of patients with the lowest CD4 T-cell counts of <200 cells/ μ L.

Table 5: The relationship between sub-type and diagnosis of ocular manifestations and CD4+T cell counts (n=194 eyes)

Ocular manifestation type	Diagnosis	CD4 counts level (cells/ μ L)				
		<200	200-350	>350	Total	
		No. (%)	No. (%)	No. (%)	No. (%)	
Adnexal	Herpes zoster ophthalmicus	5(83.3)	1(16.7)	0(0)	6(100)	
	Kaposi's sarcoma	2(1010)	0(0)	0 (0)	2(100)	
	Molluscum contagiosum	0(0)	1(50)	1 (50)	2(100)	
	Total	7(70)	2(20)	1(10)	10(100)	
Anterior segment	Keratoconjunctivitis sicca	2(100)	0 (0)	0(0)	2(100)	
	Conjunctiva growths	8(50)	6(37.5)	2 (12.5)	16(100)	
	Keratitis	6(26.1)	10(43.5)	7 (30.4)	23(100)	
	Iridocyclitis	4(50)	3(37.5)	1 (12.5)	8(100)	
	Cataract	5(20)	8(32)	12(48)	25(100)	
	Total	25(100)	27(100)	22(100)	74(100)	P=0.10
Posterior segment	HIV retinopathy	16(76.2)	1(4.8)	4 (19)	21(100)	
	CMV retinitis	1 (100)	0 (0)	0 (0)	1(100)	
	Chorioretinitis	0 (0)	0 (0)	2 (100)	2(100)	
	Toxoplasma retinochoroiditis	1 (14.3)	1 (14.3)	5 (71.4)	7(100)	
Neuro-ophthalmological	Total	18(58.1)	2 (6.5)	11 (35.5)	31(100)	P=0.42
	Optic atrophy	9 (16.7)	19(35.2)	26 (48.1)	54(100)	
	Papilloedema	6 (46.2)	4 (30.8)	3(23.)	13(100)	
	Papillitis	5 (41.7)	5 (41.7)	2 (16.7)	12(100)	
	Total	20 (25.3)	28(35.4)	31(39.2)	79(100)	P=0.04

DISCUSSION

This study aimed at describing the pattern of ocular manifestations and their relationship to HAART use and CD4+Tcell counts among HIV/AIDS patients attending the HIV clinic at Muhimbili National Hospital for planning purposes. Results show that the study population age range was 21 years to 73 years with a mean age of 38.65 ($\pm$ 0.74) years similar to the findings by Azonobi *et al*¹³ and Bekele *et al*¹⁴ in Ethiopia. The similarity in the most affected age group is a reflection the age distribution of HIV prevalence in Africa where young sexually active adults are commonly affected.

The lack of awareness about the effects of HIV on the eye among 60% of the study population signifies inadequate exposure to appropriate health education on HIV complications. Lack of awareness leads to delay

in seeking appropriate care, late diagnosis, poor post-treatment outcome, visual loss and loss of the eye in case of advanced carcinoma of the conjunctiva.

The overall prevalence of ocular manifestations in this study was 124(41.9%) which is lower than studies done during the pre-HAART era in Tanzania 76%¹² and other countries in sub-Saharan Africa^{10,11,16}. The prevalence is however higher than that reported from similar tertiary centres providing HAART services in Ethiopia 25.3%¹⁴, South India 24.32%¹⁷ and Korea (28.5%)¹⁸. The use of HAART is known to modify the clinical presentation of HIV such that the occurrence of complications and opportunistic infections are reduced. The high prevalence despite HAART in this study is probably related to the fact that about half of the study population were not on HAART. Patients were not on HAART either because they did not meet the criteria

for starting HAART or they presented late and were still in the process of being investigated and a decision on their treatment had not been reached. In this group, the natural history of HIV progressed unchecked leading to development of complications. Indeed the prevalence of ocular manifestations among patients not on HAART was three times higher than those on HAART. Similar to studies in other Asian and African countries^{10,16-18}, the prevalence of ocular manifestations in this study was significantly higher among patients with lowest CD4+Tcells.

The finding that neuro-ophthalmic manifestations were the commonest followed by anterior segment is in agreement with a study in Ethiopia¹⁰. Neuro-ophthalmic manifestations are not a marker of disease severity and could therefore occur at any stage of the disease¹⁹.

In this study, neuro-ophthalmic manifestations were significantly related ($p < 0.05$) to not using HAART and a lower CD4+Tcell counts. The fact that optic atrophy was the commonest lesions is worth noting because the condition causes permanent visual loss. Half (48%) of the lesions occurred in patients with higher CD4+Tcell counts of $> 350/\mu\text{L}$. This group of patients could either be on treatment with immune recovery and /or not yet started on treatment as they had not met the criteria for starting HAART. In HIV/AIDS the optic nerve may be damaged through various mechanisms including infection, inflammation infiltration, ischemia, increased intracranial pressure and compression. The condition can also develop in the absence of known prior history of optic nerve disease²⁰. In the present study, it was not possible to ascertain the causes of optic atrophy or other neuro-ophthalmic conditions like papillitis and papilledema due to limited diagnostic capacity. Because optic atrophy and other neuro-ophthalmic disorders have a potential to cause blindness it is important to screen all patients living with HIV for optic nerve disorders in order to initiate treatment even when the CD4+T cells count level is higher than $350/\mu\text{L}$. Early initiation of HAART has been shown to improve visual prognosis of optic nerve disorders²⁰.

Patients with HIV have a higher prevalence of cataracts²¹ than the general population and such cataracts correlate with lower CD4+Tcells count²². In this study cataracts were among the commonest anterior segment manifestations. Screening for ocular manifestation among HIV patients can identify those who need cataract surgery.

In this study we used CD4+Tcell counts tested within 6 months that may have increased or decreased by the time data was collected thereby giving wrong estimations of patients with lower or higher CD4+Tcell counts. Additionally, the study did not explore the reasons for not being on HAART for patients who met the criteria by having CD4+Tcell counts of $< 350 \text{ cells}/\mu\text{L}$. Such information would help in establishing strategies to improve care at the HIV clinic. Being a hospital based study at a referral hospital in Tanzania, a highly selected group of patients was studied hence results from this study may not reflect the situation in the community.

CONCLUSIONS

The prevalence of ocular manifestations among patients attending the HIV clinic at Muhimbili National Hospital is high. Most lesions occurred in patients who were not on HAART and whose CD4+Tcells counts was $< 200 \text{ cells}/\mu\text{L}$. Neuro-ophthalmic manifestations were the commonest. Optic atrophy, cataract, keratitis, HIV retinopathy and squamous cell carcinoma of the conjunctiva were the main diagnoses.

RECOMMENDATIONS

It is recommended that routine ocular screening of all patients with HIV be established to identify patients with ocular manifestations, ensure early diagnosis and appropriate treatment of the ocular condition and start HAART as per treatment guidelines. Patients with lower CD4+Tcell 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 examination of patients with HIV should be emphasized. Further studies are required to establish the causes of optic atrophy in this population are required.

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The authors have no proprietary interest in any materials mentioned in this article.

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Solitary retinocytoma in a seven year old boy

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ABSTRACT

Retinal astrocytoma is a rare benign tumour of astrocytes in the neurosensory retina. Detection usually occurs in childhood or adolescence. In this age group the diagnosis of solitary cases can be challenging as they may mimic retinoblastoma. However, there are cases that have been diagnosed in adulthood. In this case report, a seven year old boy presented with long standing history of leukocoria. The discussion highlights the management and distinguishing features with other causes of leukocoria.

INTRODUCTION

Astrocytic hamartomas are typically white, well-circumscribed, elevated lesions arising in single or multiple areas of the retina and epi- or peripapillary optic nerve. It is extremely slow-growing and is usually asymptomatic unless the macula is involved¹. Some cases may present with squint or poor vision. They may occur as solitary (isolated) retinal astrocytoma or it may be syndromic, in association with tuberous sclerosis². The unilateral cases are usually unifocal, sporadic and non-syndromic. However, the bilateral cases (50%) are usually multifocal and associated with tuberous sclerosis or neurofibromatosis^{3,4}.

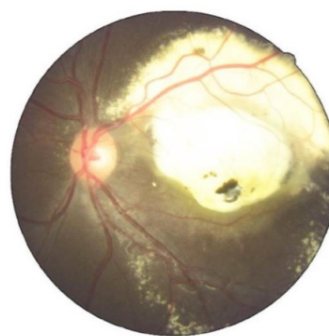
Solitary lesions appear as white superficial lesion associated with retinal oedema, exudates and calcification. The ocular ultrasound of astrocytoma resembles that of retinoblastoma. Clinical resemblance with retinoblastoma has resulted in cases whereby enucleation has been done for suspected retinoblastoma¹. We report a case of solitary retinal astrocytoma in a seven year old boy.

CASE REPORT

A 7 year old boy was referred to Kenyatta National Hospital, Kenya from another health facility with a five year history of white reflex in the left eye. There was no redness, squint, proptosis, decreased visual acuity or systemic complaints. The child had normal birth and development. There past medical and ocular history was not significant. On examination, the boy was in good general condition. He had a normal systemic examination with no skin lesions. Visual acuity was 6/6 in the right eye and counting fingers one metre in the left eye. Extra ocular muscle movement was free in both eyes. There was no squint or proptosis. Intraocular pressure was 15mmHg in the right eye and 16mmHg in the left eye. Anterior segment examination was normal in both eyes. The right eye had a normal posterior segment while the left eye, had a whitish mass in the posterior pole, which was located just below the superior temporal arcade. It was one disc diameter from the optic disc and

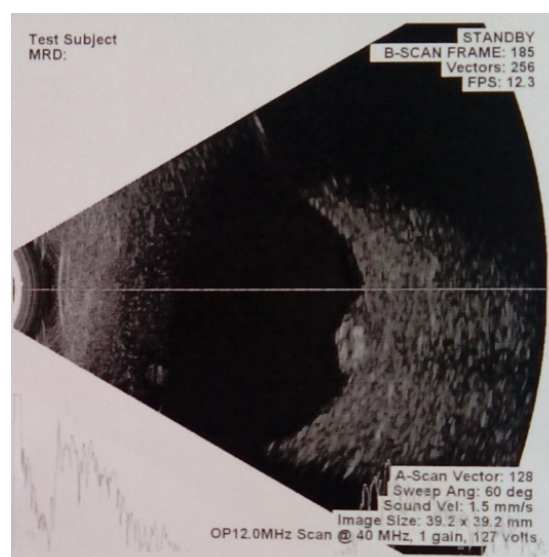
was overlying the macula region. The mass was 3 disc diameters wide and 2 ½ disc diameters high. There were exudates below and above the mass extending to above the superior temporal arcade as shown in the fundus (Figure 1).

Figure 1: Shows the fundus photograph of the left eye



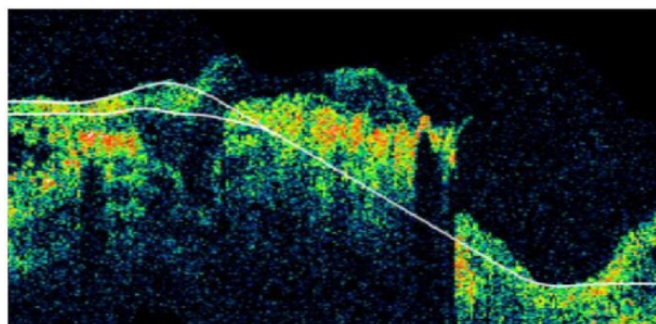
B scan ultrasound of the left eye (Figure 2) showed a raised hyperechoic retinal opacity with shadowing and was persisting on reduced gain. The retina overlying the mass was detached. The A scan showed high reflectivity spikes.

Figure 2: B scan ultrasound of the left eye



Optical Coherent Tomography (OCT) of the left eye (Figure 3) had poor image quality due to poor fixation.

Figure 3: OCT of the left eye



Differential diagnosis of this calcified retinal mass considered in this patient included retinal astrocytoma, retinoblastoma and choroid osteoma (osseous choristoma). A diagnosis of solitary retinal astrocytoma was made based on the long duration, asymptomatic nature, the presence of a mass with calcification and exudates and the ocular ultrasound features resembling retinoblastoma. Management for the patient included serial fundus photography and ocular ultrasound to monitor the mass and protective eyewear. Follow up reviews shows that mass has not progressed.

DISCUSSION

Few cases of solitary astrocytoma are reported in literature. A clinical diagnosis without histology like in this patient is usually presumptive. We highlight features that lead to this diagnosis, ruling out other causes of leukocoria. The age of presentation for solitary astrocytoma varies from one month to 45 years although most cases are diagnosed in children and adolescents.

In a review of 42 intraocular astrocytomas confirmed by histology, 57% were associated with tuberous sclerosis, 14% were related to neurofibromatosis and 29% were sporadic cases⁵. In this case report, the patient had no systemic or other ocular findings, making the diagnosis of solitary tumour more probable.

Clinical differentiation from retinoblastoma and amelanotic melanoma can be difficult. Retinal traction, retinal epithelial cells alteration and extensive yellow retinal exudation are typically found with astrocytoma but not retinoblastoma³. The long duration of the history in this patient, presence of calcification on B scan ocular ultrasound and the fundus photography findings of a solitary juxtapapillary mass with massive exudation supported a clinical diagnosis of solitary astrocytoma.

Despite the presence of a calcified mass in a child, the diagnosis of retinoblastoma was low in the list of differential diagnoses because of several reasons. The duration of presentation in retinoblastoma is much shorter, average of 24 months in unilateral cases. Those

who present later usually have proptosis with or without metastasis. Diffuse infiltrating type may take longer to be noticed and thus present at such an age as our patient, but usually this would present as diffuse infiltration of the retina rather than a discrete mass⁶. Retinal exudates are also not typical of retinoblastoma⁷.

In this case, the age and race of the patient did not support the probability of amelanotic melanoma, which are mostly found in older Caucasians. On ultrasonography, typically they show an acoustically silent zone within the melanoma, choroidal excavation, shadowing in the orbit and do not have features of calcification⁸. Solitary astrocytomas are typically located in the sensory retina unlike melanomas which are found in the choroid. Half of the cases are calcified and may shed cells into the vitreous making clinical diagnosis more suspect³.

A choroidal osteoma though highly calcified due to the presence of bone is typically found in young females in the second or third decade of life located juxtapapillary. It is usually relatively flat appearing as a calcified plaque at the level of the choroid unlike our patient who had an elevated mass arising from the retina⁹.

Another differential diagnosis is ocular toxocariasis, which may present as posterior pole granuloma. Vitreous inflammation may present as low amplitude echoes on B-scan. Other B-scan findings in ocular toxocariasis may include vitreous bands, retinal folds and tractional retinal detachment¹⁰. The most consistent ultrasound finding in toxocara is a highly refractive retinal mass in the periphery or posterior pole which may be calcified and has a main characteristic the adherence of vitreous membranes¹¹.

There are two types of acquired solitary astrocytoma, progressive and stationary type. The progressive form causes intraocular damage with exudative retinal detachment, neovascular glaucoma, central retinal vein occlusion and extensive tumour necrosis with secondary intraocular inflammation that ultimately results in a painful blind eye³. Our patient appeared to have the stable non progressive form supported by the long history without features of progression and has remained stable on follow up.

No treatment is required for retinal astrocytoma. There may be limited enlargement of the mass and they do not metastasize. One retrospective review of seven patients with presumed solitary retinal astrocytic proliferation (with a median follow-up of 6 years) showed that the tumour remained stable in six patients and gradually disappeared in one patient^{2,4}.

Most histologically confirmed diagnosis are removed surgically because of blindness and pain or because they mimic retinoblastoma, amelanotic melanoma or metastatic tumours^{3,7}.

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Fellowship Exams 2016

The COECSA Fellowship exams will be held from the 23rd September 2016.

Venue as confirmed will be University Teaching Hospital, Zambia. To register for the fellowship exams, applicants must fill application form available for download at <http://www.coecsa.org/index.php/memberships/coecsa-fellowship-examination>

For details about the structure of the exams, visit the COECSA website at www.coecsa.org membership section.

The college wishes to congratulate all the fellows who successfully sat for the 2015 fellowship examinations in Addis Ababa, Ethiopia. Successful fellows will be honored at this year's 4th Annual COECSA congress during the graduation ceremony slated for 25th of August 2016.

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