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**SPECIAL ISSUE**

**OPHTHALMOLOGY**

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Authors, reviewers, editors and readers,

Welcome to the first special issue of The Health Press Zambia. This issue captures interesting articles on various ophthalmological conditions affecting the Zambian population that were presented at the Zambia Ophthalmological Society Scientific Congress held in Lusaka, Zambia from 14th to 15th November 2019.

Quoting a blog on Marvelotics, “Sight and vision are important because they allow us to connect with our surroundings, keep us safe, and help maintain the sharpness of our minds.” I cannot agree more with the blogger Victoria [1]. As much as many agree, eye diseases and vision disorders remain a major public health concern among populations globally but more-so in the underdeveloped regions of the world causing disability, suffering, and loss of productivity [2].

A large contributor to vision impairment is eye diseases, a number of which are treatable and chronic conditions such as diabetes. Low socio-economic status, lack of awareness, and limited access to eye care services have been attributed to the increasing risk of blindness.

THP-Z invites you to learn more about the common eye diseases in Zambia and indeed the world over. Enjoy the read and hoping it may influence how you look at prevention and care of eye conditions.

Remember that “Vision disability is one of the top 10 affects people’s ability to drive, read, disabilities among adults 18 years and older and the single most prevalent disabling condition among children.” [3]

Once again we invite you to submit your articles to THP-Z using the link https://mc.manuscriptcentral.com/thpz.

1. URL: https://marveloptics.com/blog/scholarship-program/the-importance-of-sight-and-vision-molly-blakely/
Since launching the Vision 2020, the Right to Sight in 2004, Zambia has developed and implemented two eye health strategic plans on various objectives and strategies to eliminate avoidable blindness and visual impairment. The current National Eye Health Strategic Plan (NEHSP) 2017-2021 is the third to be implemented and it provides a five-year strategic direction for eye health from 2017 to 2021, highlighting the goals, objectives in the elimination of avoidable blindness in Zambia. It further provides a path and framework to guide the planning, delivery, management and implementation of quality eye health services at community, district, provincial and national levels, in order to increase eye health coverage across the country to at least 90% by the year 2021. The NEHSP draws its aspirations from the National Health Strategic Plan (NHSP) 2017 – 2021, the 7th National Development Plan, Sustainable Development Goal SDGs, the Vision 2030 and the legacy goals.

The Sustainable Development Goal 3 calls on stakeholders to ensure healthy lives and promote well-being for all individuals at all ages and recognising the important intersections between eye health and other goals including Goal 1 (reducing poverty through maintaining and restoring sight), Goal 4 (ensure inclusive and equitable quality education and promote lifelong learning opportunities for all), Goal 5 (achieve gender equality and empower all women and girls), Goal 8 (promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all), and Goal 10 (reduced inequalities).

As part of the transformation agenda, the Ministry of Health equally calls for intersection between eye health and legacy goals 1 (reduce maternal and child illnesses and deaths by tackling conditions such as trachoma which tend to affect women and children largely), 3 (recruit 30,000 health workers by 2021 which also is critical for enhanced eye health service delivery), 4 (implement the National Health Insurance Scheme and increase coverage from 4% to 100% in order to increase eye health care financing as well), 8 (train 500 specialists by 2021 in order to have ophthalmologists distributed to all parts of the country among others) and 9 (halt and reduce the incidence of non-communicable diseases in order to prevent blindness from conditions such as cataract, glaucoma and diabetic retinopathy). The objectives and strategies in attaining these intersections are embedded in the NEHSP. The national eye health service coverage has increased to 81.5% in 2019 from 31.5% in 2011.

The prevalence of blindness in Zambia ranges from 2.2% to 4.4% which implies that there are 339,081 to 678,162 people who are either visually impaired or blind within a population of 16 954 051. The major causes of blindness include cataract (53.2%), glaucoma (19.0%), trachoma (5.7%), refractive errors (15.3%), corneal opacity (3.6%) and retinal disorders including diabetic eye diseases (3.2%). All these causes of vision impairment are preventable or addressable through early detection and timely management, and that cost-effective interventions covering promotion, prevention, treatment and rehabilitation. In line with the government policy of delivering health services through the primary health care approach, the majority of the eye health services are being delivered through the primary health care levels to address the needs associated with eye conditions and vision impairment. This is the more reason of taking eye health services to all the far-flung areas of the country by the year 2021. Vision impairment has a negative impact on development, educational achievement, quality of life, social well-being and economic independence of individuals. In order to counter this, there has been an enhancement of availability and accessibility of eye health care services, such as cataract surgery, refraction services and provision of spectacles, including short-ages of trained health personnel, socio-economic and cultural factors, inequities, and costs of services. In line with the Vision 2020 Right to Sight strategy, there has been a deliberate effort to expand infrastructure, procure equipment and consumables, embrace new technological advances and human resources for eye health expansion. This progress has seen all eye health investigations and surgeries being performed within the country either at public or private facilities. It is envisaged that the foundation that has been laid down provides good prospects of the eye health public facilities to be the trend setters in the country and the SADC region. To this end, two indicators for health eye care are being used nationally which are effective coverage of refractive error and effective coverage of cataract surgery.

The fight against avoidable blindness requires commitment of purpose of all stakeholders through forging strong partnerships and collaborations. It is by doing such that we are going to attain the much-desired Universal Eye Health Coverage and integration across the continuum of eye health care.
A female patient aged 30 years was brought to the University Teaching Hospitals - Eye Hospital (UTH-EH) complaining of poor vision in both eyes after suffering from Steven Johnson syndrome (SJS). On examination, visual acuity was hand movement (HM) in both eyes. The right eye (RE) had adhesions (symblepharon) of both upper and lower eyelids, haziness and cornea opacification, while left eye (LE) had a total permanent tarsorrhaphy with Osteo-Odonto-Keratoprosthesis (OOKP) at the centre.

Benedetto Strampelli described the original technique of OOKP nearly fifty years ago using the patient’s own tooth root and alveolar bone as a vital support to an optical cylinder. The OOKP also known as a tooth in eye surgery is an auto graft used for the treatment of severe corneal opacities not suitable for corneal transplant [4,5]. A Kerato-prosthesis is used to replace damaged cornea [4,5]. Falcinelli et al., 1986, modified this technique in a stepwise fashion [6-9]. OOKP is a 2-stage operation. Stage 1 of the surgery involves 5 separate procedures. First the eye is opened up and the entire inner surface of the eyelids, corneal surface and all scar tissue is removed. Then the inner mucosal lining of the cheek is transplanted onto a new surface of the eye [10]. A canine or premolar tooth and part of the adjacent bone and ligaments are harvested. A bolt shaped structure is fashioned from the tooth-bone complex which is fitted with a plastic optical cylinder [11]. Stage 2 (about 4 months later) involves two separate procedures. The cheek mucosal lining over the eye is opened and the inner contents of the eye are removed. The tooth-bone-cylinder complex is harvested from the cheek and inserted into the eye; the mucosal cheek lining is placed over the implant. At the end of the procedure, light can now enter through the plastic cylinder and the patient is able to see through this cylinder with good vision [12-14].

The cornea is replaced by a polymethyl methacrylate (PMMA) optical cylinder glued to a biological support (haptic) made of human living tissue. Currently available KPro (kerato-prosthesis) devices range from totally synthetic such as the Boston KPro, to the totally biological tissue engineered artificial cornea [15]. The OOKP combines both a synthetic optic with a biological haptic [16]. The OOKP is a true heterotopic auto graft made of living long lasting human tissue.

A female patient aged 30 years presented to the UTHs-EH complaining of poor vision in both eyes. The patient gave a report of having reacted to anti-tuberculosis drugs while in Zambia. After being diagnosed with SJS in 2016, she sought medical advise in the United States of America (USA) where OOKP was conducted successfully on the left eye and vision improved and was able to carry out normal activities. In May 2019, she noticed that her vision was gradually decreasing, she later presented to UTHs - Eye Hospital with poor vision 6 months later.

On examination, there was an obvious symblepharon in the right eye and OOKP in the left eye (fig.1). The visual acuity in both eyes was hand movement (HM). On slit-lamp examination, the right eye had symblepharon of upper and lower eyelids and opacification of the cornea. The left eye had a total permanent tarsorrhaphy with Osteo-Odonto-Keratoprosthesis (OOKP).

Fundoscopy of the LE showed optic disc cupping of about 0.9 cup disc ratio (CDR) whereas fundoscopy was not possible to perform in the RE due to the scarred cornea. The intraocular pressures were 18 mmHg RE and was not measured in left eye. The patient was started on acetazolamide (Diamox) 500 mg stat then 250 mg three times a day for three days.

**DISCUSSION**

Osteo-Odonto-Keratoprosthesis is a vision restoring surgical technique where the patient’s opaque cornea is replaced with an artificial device. In this case, the patient had end stage corneal blindness and hence, OOKP was done on the left eye as a way of restoring her vision [11]. The optical device is made up of a PMMA (Polymethylmethacrylate) cylinder which acts as an artificial cornea. It is particularly resilient to a hostile environment such as the dry keratinized eye. Patients are ad-
vised to quit smoking and practice measures that will improve their oral hygiene so as to increase the chance of survival of the buccal mucous membrane graft. In this case the patient was neither smoking nor consuming alcohol. Therefore, the buccal mucous membrane could survive longer [12-14]. The success rate of the OOKP surgery vary from different studies, Lui C, et al (1998) reported excellent long-term retention of 85% in 18 years [3]. According to Herold et al., (1999), 80% of OOKP patients achieved improvement of vision [16]. Lui C, et al., (2005), stated that OOKP described by Falcinelli gives the best long-term results for visual acuity of 75% with 6/12 or better and retention of 85% for up to 18 years [15].

Follow up visits is life-long in order to detect and treat complications which include oral, oculoplastic, glaucoma, vitreo-retinal complications and extrusion of the devise [17]. Follow ups are done at weekly interval for 1 month, then monthly for six months, then every 2 months for six months, then every four months for stability of the prosthesis and intraocular pressure measurement. Once it is stable, follow up can be at longer intervals [10, 11]. In this case the patient did not adhere to follow up schedule and the doctors who performed the procedure did not forward the report to the doctors of the patient’s residence for effective follow up. So, when the vision started deteriorating, the patient could not be attended to promptly to establish what was causing that. There was also lack of communication between the primary OOKP team and the patient which created a huge gap for follow up. Therefore, the vision was not good as expected or it could be that the patient could have fallen in the 15% of OOKP patients reported not to have good vision by Lui et al., 2005.

Giancarlo et al., (2005), described the long term anatomical and functional outcome in 181 cases and the results indicated that modified OOKP surgery can provide favourable anatomical and function results, which are stable in the long term and retaining an intact OOKP was 85% [9]. Just as in this case, the patient retained good anatomical and functional of OOKP. Tan DT et al., 2008 treated 29 cases to restore sight with OOKP surgery and found excellent results without any instability problems or extrusion [6]. The OOKP in this case report was very stable and there were no signs of extrusion. Hughes et al., 2008, reported vitreo-retinal complications of the OOKP in a retrospective review of 35 patients after a mean 57 months follow up which revealed 9 vitreo-retinal complications in 8 patients (23%) [18]. In this case, there were no vitreo-retinal complications. Kumar et al., 2009, did a study to report diagnostic modalities and treatment options for glaucoma in 15 eyes that underwent OOKP surgery and they concluded that visual field testing and optic disc assessment with optic disc photographs seem to be effective methods to monitor glaucoma and treatment strategies include oral medication (acetazolamide 500mg twice a day) to lower intraocular pressure and cyclo-photocoagulation [19]. Due to inadequate follow up, the patient was not fully evaluated for glaucoma and as a result she ended up with a CDR of 0.9 in the LE.

The OOKP is considered the only devise capable of offering long term visual rehabilitation in patients with end-stage ocular surface disease and severe tear deficiency (with or without eyelid defect based on the studies of cases that were done before [5].

Thorough patient preparation physically and psychologically is required in order to have good results and to make patient understand the importance of follow up visits to the hospital in order to diagnose and manage post-operative complications early. Good general health and oral hygiene are important for this procedure to be successful. This technique demands the involvement of both dental and ophthalmic surgeons to complete the procedure [19].

Thus, it is necessary for both surgeons to understand the finer details of the procedure and its possible complications which can be avoided with adequate precautions during surgery and its timely follow up of the patients.

CONCLUSION
Osteo-Odonto-Keratoprosthesis is the ocular surgical procedure of choice for restoring sight in patients with end stage corneal scarring. Frequent follow up and good follow up plan for Osteo-Odonto-Keratoprosthesis is critical in order to diagnose and treat complications as early as possible so that restored vision is not lost.
LIST OF REFERENCES

AN UNUSUAL CASE OF PROLIFERATIVE SICKLE CELL RETINOPATHY

Case Report
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ABSTRACT
Sickle cell haemoglobinopathies are a group of inherited disorders characterized by quantitative or qualitative malformations of haemoglobin (Hb). Diagnosis of SCD is mainly by haemoglobin electrophoresis. Ocular manifestations are wide, encompassing anterior segment, non-proliferative and proliferative retinopathy. Proliferative sickle cell retinopathy (PSCR) represents a very serious complication and may result in blindness if not diagnosed and treated early. PSCR rarely occurs in patients with sickle cell trait, most times in association with an underlying systemic condition or ocular trauma. We present an unusual case of a healthy young male with no history of systemic illness who presented with proliferative sickle cell retinopathy in both eyes.

INTRODUCTION
Sickle cell trait is thought of as a benign condition in comparison to Sickle cell disease (SCD). Sickling haemoglobinopathies are caused by one or more abnormal haemoglobins that induce red blood cells to adopt an anomalous shape under conditions of physiological stress such as hypoxia and acidosis, with resultant vascular occlusion [1]. This results in distal tissue ischemia and a host of related systemic and ocular complications.

SCD is most common among black Africans, due to its protective effect against malaria. It also is found, with much less frequency, in eastern Mediterranean and Middle East populations.

Ocular manifestations of SCD are wide. Ocular manifestations can be noted in the anterior segment and in the posterior segment in the form of nonproliferative and proliferative retinopathy [1]. There is an inverse relationship between the severity of systemic disease and the severity of retinopathy in homozygous SS individuals compared to compound heterozygous SC subjects [2].

An unpublished study in at the University Teaching Hospital, Lusaka-Zambia involving 94 patients, looking at the ocular manifestations of sickle cell disease, found that ocular abnormalities were high with 69% of patients showing signs of ocular manifestations. However, most were not causing visual impairment, with only 1% of the patients being blind as a result of SCD [3].

Though PSCR can occur in patients with sickle cell trait, it is very rare and in most cases there are other co-existing systemic diseases such as diabetes or an inflammatory disorder or history of trauma. PSCR can be classified into five stages [4].

Table 1: Proliferative Retinopathy

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peripheral arteriolar occlusion</td>
</tr>
<tr>
<td>2</td>
<td>Peripheral arteriovenous anastomosis</td>
</tr>
<tr>
<td>3</td>
<td>‘Sea fan’ neovascularization develops at the edge of perfused retina</td>
</tr>
<tr>
<td>4</td>
<td>Vitreous haemorrhage from the new vessels</td>
</tr>
<tr>
<td>5</td>
<td>Rhegmatogenous retinal detachment caused by a retinal break associated with extensive fibrovascular proliferation</td>
</tr>
</tbody>
</table>

We present an unusual case of proliferative sickle cell retinopathy in a young male patient who presented with blurred vision in the left eye for 2 weeks who denied any history of sickle cell disease.

CASE SCENARIO
A 41-year-old male patient presented to UTHs - Eye Hospital complaining of blurred vision in the Left Eye (LE) for 2 weeks. He denied any history of trauma or straining.

Past Ocular History revealed that he had been seen on two months earlier complaining of loss of vision in the Right Eye (RE) for 3 days of spontaneous onset and was diagnosed with vitreous haemorrhage of the RE. He had received intravitreal Bevacizumab (Avastin) in the RE and was advised that he needed surgery but was lost to follow-up.

The patient had no history of hypertension, diabetes mellitus, sickle cell disease, TB or retroviral disease. Family history was non-revealing. There was no history of alcohol intake or smoking.

On examination, the general condition was good. There was no pallor, jaundice or cyanosis. Visual acuity was hand motion (HM) and 6/18 not improving with pinhole in the right and left eye, respectively.

Intraocular pressure measured with Goldmann applanation was 20 mmHg in the right eye and 18 mmHg in the LE. Slit lamp examination of the anterior segment examination was normal in both eyes.

Fundoscopy of the RE revealed pink disc with a CDR of 0.4. The blood vessels were sclerosed infero-temporally and the macula showed a thick epiretinal membrane (ERM) with retinal folds and old vitreous haemorrhage (VH). Fundoscopy of the LE revealed Pink disc with a CDR 0.4. Vessels were Normal. There was subhyaloid haemorrhage (SHH) and Salmon patch was noted supero-temporally.

At this point, an impression of proliferative sickle cell retinopathy both eyes with epiretinal membrane right eye was made.

The Full Blood Count (FBC)/ Differential Count showed thrombocytopaenia while all other parameters were normal. Urea/ Creatinine/LFTs were normal. Fasting blood sugar was within normal limits and...
so was the chest x-ray. Peripheral Blood Smear showed red cell morphology of normocytic, normochromic. The white cell morphology was mild leukopenia and no blasts were seen. On platelet morphology, thrombocytopenia was noted on film. The sickling solubility test revealed Heterozygous HbS and Haemoglobin electrophoresis AS.

Fundus Fluorescein Angiography (FFA) was done with arm retina time of 15 seconds. Fovea Avascular Zone (FAZ) appeared to be normal in both eyes. Areas of capillary non-perfusion (CNP) were noted in both eyes with areas of leakage only found in the LE.

Consultation was made to the haematologist in view of the thrombocytopenia and blood film picture. Patient was counselled on the guarded visual prognosis. Pan-retinal laser photocoagulation (PRP) was done for both eyes in two (2) sittings, covering the superior and inferior retina. The patient was counselled and planned for surgery both eyes. He was planned for pars plan vitrectomy (PPV) plus membrane peeling (MP), endo-laser (EL) and fluid-air exchange (FAE). He had surgery done on the RE from elsewhere. Unfortunately, he developed post-operative endophthalmitis. He received intravitreal antibiotics at UTH Eye Hospital.

Later he developed Hyphaema in the same eye with raised intraocular pressure. Anterior chamber washout was done. Current status, the RE is blind post endophthalmitis with neovascular glaucoma (NVG) while LE has resolving vitreous haemorrhage (VH) in proliferative sickle cell retinopathy (PSCR).
DISCUSSION
SCD is the most common and the most severe haemoglobinopathy [5]. Though sickle cell disease is prevalent in black Africans, routine sickling test is not done in most Zambian hospitals. The result is that very few sickle cell trait carriers know of their genetic condition. Sickle retinopathy can have devastating consequences and may lead to severe visual impairment and blindness if left untreated. This is what was noticed with the case under review. Both eyes ended up being blind. PSCR occurs rarely in patients with sickle cell trait. Most cases occur if there is an associated systemic condition such as diabetes, hypertension or sarcoidosis or if there is history of ocular trauma [1,6]. In this case there was no pointer to any co-morbidity systemic condition. While other blood tests were normal, he was positive for sickle cell trait which was confirmed by haemoglobin electrophoresis.

CONCLUSION
Though rare Proliferative Sickle Cell Retinopathy (PSCR) can occur in patients with sickle cell trait. There is need to elicit precipitating factors for patients with sickle cell trait that present with retinopathy. Both Sickle cell disease patients and those with sickle cell trait need regular ophthalmological examination.

LIST OF REFERENCES
2. Bwalya, W.M. (2014) Ocular manifestations of sickle cell disease at the University Teaching Hospital, Lusaka, Zambia
ABSTRACT
Congenital eversion of the upper eyelids (congenital ectropion) is a rare condition. Most of the cases are bilateral, but unilateral cases also have been reported. It does not seem to be caused by difficult labour through the birth passage. At Lumwana District Hospital, a day-old female neonate presented with ectropion on both eyes at birth. The neonate was born at term, by Spontaneous Vaginal Delivery from a multiparous mother. Birth history was uneventful, although bilateral upper eyelid ectropion was immediately noted. The neonate was taken to the eye clinic for further management.

INTRODUCTION
Owing to the asymptomatic nature of ectropion of eyelids refers to a condition where the eyelids are turned outwards away from the globe [1]. This is a common occurrence in the elderly although there are a number of causes such as stroke, skin cancer, injury, scar tissue from injuries or burns, growths on the eyelid (either cancerous or benign) birth defects (due to genetic disorders such as Down syndrome) Bell's palsy (a condition that damages the nerve that controls facial muscles) or other types of facial paralysis [1]. In the case of a new born baby, it is more frequently associated with Down's syndrome and ichthyosis [2].

CASE SCENARIO
A one-day old neonate was brought to the eye clinic at Lumwana District Hospital by the mother with complaints of swelling of both eyes and outward turning of eye lids with reddening of both eyes since birth. Further history and relevant information was obtained from the attending mid-wife who reported that, APGAR score was 9, born at term with birth weight of 3.1kgs, from a multiparous aged 37 years of age. The attending mid-wife further reported that, the patient was delivered through spontaneous vagina delivery and the pregnancy was uneventful. There was no history of discharge from both eyes. Credè’s prophylaxis using Tetracycline Eye Ointment (TEO) was conducted by the mid-wife immediately after the neonate was born. Consent for photos and publication was obtained from the mother.

On examination, the general condition was good, afebrile (body temperature 37°C), not pale, not jaundiced and had no respiratory distress. There were no other abnormalities noted in the neonate systemically. Brisk reflex was present on both eyes. The cornea and the rest of the anterior segment examination were found normal on both eyes. However both eyes had ectropion with subconjunctival haemorrhage and chemosis as shown in figure 1.

The neonate patient was admitted, and the mother was reassured and counselled on the diagnosis and prognosis. Apart from bilateral ectropion and associated findings, there was no evidence of any other abnormality on both eyeballs. The patient was treated conservatively. Tetracycline eye ointment (TEO) and systemic antibiotics were given as prophylactic management for subconjunctival haemorrhage and chemosis. To correct the ectropion, the eyelids were put in the correct position, TEO 1% applied then padded with wet gauze. After 48 hours, the bilateral ectropion resolved as shown in figure 2 and the neonate was discharged. Subsequent follow up review at 2 weeks later on showed that the ectropion had completely resolved with eyeballs noted to be normal and the neonate could fixate to light.
DISCUSSION

Congenital ectropion of the upper eyelid is a rare abnormality that can threaten the cornea and vision if not treated early. At Lumwana, the neonate who presented with bilateral ectropion of upper eyelids was treated conservatively as other causes of congenital ectropion were ruled out. Congenital ectropion of the upper eyelids was first described by Adams in 1896 [3-5]. Later, Gilbert and co-workers described two more cases associated with Down’s syndrome [6-7]. This rare condition has been reported more frequently in black infants [1-8] associated with ichthyosis [1-4] and in infants with trisomy 21 [5]. Although the condition is generally bilateral and asymmetrical, some unilateral cases have been described [8]. The neonate in this case report had bilateral but asymmetrical ectropion. Down’s syndrome encompasses numerous ocular abnormalities like myopia, keratoconus, nystagmus, epiblepharon, epicanthus, convergent strabismus, cataracts, blepharoconjunctivitis with the epicanthal folds, and the typical mongoloid slant to the eyelid fissures being the most obvious periocular findings [6]. None of these reported ocular abnormalities were found in the neonate. Essentially this neonate was normal.

Although the pathophysiology of congenital upper eyelid ectropion is unknown, multiple factors have been implied, including absence of an effective lateral canthal ligaments, lateral elongation of the eyelid, hypotonia of the orbicularis, vertical shortening of the anterior lamella, and failure of the orbital septum to fuse with the levator aponeurosis [1-6]. Treatment of congenital upper eyelid ectropion is controversial. Surgical treatment options that can be employed in the management of severe cases of congenital ectropion include tarsorraphy only [2-7], tarsorraphy with excision of redundant conjunctiva [5,7], fornix suture [3], full-thickness skin graft [1-5], full-thickness horizontal lid shortening [2,6] and attachment of the orbital septum to the levator aponeurosis [3]. In this case under review, the patient did fulfill the conservative treatment parameters due to the absence of other congenital abnormalities of the eyelids that may occur in Down’s syndrome. Therefore, a simple and conservative management with lubricants/antibiotic ointment and moist swabs were enough to prevent desiccation of the exposed conjunctiva, reduction of conjunctival edema and to allow spontaneous inversion of the eyelid within 48 hours. The fact that, the child responded to conservative treatment within 48 hours, the risk of amblyopia was removed.

Therefore, in the presented case where the eyelids were repositioned mechanically, eyelids taped down, eye ointment applied and eyes padded, we recommend conservative treatment as opposed to surgical intervention.

CONCLUSION

Though congenital bilateral upper eyelid ectropion is unusual, when it occurs, it can be conservatively managed with full resolution within 2 weeks. Not all bilateral ectropion of both upper eyelids at birth can be associated with Down’s syndrome, ichthyosis and other causes known.


Case Report

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ABSTRACT

Cytomegalovirus (CMV) retinitis is the most common cause of vision loss in patients with acquired immunodeficiency syndrome (AIDS). CMV retinitis (CMVR) afflicted 25% to 42% of AIDS patients in the pre-highly active antiretroviral therapy (HAART) era, with most vision loss due to macula-involving retinitis or retinal detachment. Due to the reduction of the incidence of CMR retinitis, there is inadequate supply of anti-CMV medications. Ganciclovir may be the most cost-effective drug for CMV management in other parts of the world, but in Zambia the drug is very expensive and beyond the reach of most Zambians. A 27 year old female presented with poor vision in both eyes for two months with gradual, painless progression. She had been commenced on Anti-Retroviral therapy for Human Immunodeficiency Virus (HIV) infection two weeks prior to presentation. Presenting visual acuity was hand movement in both eyes. Ocular examination revealed mild anterior uveitis with widespread areas of retinal mid peripheral and posterior pole vascular sheathing, retinal necrosis with haemorrhages and macula oedema in both eyes. A diagnosis of CMV retinitis was made in both eyes and the patient commenced on bi-weekly intravitreal ganciclovir injections followed by weekly maintenance injections. Visual acuity improved only in the right eye to 6/12. She developed neovascularisation of the disc in both eyes and a tractional retinal detachment in the left eye.

INTRODUCTION

Cytomegalovirus (CMV) is a ubiquitous DNA virus that infects the majority of the adult population [1]. It is the commonest intraocular infection associated with Human Immunodeficiency Virus (HIV) affecting an average of 25% of patients [2], particularly those with CD4 cell count less than 50/µl. It also occurs as an opportunistic infection in other immunocompromised states such as post organ transplant patients and those on chemotherapy [3]. With the widespread use of anti-retroviral therapy, the incidence of CMV retinitis (CMVR) has reduced [4]. The reduction in the incidence of CMVR has resulted in less interaction of the disease with eye health personnel and the reduced demand for the drugs that are used to treat it. The economic implication of this is that the price of these drugs goes up because of reduced demand. In some instances, the drugs may not even be stocked by the pharmaceutical companies in which case they have to be sourced from outside the country. The case presented highlights some of the challenges faced with treating patients with CMV retinitis in our local setting.

CASE SUMMARY

A female aged 27 years presented to the Eye Hospital of the University Teaching Hospitals outpatient department with complaints of poor vision in both eyes. The problem started with gradual loss of vision in her left eye over the preceding two months and then she had loss of vision in the right eye two weeks prior to presentation. It was not associated with pain. She had been using lubricating and dexamethasone eye drops prescribed at another eye facility. She had no previous history of ocular disorders. Medical history was significant for HIV infection for which she had been on antiretroviral treatment (ART) for two weeks. Baseline CD4 count results were not available. On examination, her visual acuity was hand movement (HM) in both eyes and IOP was 10mmHg in both eyes. Anterior segment examination was significant for mild anterior chamber reaction with 2+ cells. Vitreous was clear in both eyes. Retinal exam showed widespread areas of vascular sheathing, retinal necrosis with haemorrhages involving the posterior pole and mid periphery with disc and macula oedema in both eyes, figs 1 and 2 below.

A diagnosis of fulminant CMV retinitis in both eyes was made. The patient was planned for treatment with intravitreal ganciclovir of 2.5mg/0.1ml twice per week in each eye for three weeks which she received diligently. The CD4 count was 98 cells/mm3 and the viral load was 53,262 copies/ml. Unfortunately, these were done after the patient had commenced treatment for CMVR. She had weekly fundus photos done. Due to the unavailability of oral valganciclovir, the patient was put on weekly intravitreal ganciclovir injection as maintenance treatment. After a total of 12 injections in each eye, visual acuity improved to 6/18 in the right eye and remained HM in the left eye. At this point neovascularisation of the disc (NVD) in both eyes and a dispersed vitreous haemorrhage with tractional retinal detachment (TRD) in the left eye was noticed. She received intravitreal bevacizumab 1.25mg/0.05mls in both eyes. She also had pan-retinal photocoagulation (PRP) to the extent possible using laser indirect ophthalmoscope in the left eye. After a total of 20 intravitreal ganciclovir injections, 1 dose of intravitreal bevacizumab in both eyes and PRP in the left eye, visual acuity was 6/12 in the right eye and remained HM in the left eye. She had regressed NVD in both eyes. The right eye also had some disc pallor and sclerosed vessels while the left eye had TRD threatening macula. Viral load had dropped to 21,138 copies/mL. At this point in time, anti-CMV maintenance therapy was stopped and ART continued. The patient awaits left eye pars plana vitrectomy with endolaser and silicon oil implant.
Figure 1: Colour fundus photos at diagnosis

Figure 2: Colour fundus photos at end of intensive phase

Figure 3: Colour fundus photos during maintenance phase
DISCUSSION
Patients with CMV retinitis present with painless, progressive loss of vision such as the patient in this case presented with. Sometimes floaters and visual field defects may also be noted [5]. On retinal exam, three main forms of CMV retinitis have been identified: fulminant (as in the case presented), perivascular and granular [6].
A major component of the treatment of patients with CMV retinitis involves counselling in terms of compliance to long term treatment and in advanced cases on the guarded visual prognosis. This is so important to do because it involves injecting the ganciclovir into the eye for a long time which the patient has to endure. This may be for 20 weeks or more. A multidisciplinary treatment team involving the ophthalmologist, low vision specialist, infectious disease specialist and counselors is vital to complete care. In the management of this patient all these people had a role to play which made managing the patient easier. Frequently, CMV retinitis is a clinical diagnosis though supportive tests include presence of anti-CMV antibodies or CMV antigens in body fluids including ocular fluids [7]. This could not be done for this patient due to the poor availability of serological tests. Serial fundus photography is useful in monitoring response to treatment and progression of the disease. This proved to be so for this patient as shown in figs 1, 2 and 3 above. Medical treatment for CMV retinitis includes local (intravitreal) and/or systemic antiviral therapy. Drugs such as ganciclovir, valganciclovir, foscarnet, and cidofovir may be used. Disadvantage of local ocular therapy include that there is no protection of the other eye in case of initial unilateral retinitis and that it does not treat concurrent systemic disease either [7]. For bilateral disease systemic therapy is more useful. This was done for this patient which proved useful. Treatment is given for a three-week long induction phase followed by a period of maintenance determined by the patient response and systemic immune recovery. This patient received the induction regime as required and was given maintenance for three months. ART also is key in the treatment of HIV patients with CMV retinitis and also to prevent recurrence. This patient was already on ART. Generally, CD4 count levels above 200 cells/µl may be used to stop maintenance anti-CMV therapy for those on ART [8]. Complications that may arise due to CMV retinitis include vitreous haemorrhage, retinal detachment, macula oedema, retinal atrophy and optic neuropathy [7]. This patient had vitreous haemorrhage, RD, and neovascularisation in both eyes. These may lead to irreversible vision loss. This could be the likely fate of the left eye. The cause of poor vision in this patient included optic atrophy, macula atrophy and retinal detachment.
For the case presented, the diagnosis of CMV retinitis was made on presentation to the ophthalmologists. Primary care physician did diagnose HIV and start ART. However, baseline immune status by way of CD4 count was not done and even the patient only managed to get one result during the whole treatment course though it was repeatedly requested. At least two HIV viral load results were available showing reduced viraemia over time. Use of intravenous ganciclovir or oral valganciclovir was not possible in this patient due to the extremely high cost of such therapy that was not sustainable. This is a huge challenge in the Zambian setting because of limited availability of the drugs in the public and commercial pharmacies due of the reduced utilisation of the same. The available drugs are very expensive due to low demand. Thus, treatment for this patient was limited to intravitreal ganciclovir and ART. Other patients are apprehensive about any invasive ocular treatment and thus refuse this treatment also. Retinal surgery services are also not widely available as yet in the public sector. As a result, the patient has not yet had the surgery as at publication date. Low vision services are also a challenge at present due to lack of certain devices required for comprehensive low vision services. Despite the challenges, the patient managed to improve to 6/12 vision in one eye that enabled her to move around independently by the last follow up. She was consistent with treatment and review appointments which enabled the success.

CONCLUSION
Although there has been a success in managing patients with HIV, there has been a challenge with early detection of HIV-related conditions such as CMVR probably due to the reduced index of suspicion for the same. The successful treatment of CMVR becomes difficult as a result of the limited availability and high cost of drugs, as well as the long course of follow up. There is need to encourage people who are HIV positive to commence ART treatment early in order to avoid such complications.


Case Report
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ABSTRACT
Congenital lacrimal cutaneous fistula is a rare condition but a significant cause of epiphora in children. Many cases might be asymptomatic and may require no treatment however some might need surgical intervention owing to the high burden of recurrent infections and epiphora associated with the disease. Thus, this article reports the first case of congenital lacrimal cutaneous fistula at the University Teaching Hospitals – Eye Hospital (UTHs-EH) in Lusaka, Zambia and its management in a resource limited setting. A 3-year-old female presented with a two months history of epiphora and an opening on the lower aspect of the medial canthus of the left eye. The rest of the history was otherwise unremarkable. Physical examination revealed a prominent orifice noted on the inferomedial aspect of the medial canthal angle of the left eye. The rest of the history was otherwise unremarkable. Physical examination revealed a prominent orifice noted on the inferomedial aspect of the medial canthal angle of the left eye and a negative ROPLAS sign. The opening was noted to be discharging a watery discharge. The rest of the anterior and posterior segment examination was normal. Examination under anaesthesia revealed a patent lower canaliculus as well as nasolacrimal pathway. A simple excision (fistulectomy) and closure of the fistula was done successfully. The immediate postoperative period was uneventful. 1-week post-operative the child was noted to have developed an ocular infection which was successfully treated. Asymptomatic cases of lacrimal fistula might be managed conservatively. Simple surgical excision of lacrimal cutaneous fistula may be sufficient to treat symptomatic cases.

INTRODUCTION
Congenital lacrimal cutaneous fistula is a rare developmental condition in which a normally epithelialized tract connects the skin to the common canaliculus, lacrimal sac or nasolacrimal duct [1]. The incidence of congenital lacrimal fistula is reported globally to occur in one in 2000 births with no sex predilection [2]. Most are unilateral and are located inferonasal to the medial canthus. These fistulae may be asymptomatic and therefore overlooked for some time after birth. In some cases, it may be difficult to ascertain whether a fistula has been present since birth and remained unnoticed or has arisen later as a result of infection or surgical intervention. Symptoms may be of tearing from the ostium of the fistula or from the eye or both depending on whether there is also nasolacrimal obstruction. This article presents the first case of lacrimal fistula in our setting and we present its management in a resource limited setting like ours.

CASE SUMMARY
A 3-year-old female presented to the UTHs-EH in Lusaka, Zambia with a 2 months history of an opening on the nasal side of the left lower eyelid and watering through that same opening. There was no associated history of trauma and past ocular history. Birth history and past medical history were otherwise unremarkable. The visual acuity was 6/6 in both eyes and the fundus was normal.

Adnexa Examination
No facial asymmetry and no dysmorphic features. Fistula noted inferomedially on the left medial canthal angle as shown in fig 1.

Management
Intra-operatively, probing and irrigation was done in our patient which demonstrated a patent nasolacrimal pathway. The patient thus received a simple excision and closure of the fistula, fig 2.

On week 1 review, the patient had progressed well and was healing well (Fig 3). The child remains asymptomatic 3 months after the operation and we will keep following up since some literature reports high recurrence rates with simple excision.

Fig 1: arrow showing a depression inferomedially

Fig 2: Immediate post operatively showing no tearing

Fig 3: One-week post operatively showing complete healing
DISCUSSION

Congenital lacrimal fistulae are thought to arise due to an intrusion with the invagination, burial and subsequent tissue remodelling of the surface ectoderm that gives rise to the nasolacrimal pathway [3]. Most cases of lacrimal fistula are asymptomatic and usually might not need any treatment apart from observation. This case was symptomatic and needed surgical intervention which was conducted successfully. However, when the disease is coupled with obstruction of the nasolacrimal system, complications ensue. Commonly this might lead to epiphora [4]. This patient had no nasolacrimal obstruction which was confirmed during probing and syringing.

The treatment of choice for a symptomatic fistula is surgery, consisting of complete excision of the fistula, sometimes in conjunction with nasolacrimal intubation if there is associated distal nasolacrimal duct obstruction [1]. In the case under review the fistula was cut and sutured and there was no need to do a nasolacrimal intubation.

Establishing the patency of the nasolacrimal apparatus is important and can be done through the dye disappearance test, probing and irrigation or dacryocystogram. This is because excisions done without correcting nasolacrimal obstructions are bound to fail. In this case, probing and irrigation was adequate to demonstrate patency of the nasolacrimal apparatus.

Conclusion

Congenital lacrimal cutaneous fistula can occur anywhere despite it being rare. In longstanding cases surgical intervention may be the management of choice.

Consent

Consent to publish and use the images was obtained from the mother of the patient.

LIST OF REFERENCES

CONGENITAL PROPTOSIS

Case Report
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ABSTRACT
This is a case report of a unilateral congenital proptosis that presented at Chipata Central Hospital (CCH) of a female neonate whose birth history was uneventful. At birth the neonate was given topical antibiotics and the parents were sure it was going to resolve. Upon noticing that the proptosis of the eye was not regressing, the parents took the neonate back to the health facility in Malawi where they were referred to CCH through Mwami Mission Hospital. After examination and investigations at CCH, a diagnosis of Lymphangioma was made for which the neonate was successfully managed and discharged.

INTRODUCTION
Proptosis is defined as the forward displacement of the eyeball [1]. This condition could be induced by inflammatory, vascular, infectious, cystic, neoplastic (benign and malignant), and traumatic factors [2].

Unilateral proptosis has several differential diagnoses, including microphthalmos with a cyst, congenital cystic eyelid, and unilateral congenital glaucoma, dermoid cyst of the orbit, neuroblastoma, neurofibroma, nasofrontal or sphenoidal meningiocele, orbital haematoma, haemangioma, and lymphangioma [3]. Congenital proptosis is uncommon but may potentially be underreported. Differential diagnosis of congenital proptosis includes congenital tumours (dermoid cyst, teratoma, retinoblastoma, rhabdomyosarcoma, neuroblastoma, neurofibroma, myofibroma), vascular malformations, lymphangiomas, cysts, encephalocele/meningocele, bony abnormalities, abscesses, and thyrotoxicosis [4].

Lymphangiomas are relatively rare, benign, congenital malformations, which may affect the orbit, eyelids and conjunctiva [5, 6]. Lymphangiomas are commonly located behind the orbital septum and usually manifest with proptosis, as well as the pain caused by spontaneous intralocular haemorrhage and upper respiratory infection [7].

CASE SUMMARY
A six day old female neonate from a rural village in Mchinji District of Malawi was presented to CCH by the mother who was concerned that the left eye protrusion was not regressing despite the treatment given and the assurance from medical personnel. The mother reported that the eye was swollen and gradually increasing in size and the neonate was unable to close the left eye.

The neonate was born via spontaneous vaginal delivery with no complications. This neonate was a third child in the family and the siblings were reported to be healthy with normal eyes. General systemic evaluation was suggestive of respiratory distress and infected left eye. Visual interest was positive especially to her right eye which had normal anterior and posterior segment findings. Left eye findings included a mild proptosis, moderate chemosis, retracted eyelids, megalao-cornea, dilated irregular and fixed pupil. The patient was admitted in a paediatric ward pending laboratory and radiology investigations and consequent management.

Ultrasound showed a small cystic orbital mass suggestive of lymphangioma and the C-reactive protein (CRP) was positive. Full Blood Count (RBC) confirmed sepsis and systemic antimicrobial therapy was commenced. Ultrasound and laboratory investigations were repeated to monitor the progress of the condition. During the 3 weeks of hospitalization, C-reactive protein became negative and the orbital mass had regressed. The patient was then discharged in good condition. The patient was reviewed a one month later the proptosis had regressed. The mother of the patient gave consent to publish this case.

DISCUSSION
Lymphangiomas are relatively rare, benign, congenital malformations, which may affect the conjunctiva, lids and orbit of the eyes [5, 6]. Lymphangiomas are commonly located behind the orbital septum and usually manifest with proptosis, as well as the pain caused by spontaneous intralocular haemorrhage and upper respiratory infection [7]. In this case the lymphangioma was found to be behind the septum in the orbit.

In this article, we described a rare case of proptosis with sudden onset and complete regression, which led to no complications in a new-born referred to the neonatal ward of Chipata Central Hospital. Kasim and Gendeh (2013) reported that neonatal proptosis with post-orbital lymphangioma is a rare malformation, which has been associated with severe causes in previous studies. The rarity of such cases could be true because even at CCH such cases are rarely attended. Solarte et al., 2010, reported a case of acute proptosis in a 26-day infant caused by dural fistula, and the neonate was considered as the youngest case of acute proptosis to have been reported [9]. However, in this case report the neonate was born with a proptosis which was steadily increasing in size as was noted by the mother.

In another study, Erickson and Tse, (2014) presented a case of gross proptosis at birth as an uncommon manifestation of various lesions, which were likely to compromise vision and lead to deformity or death [2]. Furthermore, a study by Paragache et al., 2004, described the case of a one-month-old neonate with marked proptosis in the right eye. In this...
case report, the neonate did not present with gross proptosis but enough to warrant intensive investigations to confirm the cause of proptosis.

In the study by Ghosh et al., acute basophilic leukaemia was reported as a rare diagnosis in a seven-month-old male neonate who presented with a 3-week history of bilateral proptosis. In a similar research, Salihu et al., described a 15-year-old male patient with orbital lymphangioma who presented with symptoms such as sudden pain, proptosis, visual loss, restricted eye movements, diplopia, decreased visual acuity, compressive optic neuropathy, and subconjunctival haemorrhage. The patient underwent surgical operation (orbital decompression) unlike the patient in this case.

Neonates, especially sick or preterm infants, are at risk of developing severe infections (such as bloodstream infections) during their stay on neonatal units.

Infections are often difficult to diagnose early with certainty, and quick tests such as measuring the blood level of a protein that responds to infection (called CRP) are sometimes used to help make an earlier diagnosis. A low C-reactive protein level is better than a high one, because it indicates less inflammation in the body. No medical care has been proven effective for lymphangiomas however, treatment for sepsis and respiratory distress with antibiotics has seen some significant improvement. Lymphangioma is not responsive to radiation therapy or steroids. However, propranolol represents a potential option, which may be of benefit even for intractable diffuse lymphangiomatosis [10]. Antibiotics are given for secondary cellulitis as was the scenario in this case.

**CONCLUSION**

Lymphangiomas can present at birth and can be complicated with respiratory distress and sepsis which can effectively be treated with antibiotics without any surgical intervention.

**LIST OF REFERENCES**

**ABSTRACT**

Setae refer to stiff structures resembling a hair or a bristle, especially in an invertebrate. The caterpillar hairs are also referred to as caterpillar setae. These can have devastating effects on the eyes especially if they embedded themselves in the deep cornea tissues. At Kitwe Teaching Hospital Eye Annex, a very rare case of caterpillar setae embedded in deep corneal layers was encountered. An 8-year-old female patient presented with painful/pricky sensation, lacrimation, red eye, photophobia and failure to open the right eye. Poor vision was noted in the Right Eye (RE). Slit Lamp examination revealed RE chemosis, hazy cornea and a lot of corneal foreign bodies (FB). Multistaged surgical FB removal was performed and medical management was instituted afterwards. Patient recovered well after treatment.

**INTRODUCTION**

Multiple Deep Corneal FBs refer to more than 8 FBs on or in the cornea. Among the rare corneal FBs that can injure the cornea, are caterpillar hairs (setae) which can get embedded deep in the corneal layers [1]. The caterpillar setae can cause severe ocular tissue reactions that can lead to significant visual disturbance if intervention is delayed [2]. The major treatment approach is surgical FB removal [3].

The prevalence of FB corneal injury due to caterpillar setae in Zambia is not known for there is nothing documented. Few cases have been reported on from African countries, but literature shows that there are many cases in the Eastern Mediterranean region where there are farms that breed caterpillars [4]. Corneal FB due to caterpillar setae was known to be an occupational disease for being common among caterpillar farm workers, but currently it can occur in even non-caterpillar farming communities and in any age group. The caterpillars in the Eastern Mediterranean region are found on red pine trees on which they feed. These caterpillars are put in farms in order to limit their infestation in the red pine trees and to be destroyed by a trained bug that eats them (the so called Calasoma sycopanta). Literature revealed that workers lacked protective wear as they were exposed to caterpillar setae in caterpillar breeding farms resulting in setae ocular trauma. The only well-known risk factor for intraocular penetration was found to be intraconal caterpillar setae.

The first report of reactions caused by caterpillar setae was published by Schon in 1861 [5]. In 1904, Saemisch was the first to describe the granulomatous nodules found on the iris and conjunctiva caused by vegetation or insect hairs as ophthalmia nodosa [6]. Caterpillar setae ocular toxicity resulted from setae presence in the eye tissues which retain toxins [7,8]. The development of classification of ophthalmia nodosa was initiated by Cadera et al., (1984) [9]. There are five classifications which include:

- **Type 1.** An acute toxin reaction to hair (chemosis and inflammation)
- **Type 2.** Chronic mechanical keratoconjunctivitis caused by hair found in the bulbar or palpebral conjunctiva with foreign body sensation and corneal abrasions
- **Type 3.** Formation of conjunctival granulomas due to subconjunctival or intracorneal setae
- **Type 4.** Iritis secondary to hair penetration of the anterior segment
- **Type 5.** Early or late vitreoretinal involvement due to penetration of the hair through the cornea, iris and lens or via transcleral route, vitritis, cystoid macular oedema, papillitis or endophthalmitis may occur.

The progression of such complications could be prevented by using protective wear to people exposed to such caterpillars. Avoidance of rubbing the affected eye could be considered to prevent further penetration. Then seeking early medical attention to be considered immediately eyes were exposed.

**CASE SUMMARY**

An 8-year-old female from the outskirts of Mpongwe District on the Copperbelt Province of Zambia came to Kitwe Teaching Hospital Eye Annex (KTHEA) with complaints of reduced vision, painful, pricky sensation, redness, photophobia and lacrimation in the RE for a day. The patient further complained of having developed eye problem while sleeping the night before she came to KTHEA. She was referred to KTHEA as a case of Conjunctivitis of unknown cause.

On examination, general condition of the patient was satisfactory apart from reduced vision in the RE of 6/36, while LE vision was 6/6. The RE was tearing, photophobic, had conjunctival injection, chemosis, caterpillar setae and corneal clouding noted during examination. Other findings were corneal abrasions, caterpillar setae on the tarsal conjunctiva and in the deep cornea. The LE was normal.

A diagnosis of deep corneal caterpillar setae was made, and patient was admitted for corneal FB removal under general anaesthesia through a multistaged surgical process. All the setae were successfully removed, and patient was commenced on topical steroid and antibiotic treatment.

**DISCUSSION**

Classically, patients with caterpillar setae corneal FB present with failure to open the eye, painful, red eye, pricky sensation, lacrimation, photophobia and FB sensation. The severity of these ocular manifestations is mainly based on the number of caterpillar setae embedded in the cornea worsen due to rubbing the affected eye.
This action facilitates intraocular penetration and the eye happened to be increasingly traumatised [1]. Caterpillar setae on the cornea is a rare case but can occur anywhere in the world and in any age group. The complications that arose from caterpillar setae in this case were inflammation, chemosis, mechanical conjunctivitis as it has been reported in literature [9]. It is important that a careful history is taken from patients presenting with such signs to avoid misdiagnosis.

Health personnel should be aware of such manifestations of caterpillar setae trauma as there is no typical way of clinical presentation. Intracorneal caterpillar setae are very difficult to remove and a good number of them can remain unremoved [10]. Though caterpillar setae are difficult to remove, in this case the surgical removal was successful in two sittings and all the caterpillar setae were removed.

**CONCLUSION**

Caterpillar setae ocular trauma can occur in Zambia. It is possible to remove all the caterpillar setae through a thorough and well-planned surgical approach.

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Case Report

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ABSTRACT
Ndola Teaching Hospital’s eye unit had a rare but vision threatening intraocular surgery complication in a male patient aged 62 years. The patient developed suprachoroidal haemorrhage of the Left Eye (LE) intraoperatively. It was his second eye for cataract surgery as he had previously been operated on the right eye for cataract. He had no systemic illness or ocular disease and was not on any medication. The patient ended up with an evisceration of the LE eye.

INTRODUCTION
Suprachoroidal haemorrhage (SCH) is a rare but potentially devastating vision threatening complication of intraocular surgery [1,2]. It occurs due to rapture of the long and short posterior ciliary arteries [1,2] which leads to accumulation of blood within the potential space between the choroid and sclera. When it occurs, an attempt can be made to control it. If successful, the guarded prognosis can be reasonably improved and the patient can have useful vision and the globe saved [3,4,7]. In most cases the vision is lost completely and can end up with evisceration. The incidence of SCH tends to vary depending on the country, region and continent. It is estimated that the incidence of SCH in cataract surgery is currently 0.03% with new techniques compared to older techniques which was at 0.8%. Majority of SCH (50%) occurs after nucleus expression [8, 9, 10].

Risk factors of SCH include advanced age, cardiovascular conditions, peripheral vascular disease and certain medications such as anticoagulants, antplatelet agents and cardiovascular drugs. Others include high myopia, Aphakia, Glaucoma, raised intraocular pressure pre-operative-ly and previous intraocular surgery, for example, Penetrating Keratoplasty (PK) or vitrectomy [3-10]. SCH can also be as a result of type of anaesthesia employed with retrobulbar anaesthesia having the greatest risk were as with general anaesthesia the risk for SCH is minimal. Surgical risk for SCH increases in case of posterior capsule rapture with vitreous loss, conversion from phacoemulsification to Extra Capsular Cataract Extraction (ECCE) and longer duration of intraocular surgery. Furthermore, post-operative risk factors include hypotony and valsalva manoeuvres (coughing and straining) [3-10].

CASE SUMMARY
A 62-year-old male patient presented to the Ndola Teaching Hospital (NTH) eye clinic for cataract surgery in the second eye which was the LE. The first cataract surgery in the RE was successful with good visual outcome (visual acuity, 6/12). The patient had no abnormalities elicited from his past medical history as well as his previous surgery and the rest of the examinations were normal except for the visual acuity of the left eye which was Hand Motion (HM). The basic tests such as blood sugar and Ultrasound were normal. Patient had no systemic disease. Routine pre-operative medications were given. Local anaesthesia was administered through a retrobulbar injection of lignocaine 2% with adrenaline. While on the operating table, the patient suddenly developed Suprachoroidal Haemorrhage (SCH) intraoperatively. The occurrence of this complication was so rapid that there was no chance to perform the necessary manoeuvres to save the eye. There was rapid extrusion of all intraocular contents. This is what develops at the time of surgery. It is a rare but vision threatening intraocular surgery complication [3-10]. SCH can also be as a result of type of anaesthesia employed with retrobulbar anaesthesia having the greatest risk were as with general anaesthesia the risk for SCH is minimal. Surgical risk for SCH increases in case of posterior capsule rapture with vitreous loss, conversion from phacoemulsification to Extra Capsular Cataract Extraction (ECCE) and longer duration of intraocular surgery. Furthermore, post-operative risk factors include hypotony and valsalva manoeuvres (coughing and straining) [3-10].

DISCUSSION
Ndola Teaching Hospital eye unit had this rare and devastating experienced of SCH. The incidence happened so rapidly that the eye could not be salvaged by the necessary manoeuvres that would have saved the eye and possibly retain useful vision. The majority of patients encountering this complication recover with useful vision and the minority end up with blindness or complete loss of the eye [3, 4, 5]. Only a small proportion of patients completely lose the eye through evisceration such as reported by Sharma et al.,1997, in India where out of 6971 intraocular surgeries done between 1988 and 1994, only 12 developed SCH demonstrating that SCH was extremely rare at a prevalence of 0.17% and only three (0.04%) cases could end up with evisceration [3]. At NTH, of the thousands of intraocular surgeries that have been performed over years, this was the first encounter. This confirms the findings of Sharma et al. [3].

Intraoperative SCH is defined as a sudden haemorrhagic swelling of the choroid which develops at the time of surgery. It is associated with expulsion of some or all of the intraocular contents. This is what happened in the case under study. Various studies have focused on identifying patients at risk and reduction of risk factors help to reduce the incidence [3-10]. Proper intraoperative and postoperative surgical management may be critical in saving the eye and having a good visual outcome [6,7]. Some eyes can recover from SCH with useful vision. Spaeth et al., 2007, have concluded from their study that occurrence of SCH does not in itself lead to poor outcome. The prognostic factors also include vitreous haemorrhage and retinal break or detachment [10]. The NTH patient did not have risk factors, but presented the most rapid and devastating progress of SCH. In cases where there are risk factors, it is vital to have a high index of suspicion for expulsive SCH. Where SCH is suspected intraoperatively, immediate rapid closure of the wound is important especially when SCH progression is not so rapid.
Where there is a chance to control or stop the SCH, prolapsed intraocular contents should be reposited as quickly as possible whilst maintaining the anatomical integrity of the eye. If this is not possible, the eye can be softened by performing posterior sclerotomy.

In the case under discussion the progression of SCH was so rapid that there was no room to control or stop it and it was not possible to achieve wound closure. Sclerotomy was also not possible to perform. All the eye viscera rapidly spontaneously extravasated and the eye ended up in evisceration.

CONCLUSION
Suprachoroidal haemorrhage though rare can be devastating. The course of suprachoroidal haemorrhage can be unpredictable and can lead to dramatic loss of vision. Prompt recognition and appropriate management may limit its consequences and provide a reasonable visual outcome.

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EXTERNAL OPHTHALMOMYIASIS (EOM)

Case Report

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**ABSTRACT**

Ophthalmomyiasis is an ocular condition characterised by presence of live maggots in the ocular tissue. It occurs rarely especially where there is neglect in the management of bacterial ocular infection. It is believed to be a common condition in under-developed world due to poor living and hygiene standard.

This is a case in which a 16-year-old female patient presented at the Solwezi General Hospital Eye Clinic (SGHEC) with ocular foreign body sensation, lower eyelid swelling and tearing. She was referred from a rural health centre with suspected lower eyelid abscess for further management. An incision and drainage (I&D) had previously been performed from the health centre but this did not resolve the suspected abscess.

The patient's visual acuity in both eyes was normal (6/6). Exploration of the left eye (LE) revealed a larva that was deeply seated in the tissues of the lower eyelid. A diagnosis of preseptal cellulitis secondary to external ophthalmomyiasis (maggot or larva in the eyelid) was made. The larva was carefully removed surgically. The patient's condition improved within two days of commencement of the topical and intravenous antibiotics.

**INTRODUCTION**

Myiasis is the infestation of humans and animals with live maggots (fly larvae) of certain flies [1]. Skin is the most common organ of infestation, but larvae have sometimes been removed from the eyes, ears, nose and urogenital although rarely [2]. Ophthalmomyiasis is the infestation of the orbital tissues with fly larvae (maggots) is of three (3) types. In the External Ophthalmomyiasis (EOM) type fly larvae are deposited on the eyelid or ocular surface [3]. The second one is the internal type where fly larvae could penetrate the globe and can be seen in the vitreous cavity or sub retinal space [3]. The most damaging of the species, is the orbital myiasis where the fly larvae get their way to the orbital structure and cause serious damage to the surrounding tissues of the eye [3].

**DISCUSSION**

Ophthalmomyiasis is an infestation of the orbital tissues with fly larvae (maggots) of most commonly sheep and goat nasal botfly hominis of oestruidae family (oes trus ovis) and Arthropoda of insecta class...
The patient in this case report fell in the goat house and sustained injury on the left eye. It is possible that infection could have come from the goat droppings in the goat house. These fly larvae (maggots) are ejected in the milky fluid by a female fly while it is in flight. Fly larvae can be deposited on or into the ocular surface of humans and be responsible for benign external ophthalmomyiasis (EOM) [1-3]. On the contrary this was not benign as it was symptomatic, and the patient complained. Occurrences of ophthalmomyiasis are common in rural areas and animal raising community areas [4]. The patient of interest was from a rural community and the family kept goats and sheep for their living. She could have picked the fly larva from the goat house where she had fallen and sustained an eyelid injury.

The causative maggots (fly larvae) for ophthalmomyiasis are usually small translucent or creamy white worms of about 3-5 mm length with brownish or dark heads [4]. The larvae extracted from the patient measured 3mm. The fly larva may have numerous hooks on its belly which are used for crawling through tissue. When the larva infests the preseptal tissue it can sometimes invade the orbital cavity resulting into a lot of damage to the globe [5-9]. In this scenario the globe was not affected.

Among 295 cases described world-wide between 1918 and 2017 110 (37%) occurred in North Africa, 57 (20%) in Middle-east and 31 (10%) in South-Asia. In Europe EOMs are endemic in the Mediterranean basin with sporadic cases in central Europe and elsewhere, accounting for 33% [6,7]. There have been no reported cases from the sub-Saharan Africa [10,11], hence reporting this one.

**CONCLUSION**

Ophthalmomyiasis is a rare condition in Zambia but may occur especially among rural and animal rearing communities. Patients who may present with lamps on the eyelids or preseptal cellulitis coupled with conjunctival irritation and chemosis of the eye should be carefully screened in order to rule out other conditions such as the one in this case report. However, Ophthalmomyiasis is a treatable disease.


HIGH MYOPIA MISTAKEN FOR A MENTAL ILLNESS

Case Report
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ABSTRACT

A 25-year-old female patient presented to the Chainama College Eye Clinic where she was referred to by a psychiatrist for full eye examination. The patient had been taken to psychiatric filter clinic by her parents to seek help and counselling after observing unusual behaviour. The patient was reported to be isolating herself from everyone and had withdrawn from school. Examination revealed high Myopia which was corrected with spectacles at the facility. Patient’s behaviour changed dramatically, and psychiatric review showed that she was actually not a psychiatric patient.

INTRODUCTION

High Myopia is defined as a condition in which the spherical equivalent objective refractive error is minus 5.00 Dioptres or higher in either eye [1]. It is a relatively severe level of near sightedness that can be associated with significant eye health complications [1]. The onset of high myopia usually starts to develop after age of 10 years, but in other regions it can start earlier or late in life [2]. The main form of treatment in early stage high myopia is prescription for glasses or contact lenses [3]. Global prevalence rates of high myopia were estimated to affect 2.8 percent of the world population in 2010 [4]. Preliminary projections indicate that high myopia will affect 10% of the world’s population [3,4].

The exact prevalence rates of high myopia in Zambia are unknown but from Chainama Eye clinic outpatient records, these cases seem to be on the increase that is from January 2017 to December 2017. Chainama eye clinic recorded 15 cases of high myopia; whereas from January 2018 to December 2018, the cases increased to 22. High myopia can be visually and psychologically disabling and tends to affect the level of trait anxiety among young patients [5].

Reeves et al. 2000, reviewed the records of 64 patients with various conditions erroneously admitted to psychiatric units due to lack of thorough history and physical examination [6]. Anxiety traits among young adults and other psychological effects as a result of high myopia may lead to a person being mistaken to have a mental illness and yet not [7].

In the study by Dias et al., 2002, 469 myopic patients reported moderate to high levels of self-esteem [8]. Lagomarsi-no et al., (1999) and Dias et al. (2002) reported that children who experience more visual problems tend to evaluate themselves less favourably in terms of their physical appearance, school work, social activities, and behavioural conduct as they were affected with low self-esteem [9]. The identification of relationships between a high levels of trait anxiety among myopic young adults can help to define preventive actions aimed at protecting young patients from severe mental disorders [9].

CASE SCENARIO

A sixteen (16) year old female patient preA 25-year-old female presented with poor and blurred distance vision in both eyes which she said to have experienced for 9 years. She had briefly shared her vision difficulties with her parents in the early stages, but the complaint was not taken seriously as there was no one else in the family with similar problems. The parents noted unusual behaviour of the patient with decreasing vision. She withdrew from school, developed depressed mood, and always wanted to isolate herself. She was first taken to the mental filter clinic for attention where a detailed mental health assessment and examination was done, a provisional diagnosis of depressive disorder was made. Patient was further referred to the eye clinic for ophthalmic evaluation.

On examination at the eye clinic, her visual acuity was finger counting at 4 metres Right Eye (RE) and at 3 metres Left Eye (LE). On fundus examination, she had a myopic/tessellated fundus, with no new blood vessels on the retina, and the macular was normal. Intraocular pressure was normal in both eyes at 17.5 mmHg. A diagnosis of high myopia was made and her vision was corrected with spectacles of -10.50/-2.75 X 145 RE, and -14.0 DS LE. Her vision improved to 6/12 in both eyes. The correction of her sight instantly changed her behaviour and looked happy. Her quality of life remarkably improved as she went back to school and freely socialised with her peers and family members.

After six months reviews at both the mental filter clinic and eye clinic revealed that she had no psychiatric symptoms nor was she a mental patient; and that she had adapted well to her spectacle prescription. The patient consented to having her case published, but her names and location withheld.

DISCUSSION

High myopia is a severe form of near sightedness that can be associated with significant eye health complications and psychological effects [1]. In this case report the patient under review presented with severe visual impairment and strange behaviour.

According to Cohen et al., 2005, anxiety traits among young adults and other psychological effects as a result of high myopia are not uncommon [7]. High myopia is usually, personally and psychologically disabling and tends to affect the level of...
Trait anxiety among young patients [7,8]. Such traits and other psychological effects if misunderstood may lead to a person being mistaken to have mental illness when in fact not; just as in the case under review. Caregivers or General Clinicians may assume that a patient exhibiting strange behaviour will always need psychiatric diagnosis, treatment, or admissions when not. In this case of a 25 years old high myopic female patient, she was mistaken to be a mental patient simply based on the behaviour that those around her observed; when in fact the changes in her behaviour was largely as a result of the psychological impact of her visual challenges.

Poor vision impacts upon nearly every daily activity that people are used to undertaking. It is easy for those with poor vision to begin to feel isolated as their daily interaction with other people decreases [7]. In this case the patient exhibited isolation from others. Preconceived assumptions regarding psychiatric presentations and pitfalls of omission in the evaluation of patients with psychiatric symptoms allow medical mimics to go undetected [8].

CONCLUSION
High myopia resulting in blinding can lead to psychiatric condition. Early diagnosis and treatment of high myopia in patients presenting in psychiatric centres is an effective intervention. Multidisciplinary actions of the clinician’s skill both at the mental and eye units played a very important role in arriving at the correct diagnosis and treatment. Hence the need to scale up community eye health awareness programmes in an integrated approach at all levels of health care.

Disclosure Statement
The authors have no conflicts of interest

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PERIOCULAR FILARIASIS AT LUSAKA EYE HOSPITAL – ZAMBIA

Case Report
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ABSTRACT
Human ocular infestation by a live filarial adult worm is a rare occurrence. These worms are caused by organisms such as Brugia malayi, Wuchereria bancrofti, Dirofilaria repens and many others. An unusual case of periccular filariasis was diagnosed at the Lusaka Eye Hospital in a female patient aged 47 years. This was in a patient whose profession is to deal with animals. She presented with twitching and feeling of movements on the eyelid. Following clinical examination and laboratory investigations, diagnosis of pericocular filariasis was confirmed. The treatment consisted of the surgical extraction of the parasite, antibiotics, steroidal anti-inflammatory and anthelminthic drugs. The intraoperative and postoperative evolution of the case was favorable.

INTRODUCTION
The ocular manifestations of filariasis are elephantiasis of the eyelids, iritis, retinal hemorrhages, or the presence of microfilaria in the lacrimal gland secretion [1]. Intraocular infestation by the filarial worm is a rare occurrence in humans and most of the published reports are from Southeast Asia [2]. Entry into the anterior chamber may be through ciliary vessels. Lymphatic filariasis caused by Brugia malayi occurs in Southeast India, China, Indonesia, Malaysia, Korea, Philippines, and Vietnam [3]. Brugian filariasis is mainly a rural disease and is transmitted by mosquitoes of the genera Mansonia, Anopheles, and Aedes. Domestic animals like cats and dogs may serve as reservoirs of infection [4]. During a blood meal, mosquitoes ingest microfilaria and they become infective in 10 days. Humans contract the disease through repeated episodes of mosquito bite. Dirofilaria repens (Spirurida, Onchocercidae) is a nematode that parasitizes mainly dogs (Canis lupus familiaris) and other mammals, but may also infect humans, being considered a zoontic agent. The parasite’s most frequent localization in humans is in subcutaneous and ocular tissue (75.8%) [5,6], especially in the ocular area, which is accessible to mosquitoes that act as vectors. Adult parasites are found in subcutaneous tissues while the larvae (known as microfilariae) are found in the blood of the infested animals. They are ingested by mosquitoes of genera Aedes, Anopheles, or Culex during the blood meal. The larvae grow and become infective inside the mosquito’s body. Infective L3 larvae may be transferred to humans through inoculation when the mosquitoes feed.

CASE SCENARIO
A 47-year-old female patient, living in the USA who has frequent trips to Zambia and other African countries to carry out research in animals such as dogs, cats, pigs, rabbits, presented at a private hospital complaining of episodes of swelling of the lower and upper eyelids of the left eye. The patient could feel something moving in her eyelid for a period of 2 months before which she was asymptomatic. She was also complaining of twitching, discomfort in the upper eyelid, generalized body itchiness and episodes of fever. The private hospital referred her to Lusaka Eye Hospital for further management. Ocular examination revealed a visual acuity of 6/6 in both eyes, normal intraocular pressure (14 mmHg in the right eye RE and 17 mmHg in the LE). A round formation containing a mobile thing in the subcutaneous tissue of the upper eyelid was observed. Examination of the fundus of the eye revealed a well-defined disc and macula and also normal blood vessels without the presence of other larval forms. Ultrasound performed revealed a larva in the eyelid. General clinical examination did not reveal the presence of subcutaneous nodules. Heart ultrasound, abdominal ultrasound, and chest X-ray showed normal relations. Based on clinical examination and investigations, a diagnosis of subcutaneous ocular parasitosis was made. The parasite was surgically removed. A worm removed was white, translucent and was measuring 8 cm. Surgery was successful and there were no post-surgical complications. Further treatment was instituted with Diethylcarbamazine 50 mg TID on days 1 and 2, then 100 mg TID on day 3 and 125mg TID on days 4 to 14.

DISCUSSION
The patient attended to at Lusaka Eye Hospital had a rare presentation of extraocular filariasis which did not give a lot of challenges with the surgical management. Microfilariae are more commonly known to cause intraocular filariasis than adult worms [3]. W. bancrofti and B. malayi are main causative organisms to cause uveitis secondary to intraocular filariasis in the Indian subcontinent [4]. W. bancrofti is a helminth belonging to class nematodes. Man is the definitive host, the intermediate host being species of Anopheles mosquitoes. In this case report, the interaction between the patient and domestic animals predisposed her to mosquito bites through which the larvae could be transmitted to her easily. Adult worms live in the lymphatic system, discharging live embryos (microfilaria) into the bloodstream. Adult filarial worms are thread-like structures that live in the...
subcutaneous tissues and the lymphatic system. They sexually reproduce microfilaria, the first larval stage. Microfilariae are ingested by hematophagous arthropods, where they develop into infective larvae that grow in the vertebrate host and mature into adult worms. The exact route of invasion of microfilariae into the eye is still unknown. They enter the eye probably through the long and short posterior ciliary vessels, cerebrospinal fluid, or the optic nerve sheath [5]. Once a parasite is identified, it should be removed live and intact to prevent inflammation, damage to the eye and anaphylaxis. In the patient under discussion surgery was done cautiously in order to prevent any reactions. Ocular Filariasis though not commonly seen in the Zambian community, it is very important to always be on the lookout especially in patients who could present from other parts of the world. In this case the patient was not a resident of Africa but the fact that she handled the definitive hosts of the parasite, infestation could arise from there. It is therefore very important to have a high index of suspicion, to take a good history and perform a thorough ocular examination in patients presenting with ocular swellings. In the same vein the patients with uveitis of suspicious origin associated with diseases like elephantiasis and having had serious contacts with domestic animals must undergo thorough examination to rule out ocular filariasis.

**CONCLUSION**

Periocular and ocular filariasis is not common in our Zambian population but can be seen in patients coming from outside Zambia especially with the history of interacting with animals such as cats and dogs. Accurate diagnosis and early treatment bring out good outcome.

**LIST OF REFERENCES**

Case Report

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ABSTRACT

A 47-year-old male presented to the Ophthalmology department at Ndola Teaching Hospital with a discharging wound extending from the lower eyelid on the lateral aspect of the right eye and a melted cornea. He had a history of having undergone a surgical procedure for a conjunctival growth, 6 months prior to presentation. He was a known retroviral disease patient with poor compliance to antiretroviral medication. He also history of tuberculosis. Orbital cysticercosis was diagnosed following clinical examination and investigations and anti-helminthic therapy was instituted.

INTRODUCTION

Cysticercosis is a parasitic infection that is caused by the larvae of Taenia Solium, which is a pork tapeworm [1]. The infection is acquired through ingestion of contaminated food and water transmitted through the faecal--oral route [1]. Neurocysticercosis is a central nervous system variant of the infection, responsible for causing seizures worldwide [1]. The infection is postulated to cause twice as many epilepsy occurrences compared to developed countries.

In the United States and other areas with large immigrant populations, there has been widespread recognition of neurocysticercosis as a common infection, not just in developing countries [2]. The highest prevalence rates have been documented in South and Central America, Africa and Asia particularly in areas of poor sanitation and low socioeconomic status [3]. In Africa, it has been noted that Taenia Solium is transmitted around most of the continent but not in the strictly Muslim areas of North and sub-Saharan Africa where pork is not consumed [4]. As in Asia, concomitant localization of subcutaneous lesions with intracerebral infection is common in Africa. A different picture is seen however in the United States where intracerebral infection rarely occurs together with subcutaneous lesions [5]. One of the challenges in Africa and in most endemic areas, is the lack of awareness within communities as well as lack of adequate reports and study findings on cysticercosis [6]. This can be attributed to the lack of advanced diagnostic facilities and technology that would allow prompt screening and identification of infected individuals [7]. Few countries however, such as South Africa, Zimbabwe, Madagascar and other countries in Central, East and West Africa have been able to produce scientific reports although data still remains limited [7]. Consent for the case report publication was obtained from the patient.

In Zambia, the full countrywide extent, of the impact of cysticercosis in terms of prevalence, endemic areas as well as socioeconomic effect is not fully appreciated. Several studies however, have been carried out in Eastern province, tackling aspects such as prevalence of cysticercosis in bovine as well as human hosts as well as effectiveness of control measures for the prevention of spread of infection. Human cysticercosis prevalence has been reported to range from 6-13% based on circulating antigen detection whereas bovine cysticercosis prevalence was reported to range from 8.2-64.2%, in Eastern province [8].

CASE SCENARIO

A 47 year old male from Ndola city on the Copperbelt province of Zambia presented to the eye department at Ndola Teaching Hospital complaining of a painful right eye with a discharging wound for one week. These symptoms were said to have begun after he fell in the bathroom, whilst taking a bath. There was also a history of having had a growth on the white part of the eye (conjunctiva) excised from the same eye, one year prior. A sample was taken for histopathology but the results were not followed up. Five months after excision, another growth was noticed in the same eye, which he opted to have removed with a blade at home, by a relative. A few days later, he started experiencing the pain and discharge and presented to the eye department a week later. There was also history of having been on antiretroviral therapy (ARVS) for the past seven years for Human Immunodeficiency Virus (HIV), with poor compliance to medication. Anti-tuberculosis medication had been completed 7 months prior to presentation.

On general examination, the patient was ill looking and irritable but had normal vital signs (blood pressure, pulse, temperature, respiratory rate), with palpable cervical lymph nodes. Ocular examination revealed visual acuity (VA) of perception of light (LP) for the right eye and 6/6 for the left eye. Intraocular pressure (IOP) could not be taken in the right eye, but was 14.3mmHg in the left eye. The right eye had ecchymosis on the eyelids with a laceration extending from the lower eyelid to lateral canthus and past the margin. There was also a foul smelling, purulent, blood stained discharge covering the anterior aspect of the eye. The cornea was melted and the rest of the anterior segment findings were normal.

Differential diagnoses included right lid laceration with corneal ulcer, osteomyelitis, orbital cellulitis and squamous cell carcinoma of conjunctiva and eyelid. Full blood count, differential count, renal and liver function test results were all within normal ranges. The CD4 count was 65 cells/ul. The skull x-ray showed a homogenous opacity in the right later-
Computed Tomography scan (CT scan) of the head showed small, numerous hypodense opacities scattered throughout the brain parenchyma, including the right orbital region; features consistent with cerebral, subarachnoid and right orbital cysticercosis.

The patient was initiated on albendazole 400mg, orally, once a day for 3 days, praziquantel 2,600mg orally, once a day for 15 days with daily wound cleaning with povidone iodine three times a day. A week later, the patient was referred to the HIV/AIDs specialists for further assessment, counselling and drug therapy re-assessment, and was recommenced on antiretroviral therapy (Tenofovir/Lamivudine/Efavirenz).

By the third review, the patient’s laceration had healed and the discharge was no longer present. The patient however still had a melted cornea and a VA of LP in the right eye. A B-scan performed on the fourth visit indicated the absence of cysts in the posterior segment and orbit.

Figure 1: patient’s right eye with laceration wound, absence of lower lid lashes and chemosis.

Figure 2: Right eye with melted cornea.

Figure 3: skull x-ray; Anterior-Posterior view showing homogenous opacification in the orbit-right eye.

Figure 4: CT-Scan of the head with numerous well circumscribed hypodense lesions in the brain.
Cysticercosis is a condition caused by the tapeworm species Taenia Solium (mainly), Taenia Saginata and Taenia Asiatica [9]. It is commonly associated with a lower socio-economic status, in areas with free-roaming pigs and low hygiene standards. Despite the condition being generally known to be caused by infected pork, it has been noted that cysticercosis is caused by re-infection, that is, ingestion of cysts passed out through stool. The infection obtained through direct ingestion of infected, undercooked pork, water, fruit and vegetables is referred to as taeniasis. In the past, neurocysticercosis (NCC) was referred to as a neglected disease together with echinococcosis but is now recognised as a major neglected tropical disease in the world [10]. This can be attributed to the increase in cases being diagnosed in tropical regions but without sufficient and accurate data on prevalence rates and the full extent of the infection [11]. Perhaps the absence of sensitization and lack of knowledge within communities on the existence of the disease can also be considered as a contributing factor to why some cases are missed. With the prevalence of HIV/AIDS, cysticercosis is now a frequent opportunistic infection, responsible for focal brain lesions in patients with HIV [12]. The patient presented with symptoms at the age of 47. However, most literature states that individuals often present in the first and second decade of life. In a study carried out in India to determine the clinical manifestations, diagnosis, management and outcome of orbital cysticercosis, the median age at presentation was found to be 13 years [13].

NCC commonly affects the brain parenchyma but can also be found in the ventricles, meninges, spinal cord, eye and subarachnoid spaces. Occurrence of these cysts in other sites has been associated with racemose cysts, which predispose to an even more complicated disease process [4].

In the case of our patient, the cysts occurred in the brain parenchyma and the orbit. The main symptom was presence of a painful discharging wound on the right lower eyelid, associated with poor vision. Studies have however shown that most patients with NCC present with seizures and NCC is considered to be the most common cause of adult-onset epilepsy in the United States [11]. A study carried out in 1993 involving extrapolation of the population at risk and adjusting for disease other than seizures indicated that 400,000 people had symptomatic NCC in Lower Middle-Income Countries (LMICs) [14]. This was deduced by estimating mainly the active epilepsy, by subtracting epilepsy rates in non-endemic regions from rates in endemic regions in Peru [14]. This information may not be applicable to all LMICs however, as differences do exist in terms of individual country population and endemicity. Recent studies have however, through determination of active epilepsy rates from 0.6% to 1.8%, indicated that between 450,000 and 1.35 million people in LMICs suffer epilepsy due to NCC [14, 15, 16]. The seizures are due to calcified granulomas which may develop sporadic episodes of oedema, and in later stages, cause inflammatory responses [17]. Orbital cysticercosis occurs in approximately 4% of individuals with ocular cysticercosis. Despite occurring in the vitreous, subretinal space and subconjunctiva, the orbit is occasionally the site for cyst lodgement [18].

Ocular manifestations of NCC usually worsen as the larvae increase in size and may lead to blindness in 3 to 5 years. The parasites release toxins which cause severe inflammatory reaction and eventually lead to destruction of the ocular structures [19]. This was noted in our patient, who presented with a wound on the lower eyelid as well as corneal melting that is corneal ulceration and stromal dissolution. The presence of a profuse purulent discharge clinically indicated superimposed bacterial infection although pus swab examination did not identify any growths on the media. The presence of the discharge can also be attributed to immunosuppression as a result of HIV/AIDS co-infection which pre-disposed the patient to other infections. Investigations carried out included imaging studies such as computed tomography (CT), skull x-ray and ultrasonography (ocul-ular B-Scan). The patient’s CT confirmed the presence of cysts in the brain parenchyma as well as the right orbit-a feature pathognomic with NCC. No cysts were noted in the anterior segment, and the B-scan did not pick any cysts in the posterior segment. Imaging studies such as high-resolution sonography, CT and magnetic resonance (MRI) have been noted to be most beneficial for identifying and diagnosing cysticercosis [19]. Serological tests such as Enzyme-linked immunosorbent assay (ELISA) to detect antibodies and co-agglutination were not carried out as resources were unavailable. Recent diagnostic advancements have seen the development of assays that are able to detect parasite antigens in serum and cerebral spinal fluid and can also be used to detect active infections. These assays however, are best used in combination with imaging.

In terms of treatment, larvicidal drugs such as albendazole and praziquantel are often used to kill the larvae [13]. According to WHO, there are currently no standard treatment guidelines for the management of NCC. Proposals have however been made. It has been noted, that the efficacy of albendazole and praziquantel is sub-optimal, with cure rates of 40 to 50% when the recommended dose is used [2]. Therefore, there is need for more effective alternatives. The patient received albendazole (400mg, once a day for three days) and praziquantel (2,600mg once a day for 15 days). Orbital cysts can be treated conservatively with a 4-week regimen of oral albendazole at 15 mg per kilogram per day [20]. The larvicidal drugs may cause an inflammatory response, occurring 2-5 days after initiation of therapy and are therefore often combined with a corticosteroid to prevent this from occurring [21]. Rational use of corticosteroids has also been linked to a significant reduction in the occurrence of seizures, though studies are still underway [22]. The patient however, did not receive any steroids in view of the low CD4 count (64 cells/mm3), as a way of preventing further immunosuppression. In a study carried out in Latin America in 2006, in which 3 HIV positive individuals were treated for NCC, it was recommend-ed that the CD4 count be considered in the diagnosis and treatment of NCC in individuals with HIV/AIDS. It was further recommended that a CD4 count of greater than 200, with a definite or probable chance of NCC occurring, should warrant the patient being considered for treat-ment of NCC [2]. Surgical removal of orbital cysts has not been well documented but has been noted to be very successful for subconjunctival cysts. It is recommended that serial B-Scan, CT and MRI be carried out in order to monitor the resolution of the cysts.
Use of ventricular endoscopy to remove accessible ventricular cysts also results in reduced seizures and decreased morbidity [17]. Despite the treatment interventions instituted as well as the significant clinical improvement noted on consequent review appointments, the patient’s vision remained perception of light in the right eye due to the already existing melted cornea.

CONCLUSION
This case highlights the possibility of the occurrence of orbital cysticercosis in the Zambian population. It can present in an unusual form, with a wound on the lower eyelid as well as a melted cornea. The history could be for a longer duration like in this case, with a history of having had a conjunctival growth of one year prior to the presentation. Signs, symptoms and presentation of orbital cysticercosis are often non-specific and therefore require the clinician to have a high index of suspicion, backed by thorough assessment in order to be able to diagnose it.
LIST OF REFERENCES

ABSTRACT
A 1 year 8 months old baby girl presented to Arthur Davidson Children’s Hospital with a 4 month history of segmental haemangioma affecting the Left upper which caused mechanical ptosis obstructing the visual axis, with supraumbilical raphe, sternal cleft defect and ventricular septal defect. The clinical features were consistent with PHACES syndrome. Three monthly doses of intralesional methyl-prednisolone were administered with complete regression of the haemangioma.

INTRODUCTION
Infantile haemangioma (IH) is the most common tumour in infancy. They occur in up to 2.6% of neonates and up to 12% of children by the first year [1,2,3]. A subgroup of patients with IH exhibit associated structural anomalies of the brain, cerebral vasculature, eyes, aorta, and chest wall in the neurocutaneous disorder called PHACES syndrome. IH typically present in 2 phases; a phase of rapid proliferation which occur in the first year of life, followed by a slow gradual involution over the next 5 to 7 or more years. IH remain asymptomatic and can, therefore, be managed by close observation. Indications for immediate management include; IH that might cause significant complications such as amblyopia, airway obstruction, bleeding and ulceration, high output cardiac failure [1].

CASE SCENARIO
A 1 year 8 months old girl with congenital sternal defect was referred from Roan General Hospital to Arthur Davidson Children’s Hospital for further management. The patient was born at term via spontaneous vaginal delivery at the university Teaching Hospitals Women and New-born Hospital with no perinatal complications. She presented with a 4/12 history of swelling on left upper eyelid, left side of the face and lower lip which increased in size progressively. The patient being a child, consent to have the case report published was obtained from the mother.

On examination, patient had a stable general condition, Visual acuity (VA) in both eyes was central, steady and maintained, that is, the patient was able to fix and follow moving targets. The intraocular pressure was 11 mmHg and 12 mmHg in the right and left eyes respectively. The right eye had normal anterior and posterior segments. Left eye had a lesion, measuring about 6 by 4 cm, on the upper eyelid which was blanching with pressure. There was mechanical ptosis on the affected eye and smaller other lesions were noted on lower lips also (figs 1 and 2). Systemic examination revealed a sternal cleft deformity with a holosystolic murmur, and supraumbilical raphe. Chest x-ray revealed an enlarged cardiac shadow and a small ventricular septal defect (VSD) was noted on echocardiogram. The ECG and abdominal u/s were normal. The parameters on Full blood count were within normal limits. Unfortunately, MRI or CT scan of the brain and orbit were not done because the patient’s care-givers could not afford to do the investigations due to the cost involved.

A diagnosis of PHACES syndrome was made based on above findings and multi-disciplinary approach was employed in the management of the patient. The teams involved were Ophthalmology, Paediatric Surgery, General Paediatrics, and Cardiology. Monthly doses of intralesional methylprednisolone were administered for 3 months. The outcome was complete resolution of the lesions as shown in fig 3.

DISCUSSION
PHACES syndrome is a group of disorders characterized by posterior fossa abnormalities, haemangioma, arterial lesions, cardiac abnormalities/coarctation of the aorta [1,2,3].
The first description of PHACE syndrome with brain abnormalities was reported in 1978 by Pascual-Castoviejo [4] in 1996 while acronym PHACE was created by Frieden et al in 1996; this gave the details of the most representative features of the syndrome [1]. The acronym has been expanded to PHACES which includes supraumbilical raphe and sternal clefting [5].

In 2009, a consensus to define the diagnostic criteria for PHACES syndrome was arrived at. These criteria were divided into 2 categories that is PHACES syndrome or possible PHACES syndrome. Major and minor criteria were determined for the following organ systems: cardiovascular, cerebrovascular, ocular, structural brain, ocular, and ventral/midline. The diagnosis of PHACES Syndrome requires the presence of a characteristic segmental haemangioma greater than 5cm on the face or scalp plus 1 major criterion or 2 minor criteria while possible PHACE requires the presence of a characteristic segmental haemangioma greater than 5cm on the face or scalp or face plus 1 minor criterion [6].

Our patient presented with a haemangioma affecting the left upper eyelid about 6x 4 cm in size, sternal cleft deformity, umbilical raphe and as small ventricular septal defect. Sternal cleft deformity and umbilical raphe represented the major criteria while ventricular septal defect the minor criteria. Therefore, the presence of above features in our patient satisfied the criteria for diagnosis of PHACES syndrome.

Haemangiomas in PHACES syndrome are more common in female with a female: male ratio of 9:1 ratio for the latter [1]. They are typically bulky, plaque-like lesions involving several cervicofacial segments, but without being confined by their boundaries. They have a segmental distribution which partially corresponds to developmental facial prominences. Facial haemangioma patterns have been described into four segments: frontotemporal (S1), maxillary (S2), mandibular (S3) and frontonasal (S4) segments. The majority of PHACE patients have haemangioma involving the S1 segment regardless of other segment involvement. The facial segmental involvement is also associated with clinical manifestation. Haemangiomas located in the S1 & S4 segments are associated with structural brain, cerebrovascular and ocular anomalies, while those located in the S3 segment are associated with sternal defects or supraumbilical raphes. About 22% of patients present with extracutaneous haemangioma with the most affected ones having only one extracutaneous manifestation to fulfil a diagnosis of PHACE syndrome; the most common ones being CNS anomalies [1,7]. The first description of the association of PHACE syndrome with brain abnormalities was reported in 1978 by Pascual-Castoviejo. He reported that between 43% and 90% of patients with PHACES have a CNS structural malformation [8]. Malformations typically involve the posterior fossa, presenting as a Dandy-Walker complex, isolated cerebellar hemispheric hypoplasia, or a combination of the 2. Dandy-Walker malformation is the most common associated developmental abnormality [1,7]. Vascular anomalies are the most frequent malformation associated with cutaneous haemangioma–vascular complex syndrome. Absence of the internal carotid and/or vertebral arteries and persistence of the trigeminal artery are the most common malformations [8]. Cardiac anomalies include; patent ductus arteriosus, ventricular septal defects, arterial septal defects, pulmonary stenosis, tricuspid aortic valve, arterial enlargement, ventricular hypertrophy, tetralogy of Fallot, and patent foramen ovale. The case we presented had a Ventricular septal defect which was confirmed by echocardiogram [1].

Approximately one-third of the PHACE(S) syndrome cases have eye involvements [6]. In a recent study on 23 cases of PHACE(S) syndrome, 14% of the cases showed ocular involvement [9]. The reported ocular manifestations of this syndrome could be posterior segment abnormalities which include morning glory disk anomaly, retinal vascular anomalies, optic nerve hypoplasia and atrophy, while anterior segment abnormalities include cataract, microphthalmia, conjunctival haemangioma, posterior embryotoxon, Mittendorf dots, corneal opacity, sclerocornea, iris coloboma, iris heterochromia, iris hypoplasia, and iris vessel hypertrophy. There can also be presence of miscellaneous ocular abnormalities such as congenital glaucoma, cryptophthalmos, proptosis, Horner syndrome, congenital 3rd or 4th nerve palsies, strabismus, and ptosis [10].

Sternal defects and supraumbilical raphe were encountered in 43 patients with PHACES syndrome. Matry et al. reported three patients with subtle sternal pits without underlying soft-tissue or bony loss in a series of 14 patients with PHACES syndrome. Our patient presented with both sternal defect and supraumbilical defect [1]. Observation remains the mainstay of treatment of capillary haemangiomas since most lesions regress on their own. However, intervention is indicated in the following circumstances; occlusion of the visual axis, optic nerve compression, severe proptosis, anisometropia, maceration and erosion of the epidermis, infection, and cosmetic disfigurement [11]. Obstruction of the visual axis in our case was the reason why we had to intervene in order to prevent amblyopia. The management option can either be surgical or medical depending on the size and location of the lesion. Medical management options include; Steroids- topical, intralesional or systemic, interferon alfa-2a therapy, Vinchristine, Propranolol therapy or timolol therapy. Our patient responded well after administration of 3 doses of intralesional methyl-prednisolone [1,11].

CONCLUSION
Intralesional injection of corticosteroids has proven to be effective in the management of cutaneous infantile haemangiomas. In this case we highlighted the successful management of a 1 year 8 months old girl who presented with a haemangioma affecting the left eyelid and causing mechanical ptosis and had other features of PHACES syndrome. The haemangioma was successfully treated with intralesional steroid injections.
Proliferative Diabetic Retinopathy in a 16-Year-Old

Case Report
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**ABSTRACT**
Diabetic retinopathy (DR) is a common blinding ocular complication of diabetes mellitus (DM). Its manifestation depends on a patient’s glycaemic control, duration of DM and the type of DM. It mostly affects patients with type 2 DM. Children are almost never affected by DR.

The University Teaching Hospitals - Eye Hospital (UTH-EH) had an unusual presentation of Proliferative Diabetic Retinopathy (PDR) in a female patient aged 16 with Type 1 Diabetes Mellitus (T1D). The patient was referred from Lewanika General Hospital where Diabetic Retinopathy (DR) was elicited. The patient complained of poor vision in both eyes for 2 months. On examination visual acuity (VA) was 6/12 right eye (RE) and 6/18 left eye (LE). Funduscopy revealed neovascularisation elsewhere (NVE’s) in both eyes. A diagnosis of PDR was made, and the patient was managed with Pan-retinal photocoagulation (PRP).

**INTRODUCTION**
Diabetes mellitus is the third most common chronic disease among children [1]. The incidence and prevalence of T1D varies among different populations and appears to be based upon several factors including racial composition, age distribution and geographic location. The Centers for Disease Control report that approximately 1 in 400 American children has diabetes [2] and Lueder estimated that 1 of every 500 has TID [3]. The rising prevalence of childhood type 1 and type 2 DM possess a huge risk of visual impairment and blindness due to DR which is an important complication of DM [4].

Diabetic retinopathy has been well described in children. The majority of affected patients do not develop vision-threatening retinopathy until after the teenage years [1]. The risk of developing DR is greater in patients who are diagnosed during or after puberty [5] and studies demonstrate a higher incidence of DR in late puberty than early puberty despite similar durations of disease [6]. Some adolescents lose vision due to macular edema or, more commonly, PDR. Furthermore, a number of adolescent patients rapidly develop progressive DR that leads to irreversible blindness unless it is detected early and treated aggressively [7,8]. Therefore, early detection of DR and other blinding conditions through screening programmes is critical for preserving vision in patients with diabetes [7,8].

Treatment for PDR is by Pan Retinal Photocoagulation (PRP). However, having been treated with PRP still renders patient at increased risk of reverting to new proliferative disease, without the development of all the classical features of pre-proliferative disease if DM is poorly controlled [9].

**CASE SCENARIO**
A 16-year-old female from Western Province of Zambia presented to the UTH-EH with complaints of poor distance vision in both eyes for two months. She presented to Lewanika General Hospital (LGH) in comatose state where she was diagnosed with Diabetic Ketoacidosis and a diagnosis of Type 1 DM was made. Treatment with insulin was initiated. When the patient’s condition was brought under control and became stable, she complained of poor vision in both eyes following which she was attended to at LGH Eye Unit where she was subsequently referred to the UTH-EH for DR management.

On examination at UTH-EH, she appeared appropriate for age and of good nutritional status. Visual Acuity (VA) was 6/12 RE and 6/18 LE. The VA in both eyes could not improve with the pinhole. Her weight was 43.3 kgs, height – 1.6 m, which gave a Body Mass Index (BMI) of 16.9 kg/m². The Blood Pressure (BP) was 120/70 mmHg. Retina examination in both eyes had dot blot and flame shaped haemorrhages, cotton wool spots, hard exudates and new vessels elsewhere (NVEs). The Fasting Blood Sugar (FBS) was 16.3 mmol/l and renal function tests were all within normal range. Fundus Fluorescein Angiography (FFA) findings showed multiple areas of increasing fluorescence suggesting leakage and confirming NVEs, (Figs 1 and 2).

The patient underwent PRP I and PRP II in both eyes. The two were performed a week apart for each eye, (Figs 3 - 6). A week after PRP II her vision improved to 6/9 in both eyes. Subsequent review at 3 months showed that her vision was restored to 6/6 in both eyes. The patient was put on long-term DR follow up plan.

Considering the fact that the patient was below 18 years, her mother consented to the publication of the case including the pictures.
Fig 1: RE FFA confirming NVEs

Fig 2: LE FFA confirming NVE's

Fig 3: Fresh LASER Marks RE

Fig 4: Fresh LASER marks RE
Fig 5: LASER marks LE

Fig 6: LASER marks LE
DISCUSSION
Diabetic retinopathy in children has been well described in the developed world where as in the developing countries it is yet to be described properly. Initially the thinking was that DR could not occur in children, but it evidently occurs as demonstrated by Forlenza and Stewart, 2013. Just as established by Forlenza and Stewart, this report confirms a DR case in a 16-year-old. It has been reported that the majority of affected patients do not develop vision threatening retinopathy until after the teenage years. Some adolescents lose vision due to macular edema or, more commonly PDR. In this case report the patient was an adolescent and a teenager with a huge risk of developing PDR which was the final diagnosis in the patient. From history this had developed rapidly and as reported by other researchers such as Soffer et al. (2003) and Maguire et al. (2006) [7, 8].

Treatable DR is extremely rare among paediatric Type 1 DM [10]. On the contrary, this case had vision threatening DR within 2 months of diagnosis with T1D and her condition needed DR treatment. Moreover, DR can become quite advanced before children recognize and report changes in vision, thus further emphasizing the need for regular screening programs [1]. The case under discussion reported poor vision four days upon recovery from the comatose state during which she was first diagnosed of having T1D.

A number of adolescent patients develop rapidly progressive DR that leads to irreversible blindness unless it is detected early and treated aggressively [7, 8]. Timely treatment with laser photocoagulation can prevent visual loss in vision-threatening retinopathy [11]. Fortunately, this PDR case was diagnosed at the right time and managed aggressively with LASER with good visual outcome. Treatment of affected adolescents is generally the same as for adults – focal or grid laser photocoagulation for macular edema and pan-retinal photocoagulation (PRP) for PDR. Intravitreal injections of anti-VEGF drugs have recently become the standard-of-care for adults, but neither anti-VEGF drugs nor intraocular corticosteroids have been used to treat DR in children due to concerns regarding ocular and systemic side effects [1]. In line with the treatment recommendations for PDR in children, this case was treated with PRP on time, adequately and successfully.

Following the increasing number of children with DR, a number of organizations and institutions have come up with recommendations on follow up of DM patients for DR screening. The American Academy of Pediatrics (AAP) recommends ophthalmologic examinations starting “3 to 5 years after diagnosis if the patient is 9 years of age and above” with annual follow-up examinations [12]. The American Academy of Ophthalmology (AAO) preferred practice pattern recommends the first examination “3-5 years after diagnosis” with yearly follow-up examinations [13]. The American Diabetes Association (ADA) position statement recommends the first eye exam “within 3-5 years after diagnosis of diabetes once the patient is age 10 years or older” with yearly follow-up examinations [14]. The newly published Canadian Ophthalmological Society (COS) guidelines recommend that screening for DR should be initiated “5 years following the diagnosis of diabetes” or at puberty with yearly follow-up examinations [15]. In the Zambian situation the guidelines are that every diabetic child who is ten years and above is subjected to annual DR screening. However, the process of developing protocols is still under way.

CONCLUSION
This case report demonstrates that diabetic retinopathy can occur in children with diabetes mellitus regardless of the type of diabetes. Timely management with LASER can help in maintaining or restoring vision and preventing blindness. Therefore, early detection of DR and other blinding conditions through screening programs is critical for preserving vision in patients with diabetes.
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REGRESSION OF OCULAR HODGKIN’S LYMPHOMA IN A 13-YEAR-OLD

Case Report
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ABSTRACT
An increasing number of cases of ocular non-Hodgkin’s lymphoma (HL) is being reported. While ocular involvement in Hodgkin’s lymphoma is rare, it is a frequent affection in non-Hodgkin’s lymphomas (NHL). A 13-year-old boy presented to Chongwe District Hospital (CDH) with pan uveitis. The patient presented with blurred vision in his Left Eye (LE), skin rash and dry cough over a period of three months. He had not sought any medical attention prior to his visit to eye unit. Slit lamp examination revealed bilateral non-granulomatous keratic precipitates and flare. Physical examination revealed cervical and inguinal lymph nodes. His laboratory workup including rheumatoid factor and serum protein electrophoresis tests were all normal. A diagnosis of pan uveitis was made and the patient was treated with topical and systemic steroids over a period of six months without improvement. The patient was counselled and referred to a pediatrics hospital where an excisional biopsy for inguinal lymph nodes confirmed Hodgkin’s lymphoma. Appropriate systemic treatment was given for Hodgkin’s lymphoma.

INTRODUCTION
Hodgkin’s lymphoma (HL) is a disease originating from lymphoid tissue and accounts for less than 1% of all cancers [1]. As lymph nodes are distributed throughout the body, lymphomas may manifest with involvement of various body parts [2]. This can cause difficulties in diagnosis as well as delayed treatment. Ocular involvement is more prevalent in non-HL compared to HL [3]. A number of case reports of ocular HL following the diagnosis of systemic HL have been documented [4, 5, 6]. Though rare, HL can initially present with ocular manifestations [7, 8]. According to 2016 revision of the World Health Organization (WHO) classification of lymphomas, approximately 15% of lymphomas are classified as HL; the remainder are classified as Non-HL [9]. This recognizes >40 mature B cell neoplasms and <25 mature T and NH (natural killer) cell neoplasms [9].

This case report is about a 13-year-old patient who presented with complaints of low vision, watering eyes and photophobia. The patient had other systemic infections in which after medical testing was diagnosed with HL. This case report also examines the relationship between ocular findings and HL within the context of literature, and to raise awareness of this condition.

CASE SCENARIO
A 13-year-old male patient presented with skin rash, dry cough, and reduced vision in his left eye for 3 months. There was history of the child being sickly of more than 3 months, weight loss, no night sweats and could not attend school due to illness. This was the first presentation to the hospital and was not on any treatment. On general examination the child was ill looking, febrile, pale, slightly jaundiced, not cyanosed, had no finger clubbing and was not breathless. Head and neck examination showed a buffalo face appearance. Systemic examination revealed multiple cervical and inguinal lymphadenopathy bilaterally. On ocular examination, visual acuity was 6/6 Right Eye (RE), 6/36 Left Eye (LE), bilateral non-granulomatous keratic precipitates (KPs) and grade two flare. The KPs were more pronounced in the RE. Fundus examination was normal in the RE, while macula edema and vitritis were observed in the LE, though there was no vitreous turbidity. His laboratory investigations, which included rheumatoid factor, serum protein electrophoresis and other tests were all normal. A diagnosis of chronic posterior uveitis secondary to HL was made and ocular treatment was initiated, and the child was referred to the paediatric hospital where the excisional biopsy of the inguinal lymph nodes was done. The histology results confirmed the HL diagnosis and the patient was commenced on appropriate management. The child was followed up for a period of one year and the HL resolved including the uveitis. Currently the child is on permanent follow up with the children’s hospital and the eye unit at CDH. Considering that the patient is under the age of 18, the mother consented for publication.

DISCUSSION
HL is usually seen in individuals aged 15-34 years and those over 55 years old [1]. The child reported in this case was 13 years old demonstrating that HL can still occur in children younger than 15 years. The incidence of pediatric HL tends to rise as family size increases and socioeconomic status decreases; the opposite has been reported with the adult form, which is associated with high socioeconomic status in industrialized nations [10]. The child discussed in this report was the sixth born and came from a poor socioeconomic status justifying the incidence occurrence. Although HL is more prevalent among males in all age groups, the nodular sclerosis subtype is more common among females [10]. This is consistent with what has been reported as the victim is male child. Unlike most other cancers, HL can be cured through a combination of medical management. Towler et al., 1999, reported achieving complete remission of ocular inflammation with chemotherapy [8, 11] just as the child in this case was treated successfully.

Ocular involvement in HL occurs by various mechanisms including direct lymphomatous or metastatic involvement of the choroid and the retina; paraneoplastic vasculitis; and iatrogenic complications.
arising from HL treatment or immunosuppression [5-7, 12]. In this case, the child was not immunosuppressed and could have been metastatic. These patients may exhibit infiltration of the ocular structures, retinal periphlebitis, focal chorioretinitis, vitritis, papillary edema, exudative retinal detachment, soft exudates, retinal hemorrhages, necrotizing retinitis, peripheral retinal exudates, and retinal white spots [3, 13]. The child under discussion exhibited with vitritis and macular edema just as described above.

CONCLUSION
This case demonstrates the occurrence of ocular Hodgkin’s Lymphoma despite it being rare. It also highlights the fact that ocular Hodgkin’s Lymphoma can occur in younger age. Hodgkin’s Lymphoma is treated with successful remission.

LIST OF REFERENCES

ABSTRACT
A 55-year-old female patient presented at Kasama General Hospital’s Eye Clinic with painful eyes, excessive tearing, foreign body sensation and blurred vision in both eyes. After examination the patient was diagnosed with Trachoma Trichiasis (TT), ectropion, exposure keratitis and facial nerve palsy. Patient underwent simultaneous multiple management involving Tarsal Plate Rotation (TPR), ectropion correction, physiotherapy and was treated for keratitis successfully.

INTRODUCTION
Normally, the upper and lower eyelids close tightly, protecting the eye from damage and preventing tear evaporation. If the edge of one eyelid turns inward (entropion), the eyelashes rub against the eye, which can lead to ulcer formation and scarring of the cornea. If the edge of one eyelid turns outward (ectropion), the two eyelids cannot meet properly, and tears are not spread over the eyeball [1]. These conditions are more common among older people due to increased tissue relaxation with age, eye changes caused by infection, surgery, or injury and people who have blepharospasms. Ectropion may occur in people with facial nerve palsy [2]. These eyelid pathologies are characterised by common presentation such as redness, tearing, irritation of the eyes and altered balance of the anterior and posterior lamellae of the eyelids. They involve more frequently the inferior eyelid and the therapy is mainly surgical [3].

CASE SCENARIO
A female patient aged 55 years came to the eye clinic from Kasama village with complaints of tearing, eyelashes rubbing onto the cornea, pain, redness and poor vision for one year. The patient reported history of epilation to relieve pain. On examination visual acuity was 6/12 Right eye and 6/36 Left eye. The eyelashes were rubbing on the cornea and there was dryness of the eye. The conjunctiva was injected and patient was in pain. The face was drawn on the left side due to facial nerve palsy on the right side (Fig 1). Diagnoses of Bilateral trachoma trichiasis (TTT), Bilateral ectropion, Facial palsy affecting left side and Bilateral keratitis was made.

Surgical correction involved Tarsal plate rotation and blepharoplasty. Medical management with antibiotics and physiotherapy was initiated. Consent for publishing this case and patient’s pictures was obtained from the patient herself.

DISCUSSION
All cases of trachoma trichiasis including ectropion should be subjected to corrective surgery of the eyelids. If left unattended to, these conditions can lead to an impaired optical function of the ocular surface through chronic irritation of the conjunctiva and the cornea [4]. The patient discussed in this case report had a rare presentation of trichiasis and ectropion that complicated to keratitis [5,7]. It was determined that early intervention was required in order to stabilise the tear film and to prevent recurrent corneal abrasions, corneal ulceration, corneal opacities and eventually vascularization as well as scarring of the cornea and conjunctiva as suggested by other researchers [6].

To address these multiple eye problems, a combination of Tarsal Plate Rotation (TPR) and blepharoplasty was conduct-
ed to correct entropion and ectropion respectively. Following surgery, there was improvement of the patient's vision and the pain was no longer there. The causes of ectropion include Facial nerve palsy and involutional. Normally, these two causes occur independent of each other. Strangely this patient had both situations occurring simultaneously. This posed a challenge in the management of such a combination of the two conditions. However, this was skilfully executed to the satisfaction of the patient.

This demanded good planning and teamwork as other disciplines were involved.

Keratitis was treated with tetracycline eye ointment and the patient equally responded well. Unfortunately, in literature there was no information regarding management of such combination of conditions. The management purely depended on experience and extensive consultation.

**CONCLUSION**

This case report shows that one can have multiple occurrence of ocular conditions with atypical presentation. Management of such a combination of ocular conditions requires experience, collaboration and skilfulness.

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SUBCONJUNCTIVAL FOREIGN BODY MISTAKEN FOR A SCLERAL TEA

Case Report
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ABSTRACT
A 35-year-old, male factory employee with retained subconjunctival foreign body in form of a glass particle in the left eye (LE) presented at Mazabuka General Hospital Eye Unit with chronic painful red eye, photophobia and epiphora for two months. On examination, his visual acuity was 6/6 for the right eye (RE) and 6/9 for the LE. There was mild upper eyelid swelling and ecchymosis. The posterior segment of both the right and left eyes had normal findings. A clinical diagnosis of the left eye ocular trauma was made with suspected scleral tear near the limbus at 9 O’clock position. Examination under local anaesthesia revealed a foreign body which was later removed. The sclera was found to be intact.

INTRODUCTION
Eye trauma refers to damage caused by an injury to the eye [1]. Trauma may affect not only the eye, but the adnexa, including adjacent tissue and bone structure [1,2]. There are many different forms of trauma, varying in severity from minor injury like eye foreign bodies to medical and surgical eye emergencies [1,2].

An ocular foreign body is any abnormal substance or object that is found on the eye, but does not belong to the eye [2,3]. The incidence of ocular foreign body is high especially in the industrial towns. It can occur at any age and in both genders. It affects the eye by mechanical effects, by introduction of infection or by specific reaction [1-3].

The reaction of the eye to a retained foreign body varies with the composition of particle [4]. The ocular reaction may be of three types in the first place, inorganic substances cause no specific reaction except for mechanical irritation and an exudative and fibroblastic isolation of the foreign body [4,5]. Secondly, a chemical reaction may produce a nonspecific or occasional specific damage. In the third place, organic material tends to set up a proliferative response characterized by the formation of granulation tissue with the giant cells [4,5].

Foreign bodies on the conjunctival surface are best recognized with slit-lamp examination. Foreign bodies can lodge in the inferior cul-de-sac or can be located on the conjunctival surface under the upper eyelid [4]. It is imperative to evert the upper eyelid to examine the superior tarsal plate and eyelid margin in all patients with a history that suggests a foreign body [4]. If several foreign bodies are suspected, double eversion of the eyelid with a Desmarres retractors or a bent paperclip is advised to allow the examiner to effectively search the entire arc of the superior cul-de-sac [4].

Usually the materials of extra ocular foreign body are coal, dust, sand, iron particles, glass, eye lashes, wood piece, husk of seed and wings of insect among others. Foreign bodies on the conjunctival surface are coal, dust, sand, iron particles, glass, eye lashes, wood piece, husk of seed and wings of insect among others. The Intra Ocular Foreign Body (IOFB), which penetrate the eye and retained are minute chips of iron or steel, stone, glass, lead pellets, copper, spicules of wood to mention but a few [1,3].

Ocular foreign body injuries are sometimes preventable. Vision is intimately linked with one’s ability to navigate the environment and can strongly affect our mental, physical and economic well-being. Losing one’s vision through an eye injury can lead to substantial long-term costs, and impact on an individual, their family and community.

CASE SCENARIO
A 35 year-old male factory worker from Mazabuka district in Southern Province of Zambia presented to Mazabuka General Hospital eye unit complaining of chronic painful red eye with sensitivity to light, tearing, headache and blurred vision for two months. He constantly got permission from work to seek medical attention for his eye condition of which he lost many man hours from work. He had received medical attention and treatment at several public and private health centres with no improvement. The pain remained the same despite receiving different types of topical medication and oral pain killers. He also received traditional herbs and tattoos without any improvement at all. He eventually sought for help from local private optician where he was prescribed photochromic spectacles.

He could not recall any history of ocular infection or trauma to the eye prior to the onset of this problem. He could not recall any history of work related accidents prior to the onset of the pain. However, he reported history of working under various departments, including factory maintenance department where he was attached a week prior to the onset of his ordeal. He was a constant user of safety glasses at work and he reported that the company was strict with the policy of safety attire at work stations. There was no history of known allergies in the family.

On examination, his Visual acuity was 6/6 on the RE and 6/9 on the LE. He had photophobia and tearing in the LE with subconjunctival haemorrhage. Slit lamp examination did not reveal any apparent corneal or conjunctival foreign body or lacerations and fluorescein staining was
negative. There was mild upper eyelid swelling and ecchymosis. The posterior segment of the LE had normal findings. The RE was quiet with normal anterior and posterior segment findings and his vital signs were normal. A diagnosis of LE blunt ocular trauma was made with suspected scleral tear near the limbus at 9 O’clock position. After taking written informed consent, this patient was taken to theatre for further examination and possible suturing of the suspected scleral tear. Under aseptic conditions the LE was given peribulbar injection as local anaesthesia while being mindful of ocular pressure. The conjunctiva was separated from the sclera to expose the source of the haemorrhage. A small piece of glass approximately 0.3 mm diameter was exposed and removed but the scleral was intact. The scleral blood vessels were cauterised and subconjunctival steroid antibiotic injection was given. Topical drugs, eye pad and analgesics were given. The patient was discharged the following day and reviewed after fourteen days. The pain and haemorrhage had subsided significantly and the patient was happy with this outcome.

Permission to publish this case was granted by the patient.

**DISCUSSION**

The subconjunctiva is a rare site for lodging of ocular foreign body. Seventy five percent (75%) of conjunctival foreign bodies lodge on the conjunctival surface of the upper eye [4]. Conjunctiva foreign bodies of the eye are common and can be removed with proper technique [4]. A conjunctival foreign body should be suspected if a patient present with a sensation of something in the eye. Patients with a conjunctival foreign body often state that their eye feels as if an irritating object (grit), sand, or glass is in the eye but that they cannot localize exactly where the sensation is [7,8]. The foreign body sensation is often worse upon blinking when the foreign body is located on the conjunctival (inner) surface of the upper lid. Corneal foreign bodies are easily detected as they are exposed clearly on the clear cornea and because it is highly innervated there is severe pain [7,8].

In this patient, the signs of conjunctival foreign body was not obvious as that of irritating eye object (grit) and sand sensation demonstrating that ocular foreign bodies can lodge without eliciting clear signs and symptoms. He did not give any account of trauma prior to the onset of his ordeal. He recalls strict adherence to safety goggles at work. He did not notice at any point that a foreign particle had lodged in his left eye neither did any of the staff who attended to him at various health centres, including our team at Mazabuka General Hospital on first examination. Glass particles and insect hairs are often difficult to see, but a careful search of the cul-de-sac with high magnification aids in identification and removal. In case of conjunctival foreign bodies there is need to search for signs of globe perforation [7,8]. In this case, glass particle foreign body embeld subconjectivally on to the sclera surface, which presented as a small conjunctival growth and caused local inflammatory response.

Eye injuries in the workplace are very common. More than 2,000 people injure their eyes at work each day. About 1 in 10 injuries require one or more missed workdays to recover from. Of the total amount of work-related injuries, 10-20 % will cause temporary or permanent vision loss [4]. Common causes for eye injuries are: flying objects (bits of metal, glass), tools, particles, chemicals, Harmful radiation and any combination of these or other hazards. Many times these foreign particles are missed and intervention is only sought 24 to 72 hours later [5]. There are three things one can do to help prevent an occupational eye injury; (1) know the eye safety dangers at work place (2) complete an eye hazard assessment (3) eliminate hazards before starting work [4].

The most recommended management of ocular foreign bodies is prevention by use of safety eyewear protection which includes non-prescription and prescription safety glasses, goggles, face shields, helmets and full-face respirators. The type of safety eye protection one should wear depends on the hazards at the workplace. Safety glasses with side protection (side shields) are recommended for particles, flying objects, or dust areas. Goggles are recommended for chemicals. Special-purpose safety glasses, goggles, face shields, or helmets are designed for near task radiation (welding, lasers, or fibre optics) [4,5].

Prompt referral to specialised emergency centres is recommended once ocular trauma is suspected or identified at first contact [6,8].

**CONCLUSION**

This case report highlights the importance of thorough ocular examination and good clinical acumen to avoid vision threatening complications because of retained foreign bodies. Glass particles are often challenging to identify and requires skill to manage successfully.
REFERENCES

Case Report

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ABSTRACT

Trichiasis a medical term for abnormally positioned eyelashes that grow back toward the eye, touching the cornea or conjunctiva. This can be caused by infection, inflammation, autoimmune disorders, congenital defects, eyelid agenesis and trauma such as burns or eyelid injury. Trachomatous trichiasis is the result of multiple infections from childhood with Chlamydia trachomatis, which causes recurrent chronic inflammation in the tarsal conjunctiva. This produces conjunctival scarring, entropion, trichiasis, and ultimately blinding corneal opacification. It is the leading cause of infectious blindness in the world. A 24-year-old female patient presented to Senanga’s Mata Rural Health Centre (RHC) where she was referred for eye checkup due to a chronic eye condition she had. The patient was a confirmed psychiatric case. Examination revealed severe misdirected eyelashes, cornea opacities and tearing bilaterally. A diagnosis of Trachoma Trichiasis was made. Despite the mental illness, Trachoma Trichiasis surgery was performed successfully, and the patient healed well.

INTRODUCTION

Trachoma is a disease of the eye caused by infection with the bacterium Chlamydia trachomatis which leads to Trichiasis after a chronic phase [1]. Trachomatous trichiasis (TT) is referred to as a cicatricial entropion of the upper eyelid which results into inward turning of eyelashes rubbing on the cornea causing constant pain and light intolerance [2]. If Left untreated, this condition can lead to corneal ulceration resulting in corneal opacification and eventually visual impairment or blindness [3]. TT can affect anyone regardless of their mental state. Mentally ill patients tend to be uncooperative, restless, mobile, illogical and impulsive making it difficult to handle them [4]. While it is necessary to gain understanding that TT can occur in either mentally ill or sound patients, Tarsal Plate Rotation Surgery remains the reliable option for Trachoma Trichiasis Management in our Zambian setting [5].

CASE SCENARIO

A 24-year-old female mentally ill patient presented to Senanga District Health TT Case management team with complaints of loss of vision, painful eyes, tearing, headache, foreign body and pricking sensation in her eyes which had been there for more than eight years. The mental illness had also been there for eight years. The patient was the eighth and last-born child. The patient had had the eye condition for over 8 years for which she received traditional medicines and all sorts of concoctions such as herbs mixed with fertilizer or sugar. Whenever she visited the nearest health facility situated 25 km away, she was only given some unknown eye ointments. Despite her being a known psychiatric patient, she was not on any anti-psychotic treatment as access to a reliable option for Trachoma Trichiasis remained the challenge to the family.

On account of being a mentally ill patient, her mother consented for her surgery and use of her information in any medical/clinical publication.

Though difficulty to handle due to her mental state, her visual acuity was checked, and findings were: light perception in both eyes.

Other examination findings were: entropion, turned in eye lashes touching the globe (Figure 1), mucopurulent discharge, upper tarsal scarring, cornea opacities in both eyes, hyper photosensitivity and failure to open her eyes. The face was dirty, and she was generally in a poor state of hygiene. Her Blood Pressure was 110/70mmHg.

Considering her mental status, she was subjected to retroviral test and Rapid Plasma Reaction (RPR) in order to rule out other causes of mental illness. Both tests were negative. She received her trachoma surgery after sedation with Diazepam intravenously. Both eyes were operated in one sitting in order to avoid going through the same challenges the next time. Local anaesthesia (lignocaine 2% with Adrenaline) was then infiltrated in her eyelids. Posterior Lamellar Tarsal Plate Rotation (Trabut) was successfully performed. After surgery, tetracycline eye ointment was applied in both eyes and thereafter padded for 24 hours. Painkillers were given to her and the following day the eye pads were removed. On her first day post operatively, her visual acuity improved to hand movements. One week follow up was done and her visual acuity was 6/36 in both eyes. A week after surgery, the patient seemed oriented in time and place although she exhibited inappropriate behaviour and she was a bit cooperative and calm. The TPR surgery outcome was successful as shown in figure 2 below.

Fig1: Showing bilateral ectropion and house flies on the face
DISCUSSION
Classically, the sequelae of trachoma trichiasis is visual impairment due to corneal opacities [6]. The patients with TT who are mentally stable are easier and straightforward to manage because of their being cooperative and heading to instructions. This is a clear demonstration that illnesses can affect anybody without considering mental status. Due to her mental state, it is possible that she could have had severe trachoma infection which could have complicated with TT at a tender age of 24. Such people do not need sedation or general anaesthesia (GA) to undergo an operation.

This patient was young and mentally ill. She presented with all sorts of challenges as outlined above. She had to be sedated for the surgery to take place. GA could have been the best option, but the place where surgeries were conducted from had no GA facilities.

Trachomatous visual impairment and blindness, which result from corneal opacification, have generally been thought of as irreversible [7]. On the contrary, the patient recovered good sight of 6/36 in both eyes after surgery.

As a result of the unpredictability of mentally ill patients a more individualized management approach with them is cardinal and their management needs patience, tolerance and good clinical acumen [4, 8]. In this case, the patient had to be sedated for the TPR surgery to be carried out.

Patients with mental illness can have significant and rapid mood and behavioural changes as well as sudden, volatile and aggressive outbursts which can be both verbal and physical. Therefore, staff members who interact with the patient are at risk of being victims of outburst [4, 9] hence proving difficulty to handle when conducting surgical management of TT. Equally in this case, the patient was aggressive, uncooperative that she had to be handled skilfully by the team to be sedated and for surgery to be done successfully. Despite all these challenges, the patient was managed successfully with some endurance.

CONCLUSION
Surgery to correct TT is a key component of all trachoma blindness control programmes in endemic countries. Therefore, mental state of an individual should not be a barrier to accessing TT surgery. World Health Organization recommends that TT surgery should be performed when the opportunity arises.
LIST OF REFERENCES

RAPID ASSESSMENT OF AVOIDABLE BLINDNESS IN MUCHINGA PROVINCE, ZAMBIA

Research Article


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ABSTRACT

Aim: To determine the prevalence and causes of blindness and visual impairment in Muchinga Province of Zambia using the RAAB methodology.

Method: Ninety (90) clusters of 40 participants aged 50 years and older were randomly selected. Consenting subjects underwent enumeration to establish a demographic profile and thereafter a clinical eye examination. Visual acuity (VA) was measured with a Tumbling ‘E’ chart. Participants having a VA worse than 6/18 were retested with a pinhole. If no improvement in VA occurred, subjects underwent clinical examination, including a dilated fundus examination where necessary, to determine the cause of visual impairment.

Results: A total number of 3,600 persons aged 50 years and above were sampled; among these 3,502 (97.3%) were examined. The age and sex-adjusted prevalence of bilateral blindness (presenting VA < 3/60) was 4.1% (95% Confidence Interval [CI], 3.4-4.9%), and age and sex-adjusted prevalence of bilateral severe VI (VA of <6/60-3/60) was 3.1% (95% CI, 2.4-3.8%). Avoidable causes of blindness such as cataract, glaucoma and non-trachoma corneal scarring were responsible for 89.8% of bilateral blindness and 86.1% of bilateral severe VI. Cataract was the major cause of blindness (53.0%); similarly, it was a major cause of severe VI (63.5%). The cataract surgical coverage in blind people adjusted for age and sex was low at 36.8% with significant gender difference of 45.8% for males and 27.6% for females. The main barrier for cataract surgery was inaccessibility of the service (49.1%); this was followed by lack of awareness of the available service (32.7%).

Conclusion: The prevalence of blindness and VI in persons aged 50 years and above was higher than estimated by WHO for Zambia. The majority of the causes were avoidable, with cataract accounting for 53% of all cases of blindness. The data suggests that expansion of eye care programmes to address avoidable causes of blindness is necessary in this area of Zambia.

Key words: Rapid Assessment of Avoidable Blindness, Cataract, Blindness, Visual Impairment, Prevalence .

INTRODUCTION

Globally, more than 82% of all blindness occurs in people U 50 years old [1]. In Africa, the prevalence is 7.3 blind people per million population [1]. These estimates are based on the World Health Organization (WHO) definition of blindness as presenting visual acuity (VA) less than 3/60 in the better eye and visual impairment as VA less than 6/18 but at least 3/60 in the better eye [2]. The study area is in the Africa-E WHO sub-region [3]. Resnikoff et al. [4] posit an expected Africa-E sub-regional prevalence of bilateral blindness in individuals U 50 years old of 9%. The implementation of the ‘VISION 2020: Right to Sight’ campaign has created global awareness of the causes of avoidable blindness and the need to provide evidence for eye health needs and the impact of interventions to guide future eye health strategies. This awareness has led to an expansion of epidemiological investigations as baseline data became more important. However, according to the International Centre for Eye Health, ‘Blindness surveys are usually lengthy, costly and complicated exercises, requiring expert assistance from epidemiologists or statisticians to produce reports [5]. It is for this reason that surveys have been undertaken in only a few countries and with only a few repeat surveys to determine the effect of the intervention programmes implemented. Comprehensive blindness surveys are therefore often not feasible for planning and monitoring VISION 2020 programmes. Affordable and faster methodologies are required.

The rapid assessment of avoidable blindness (RAAB) methodology has addressed this need. The RAAB study methodology elicits information on the magnitude and causes of blindness and vision impairment via reduced vision screening and ocular health screening of adults U 50 years old. In addition, this methodology provides information on the output and quality of eye care services, barriers to service, cataract surgical coverage and other indicators of eye care services in the study area. Numerous RAAB studies have been conducted in many countries around the world [6,7,8,9,10,11,12,13]. The RAAB survey provides a needs assessment in the region under investigation so that a focused district plan can be developed or adjusted accordingly.

Muchinga Province

Muchinga Province is located in the north-east of the country and borders with Tanzania in the north, Malawi in the east, and Eastern and Central Provinces in the south. The province is located on both sides of the Muchinga mountains (Muchinga Escarpment), which serve as...
a divide between the drainage basins of the Zambezi River (Indian Ocean) and the Congo River (Atlantic Ocean), making it geographically a hard-to-reach area. It is one of the most sparsely populated provinces in the country, with a population density of 8.1 persons per square kilometre and a population of 1,052,996 [14]. The main rivers of the province are the Luangwa River, a major left tributary of the Zambezi, the Chambeshi River, and a tributary of Lake Bangweulu in the drainage basin of the Congo. The northern part of the country receives the highest rainfall, with an annual average ranging from 1,100 mm to over 1,400 mm. The main economic activity for the province is agriculture, with livestock farming and the growing of cereals, cassava and beans at subsistence level [14].

METHODS
A 16-year-old female from Western Province was the RAAB study area Muchinga Province. The total population in the area was 1,052,996, with a mixture of urban, peri-urban and semi-rural areas [14]. The estimated total population of the region surveyed was 322,601, with the population for each district as follows: Chama 103,894, Chinsali 86,723, Isoka 72,189 and Shiawang’andu 59,795 [15]. As in the rest of Zambia, the delivery of eye care follows the district health model. Current eye health care infrastructure in the study area is found in a district hospital. Human resources for eye health in the area are ophthalmic nurses and clinical officers. Primary community health workers in the area refer to community health centres which also refer to the district hospitals.

Sightsavers, a non-government organisation (NGO), supports eye health services in the province through the seeing is believing programme.

A list of all the villages and their populations in the respective wards was collected from the various districts and sent to the trainers who then used this to select the clusters. The sampling procedure embedded in the RAAB software uses probability proportional to the size of the population methodology to randomly select villages automatically. The households within clusters were selected through compact segment sampling which involved choosing a start point within the village and moving from house to house, enumerating all eligible residents (whether at home at the time of visit or absent) until 40 eligible participants are enrolled. If any eligible participants were away from home at the time of the visit, the survey team would return to the house at the end of the day to meet with them. If they were still absent, a neighbour or friend would be asked for details on the individual’s visual status.

In order to facilitate the survey team’s work, the selected village was visited a day or two beforehand by the cluster informer. They worked with village leaders to produce a sketch map of the ward showing major landmarks and the approximate distribution of households in the village. The cluster informer requested that local leaders inform the residents of the visit of the survey team and requested that residents of 50 years and above stay around their homes on the day of the survey. The village leader also appointed a guide to work with the survey team on the day of their visit to introduce them to residents.

Large villages were split into segments where each segment would include approximately 40 people aged 50 years and above. One of the segments was chosen at random in collaboration with the village leaders by drawing lots and all households within the segment were included in the sample sequentially, until 40 people aged 50 years and above were identified, examined, and their data entered on the data collection programme on the smartphone.

If the segment had fewer than 40 people aged 50 years and above, then another segment was chosen at random and sampling continued. The sampling started at the edge of the village and all the households were sampled sequentially until 40 people aged 50 years and above had been examined.

If the village had fewer than 40 people aged 50 years and above, there was no need for segmentation and all the people of that age group were examined. In such cases, the cluster informer would inform the next village leader of the possibility of the RAAB team including his area in the survey.

Ethical approval
Ethical approval for this study was granted by the University of Zambia Research and Ethics Committee and cleared by the Ministry of Health. Permission to conduct the study was obtained from the Provincial Medical Office and the respective district medical offices.

When the team reached the area informed, (verbal) consent was obtained from the participants after providing information on the purpose, procedure and the possible benefits of the study. Participants were informed that participation was voluntary, and that all discussions and data collected from the study would be kept confidential, and that findings will be anonymously reported. Appropriate counselling, treatment or referral for eye problems was provided to study participants. All subjects in the study were examined after informed consent and information documents were signed. All individuals requiring further investigation for refractive correction, treatment of ocular disease or further investigative procedures were referred to the most appropriate and accessible eye care facilities. Findings from the research were disseminated to the community in a feedback session to the community and its leaders at the end of the study.

Training
The study was preceded by a training session and pilot study involving the enumerators and clinical team to ensure the ability of all individuals in the study to carry out their respective roles. Kappa values were used as a measure of inter-observer agreement between the clinical research team and a ‘gold standard’ team, with 0.6 being an acceptable standard. All clinicians satisfied this criterion. There were five survey teams, each consisting of an ophthalmologist and an ophthalmic nurse or ophthalmic clinical officer, as well as a driver and a cluster informer who would work independently of the survey teams to prepare the clusters for their visit.

Clinical examination
The standardised RAAB protocol was used in the clinical examination and involved the assessment of visual acuity
using a tumbling E optotype of 6/60 and 6/18 sizes. Subjects who failed testing on the 6/60 optotype target were retested with a pinhole occluder. Blindness was classified as VA < 3/60 in the better eye with available correction; severe visual impairment as VA between 3/60 and 6/60 in the better eye with available correction; and moderate visual impairment as VA between 6/60 and 6/18 in the better eye with available correction. The VA examination was followed by an examination of the crystalline lens and the posterior segment with a direct ophthalmoscope. Subjects presenting with VA < 6/18 and with no improvement with pinhole were dilated using 0.5% tropicamide solution, and a dilated ophthalmoscopy was performed to determine any posterior segment cause for vision impairment. All measurements were taken in full daylight with available correction. If the VA was <6/18 in either eye, then pinhole vision was also measured. If the vision improved to >6/18, then the condition was entered into the data as refractive error.

The participant was then moved to a dark location - this was usually in their homes, where the lens was assessed for cataract formation. If there was no cataract and the vision was still <6/18, the participants’ pupils were dilated with a short-acting mydriatic for direct fundoscopy. The fundus was then examined and the cause for vision loss recorded on the RAAB application.

A questionnaire on the barriers to cataract surgery and surgical success was administered to subjects presenting with cataracts or who had undergone cataract surgery respectively. Statistical analysis

The specific RAAB software package developed for the survey (Version 4.02) was used for data entry and standardised data analysis.4 Data were captured by double entry (to ensure reliability of data entry) and reports were generated daily to ensure consistency within the data capture process. Automated analyses produced reports on the unadjusted prevalence of visual impairment, causes of visual impairment, age- and gender-adjusted prevalence, and cataract surgical coverage. Multiple logistic regression analysis was conducted to determine associations between gender, age and education levels and various degrees of vision loss. The survey was carried out over 6 weeks from October to November 2009.

RESULTS

Demographics of the sample

The total number of people examined was 3,600 giving a response rate of 97.3%, of which 80 individuals (2.2%) were unavailable, 11 (0.3%) refused and 7 (0.2%) were not capable of taking part in the survey. Almost half of the people surveyed belonged to the 50-59 years age group. The age and gender composition of examined participants in relation to the population in the survey area is summarised in Table 1.

Table 1: Age and gender composition of examined participants in relation to the population in the survey area.

<table>
<thead>
<tr>
<th>Age Distribution</th>
<th>Male</th>
<th>Population</th>
<th>Female</th>
<th>Population</th>
<th>Total</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59 years</td>
<td>47.3%</td>
<td>44.9%</td>
<td>41.2%</td>
<td>43.3%</td>
<td>44.0%</td>
<td>44.1%</td>
</tr>
<tr>
<td>60-69 years</td>
<td>22.7%</td>
<td>28.6%</td>
<td>26.9%</td>
<td>33.1%</td>
<td>25.0%</td>
<td>30.9%</td>
</tr>
<tr>
<td>70-78 years</td>
<td>10.5%</td>
<td>18.8%</td>
<td>21.8%</td>
<td>17.3%</td>
<td>20.8%</td>
<td>18.0%</td>
</tr>
<tr>
<td>80-89 years</td>
<td>10.4%</td>
<td>7.7%</td>
<td>10.1%</td>
<td>6.3%</td>
<td>10.3%</td>
<td>7.0%</td>
</tr>
</tbody>
</table>

Females constituted 54.9% (1,921) of selected participants compared to 51.9% in the population.

Bilateral vision loss in the sample

Of 166 people in the sample, 4.7% (95%CI4.0-5.5%), were found to be bilaterally blind (defined as VA worse than 3/60 in the better eye with available correction - see Table 2). The prevalence was similar between males and females, 4.6% and 4.8% respectively. The prevalence of bilateral blindness, SVI and VI is summarised in Table 2.

Adjusting for differences in age and sex between the sample and survey area produced a prevalence of blindness of 4.1% (95%CI3.3-4.9% - see Table 3). Extrapolating this to the total population of the survey areas means that an estimated 2,315 people were blind, of whom 1,179 were females (50.1% female).
Sample prevalence of severe VI (presenting VA<6/60-3/60 in better eye) was 3.3% (95% CI 2.6-4.0%), and 31% (95% CI 2.4-3.8%) after adjustment for age and sex. Adjusted prevalence of VI was 3.3% among males and 2.9% among females, which means an estimated 895 males and 837 females with bilateral severe VI in the survey area. Sample prevalence of moderate VI (presenting VA<6/18-6/60 in better eye) was 10.2% (95% CI 8.8-11.5%) and 9.6% (95% CI 8.3-11.0%) after adjustment for age and sex. Adjusted prevalence of MVI was 9.9% among males and 9.4% among females which means an estimated 2,678 males and 2,733 females in the survey area (50.5% female).

Causes of vision loss in the sample
Cataract was the primary cause of bilateral blindness (53.0%), and bilateral severe VI (63.5%), and a major contributor to moderate VI (36.4%). Of the remainder of blindness, glaucoma accounted for 14.5%, non-trachomatous cornea opacity was 10.2%, other posterior segment disease 7.2%, trachoma corneal opacity 6.0%, phthisis 3.0%, other globe/CNS abnormalities 3.0% and cataract surgical complications 3.0% (Table 4).

Cataract blindness, surgical outcomes and cataract surgical coverage
After adjustment for age and sex, it was estimated that 3.6% (95% CI 2.9-4.3%) of eyes (approx. 4,059) were blind with a cataract (cataract may not be the major cause of blindness), Table 5. Nine hundred eighty-three (983) people (1.7%, 95% CI 1.2-2.3) in the survey area were estimated to be bilaterally blind with cataract and 2,092 (3.7%, 95% CI 3.0-4.4) were estimated to have one cataract blind eye, Table 5. No major differences were observed between males and females.

Of eyes (approx. 4,059) were blind with a cataract (cataract may not be the major cause of blindness), table 5. Nine hundred eighty-three (983) people (1.7%, 95% CI 1.2-2.3) in the survey area were estimated to be bilaterally blind with cataract and 2,092 (3.7%, 95% CI 3.0-4.4) were estimated to have one cataract blind eye, table 5. No major differences were observed between males and females.

Table 3: Extrapolated prevalence of blindness, severe (SVI), and moderate (MVI) visual impairment - bilateral presenting VA

<table>
<thead>
<tr>
<th>Feature</th>
<th>Males</th>
<th>% (95%CI)</th>
<th>N</th>
<th>% (95%CI)</th>
<th>N</th>
<th>% (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blindness</td>
<td>1,147</td>
<td>4.2 (3.1-5.4)</td>
<td>1,179</td>
<td>4.6 (3.1-5.0)</td>
<td>2,325</td>
<td>4.1 (3.4-4.9)</td>
</tr>
<tr>
<td>Severe VI</td>
<td>895</td>
<td>3.3 (2.4-4.2)</td>
<td>877</td>
<td>2.9 (2.0-3.7)</td>
<td>1,755</td>
<td>3.1 (2.4-3.8)</td>
</tr>
<tr>
<td>Moderate VI</td>
<td>2,678</td>
<td>9.8 (8.5-11.5)</td>
<td>2,733</td>
<td>9.4 (7.7-11.0)</td>
<td>5,414</td>
<td>9.6 (8.5-11.0)</td>
</tr>
</tbody>
</table>

Table 4: Causes of visual loss (with available correction) in the study sample.

<table>
<thead>
<tr>
<th>Cause of visual loss</th>
<th>Refractive error</th>
<th>Cataract</th>
<th>Cataract surgical complications</th>
<th>Corneal scar</th>
<th>Glaucoma</th>
<th>Diabetic retinopathy</th>
<th>Other posterior segment disease</th>
<th>Age related macular degeneration (AMD)</th>
<th>Trachoma corneal opacity</th>
<th>Phthisis</th>
<th>Other globe problems / CNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA &lt; 6/18</td>
<td>12</td>
<td>53</td>
<td>3</td>
<td>10</td>
<td>15</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>VA &gt; 6/18</td>
<td>48</td>
<td>63</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>VA = 6/18-6/30</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5: Age and sex-adjusted results for cataract and blindness, severe (SVI), and moderate (MVI) visual impairment - bilateral best corrected VA

<table>
<thead>
<tr>
<th>Feature</th>
<th>Males</th>
<th>% (95%CI)</th>
<th>N</th>
<th>% (95%CI)</th>
<th>N</th>
<th>% (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract blindness - VA&lt;6/30</td>
<td>415</td>
<td>1.6 (0.8-2.3)</td>
<td>588</td>
<td>1.9 (1.2-2.6)</td>
<td>983</td>
<td>1.7 (1.2-2.3)</td>
</tr>
<tr>
<td>Unilateral cataract</td>
<td>1,060</td>
<td>3.6 (3.0-4.5)</td>
<td>1,038</td>
<td>3.5 (2.4-4.6)</td>
<td>2,076</td>
<td>3.7 (2.0-4.4)</td>
</tr>
<tr>
<td>Cataract eyes</td>
<td>1,919</td>
<td>3.5 (2.7-4.4)</td>
<td>2,240</td>
<td>2.7 (2.0-3.4)</td>
<td>4,059</td>
<td>2.9 (2.0-3.4)</td>
</tr>
<tr>
<td>Cataract and Severe VI - VA&lt;6/30</td>
<td>289</td>
<td>1.1 (0.7-1.6)</td>
<td>341</td>
<td>1.2 (0.8-1.5)</td>
<td>630</td>
<td>1.1 (0.9-1.4)</td>
</tr>
<tr>
<td>Unilateral cataract</td>
<td>472</td>
<td>1.7 (1.0-2.5)</td>
<td>539</td>
<td>1.5 (1.0-2.0)</td>
<td>831</td>
<td>1.5 (0.9-2.0)</td>
</tr>
<tr>
<td>Cataract eyes</td>
<td>882</td>
<td>1.6 (1.1-2.1)</td>
<td>881</td>
<td>1.5 (1.0-2.1)</td>
<td>1,765</td>
<td>1.5 (1.1-2.1)</td>
</tr>
<tr>
<td>Cataract and Moderate VI - VA&lt;6/18</td>
<td>612</td>
<td>2.3 (1.6-3.2)</td>
<td>965</td>
<td>3.1 (2.6-4.0)</td>
<td>1,575</td>
<td>2.8 (2.3-3.3)</td>
</tr>
<tr>
<td>Unilateral cataract</td>
<td>722</td>
<td>2.7 (2.0-3.4)</td>
<td>500</td>
<td>1.9 (1.0-2.9)</td>
<td>1,287</td>
<td>2.3 (1.9-2.8)</td>
</tr>
<tr>
<td>Cataract eyes</td>
<td>1,679</td>
<td>3.1 (2.4-4.0)</td>
<td>2,070</td>
<td>3.5 (2.7-4.4)</td>
<td>3,749</td>
<td>3.5 (2.6-4.0)</td>
</tr>
</tbody>
</table>

Cataract surgical coverage (CSC) was reflected in the number of aphakic/pseudoaphakic people divided by the number who had operable cataract (i.e. the number of aphakic/pseudoaphakic plus the number needing surgery). Ninety-two (92) eyes (1.3%, 95% CI 1.0-1.6) examined in the survey were found to be aphakic or pseudoaphakic. Age and sex adjustment imply this extrapolated to 1,360 eyes in the survey population (1.2%, 95% CI 0.9-1.5%). Following adjustment for age and sex, 37% of people with VA<3/60 who required surgery were found to have received it. Males were more likely to have received surgery than females (45.8% vs 27.6%).

Twenty eight percent (28%) of people with VA<6/60 who required surgery were found to have received it, with...
These districts were selected because they were regions with inadequate eye health service before interventions were implemented. The response rate was 97.2% which can be considered very high. Although the cluster informers working with local leaders knew the village boundaries and residents well, the response rate could have probably been higher had the survey not been conducted during harvest time. Normally because of the mountainous terrain, villagers would camp at the farms away from the village until harvesting was complete. A proportion (0.3%) refused examination and the scope of the study did not provide an explanation for the reasons for refusal of the clinical examination.

The survey found a high prevalence of blindness (4.1%, 95%CI 3.4-4.9) compared to that obtained in Southern Zambia (2.3%) [16]. Results from other RAAB surveys done in Malawi [17], Rwanda [18] and Tanzania [19] ranged from 1.8-3.3% (unadjusted) which was lower than what was found in the study area. The prevalence of blindness in Muchinga was possibly higher than that of Southern Zambia due to a number of reasons: Southern Zambia’s demographic is an urban and rural setting with the presence of active eye health services. The extrapolated number of blind people in the four districts of Muchinga was 2,315. The proportion of blind people was higher for females than males, a finding common to other RAAB studies in the region, except in a RAAB conducted in South Malawi where the prevalence of blindness was higher in males than females.

The main causes of blindness in Muchinga were cataract, glaucoma and non-traumatic cornea opacities. Similar causes have been observed in other RAAB surveys in the southern province of Zambia and Malawi. This result is consistent with the current trend that cataract is the most common cause of blindness worldwide. Our study found that unoperated cataract is also the major cause of severe VI and that uncorrected refractive error is the primary cause of moderate VI. The finding of refractive error as the most common cause of VI could be due to the myopic shift induced by age-related nuclear sclerosis as reported by researchers for RAAB in Kwazulu Natal [20]. In this study, avoidable causes were responsible for 89.8% of blindness. The finding that most causes of blindness are avoidable justifies the initiative to address blindness in this area. The prevention of blindness initiative in this area should include the correction of refractive errors, which contributed to 48% of moderate VI.

The age and sex-adjusted cataract surgical coverage was low (37%) compared to studies from Malawi (44.6% unadjusted) [17], Kenya (78%) [21], Tanzania (68.9%) [19] and Rwanda (47%) [18]. Muchinga province has always depended on sporadic eye camps conducted by ophthalmologists from outside the province, with the support of cooperating partners. The low CSC could be due to the absence of a dedicated ophthalmic unit headed by an ophthalmologist. The finding of a low cataract surgical coverage for females (25.5%) has also been noted in other areas of Sub Saharan Africa [22].

WHO recommended that the grades of outcome for cataract surgery with an IOL are: good outcome VA >6/18 at 90%, borderline VA >6/60 at less than 5% and poor outcome of VA<6/60 at less than 5%. The high proportion of poor outcomes after cataract surgery in this survey could be due to a combination of factors, for instance there is no ophthalmologist to follow up patients and therefore manage any complications. In this study, the majority were attributed to poor patient selection and surgical complications. Most surger-

### Table 6: Age and sex-adjusted results for cataract surgical coverage

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract surgical coverage (eyes) - percentage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA&lt;3/60</td>
<td>32.6</td>
<td>16.8</td>
<td>25.1</td>
</tr>
<tr>
<td>VA&lt;6/60</td>
<td>25.0</td>
<td>12.5</td>
<td>19.0</td>
</tr>
<tr>
<td>VA&lt;6/18</td>
<td>17.2</td>
<td>7.8</td>
<td>12.5</td>
</tr>
<tr>
<td>Cataract surgical coverage (persons) - percentage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA&lt;3/60</td>
<td>45.8</td>
<td>27.6</td>
<td>36.8</td>
</tr>
<tr>
<td>VA&lt;6/60</td>
<td>36.7</td>
<td>19.1</td>
<td>28.0</td>
</tr>
<tr>
<td>VA&lt;6/18</td>
<td>24.3</td>
<td>12.2</td>
<td>17.7</td>
</tr>
</tbody>
</table>

The CSC was 36.8% at visual acuity <3/60 level; 28.8% at visual acuity <6/60 level, and 17.7% at visual acuity <6/18 level. Overall, CSC was greater amongst males than females.

Cataract surgical outcomes with available correction was relatively poor (Table 7). Exactly half of the eyes (50.0%) had a good outcome (can see 6/18), 17.0% had borderline outcome (can see 6/60) and 33.0% had poor outcome (cannot see 6/60). Among eyes operated on in the past three years, 58.1% of outcomes were good and 29.0% were poor. With best correction, the proportion of good outcomes could rise to 63.8%, borderline outcomes to 9.6% and poor outcomes would be 26.6%. Over half (61.3%) of the poor outcomes were conducted in the government hospital. Of the 94 eyes that received cataract surgery, all except three had an intraocular lens (IOL) inserted.

### Table 7: VA in operated eyes obtained after cataract surgery

<table>
<thead>
<tr>
<th></th>
<th>No IOL Eyes (n=3)</th>
<th>IOL Eyes (n=85)</th>
<th>All Eyes (n=94)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Available correction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good: Can see 6/18</td>
<td>0 (0.0)</td>
<td>47 (51.6%)</td>
<td>47 (50.0%)</td>
</tr>
<tr>
<td>Borderline: Can see 6/60</td>
<td>1 (33.3%)</td>
<td>15 (16.5%)</td>
<td>16 (17.0%)</td>
</tr>
<tr>
<td>Poor: Cannot see 6/60</td>
<td>2 (66.7%)</td>
<td>29 (31.9%)</td>
<td>31 (33.0%)</td>
</tr>
<tr>
<td><strong>Best correction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good: Can see 6/18</td>
<td>1 (33.3%)</td>
<td>59 (64.1%)</td>
<td>60 (63.8%)</td>
</tr>
<tr>
<td>Borderline: Can see 6/60</td>
<td>0 (0.0)</td>
<td>9 (9.9%)</td>
<td>9 (9.6%)</td>
</tr>
<tr>
<td>Poor: Cannot see 6/60</td>
<td>2 (66.7%)</td>
<td>23 (25.3%)</td>
<td>25 (26.6%)</td>
</tr>
</tbody>
</table>

### DISCUSSION

This study was conducted to create baseline information on the prevalence and causes of blindness in Muchinga region. These districts were selected because of a number of reasons: Southern Zambia’s demographic is an urban and rural setting with the presence of active eye health services. The extrapolated number of blind people in the four districts of Muchinga was 2,315. The proportion of blind people was higher for females than males, a finding common to other RAAB studies in the region, except in a RAAB conducted in South Malawi where the prevalence of blindness was higher in males than females.
ies, although conducted in a hospital environment, have a setting like that of an eye camp where the screening of patients preoperatively is inadequate; for instance, conditions like glaucoma may be missed as most patients present with dense cataract that obscures fundus view, and may not have had any examination before the development of cataract. Secondly, biometry is not conducted pre-operatively and patients are offered a standard lens which may not be appropriate for the patient.

In our study, half of those that had not accessed surgery for cataract reported that they were not able to access the service. Studies have reported that major reasons for low cataract surgical rates include the following: low demand because of fear of surgery, low demand from poor people because of high cost of surgery, low demand because of poor visual results, lack of eye surgeons (particularly in Africa), old age, no available services close to the community, and lack of awareness of available surgical services [23].

In our study, subjects with blindness owing to bilateral cataracts (32.5%) did not seek intervention because they were 'unaware of treatment'.

**CONCLUSION**

The prevalence of blindness in Muchinga province of 4.1%. Although lower than the WHO projected for Africa, it remains higher than that obtained in the region. Cataract is the commonest cause of blindness in Muchinga with refractive errors being the main cause of VI. Eye health services are severely inadequate and inaccessible.

Cataract surgical coverage is low and there is an obvious gender imbalance in the accessibility of cataract service. Information/sensitisation on the availability of services is also low. The quality of cataract surgeries performed in the area is below the WHO recommendation.

It is therefore evident that eye health services are not available in Muchinga province and the result of this survey justifies Sightsavers extending the services to Muchinga province.

**Competing interests**

The authors declare that they have no financial or personal relationships which may have inappropriately influenced them in writing this article.

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DIABETIC RETINOPATHY AMONG PATIENTS ATTENDING UNIVERSITY TEACHING HOSPITALS ADULT HOSPITAL MEDICAL CLINIC IN LUSAKA

Research Article
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**ABSTRACT**

**Purpose:**
Diabetic retinopathy (DR) is a blinding complication of diabetes mellitus and a leading cause of visual impairment in people aged 20–64 years. Retinopathy develops overtime in all diabetics and controlling the modifiable risk factors delays its onset and reduces progression. This study was carried out to assess DR; its prevalence and associated clinical and demographic characteristics among patients attending the UTHs-Adult Hospital medical clinic in Lusaka, Zambia.

**Methods:**
This was a hospital-based cross-sectional study carried out from 18th December, 2018 to 16th April, 2019 at the adult medical diabetic clinic. Snellen visual acuity (VA), blood pressure, weight and height were measured as well as relevant demographic and medical information collected. Retinal images were captured after pupil dilatation and used for grading retinopathy using the International classification of DR scale. The worse eye was used to grade for DR.

**Results:**
A total of 213 participants were studied with a female to male ratio of 2.3:1. The median age was 53 years and majority (183=85.2%) had type 2 diabetes. Median duration of diabetes was five years. Median glycated haemoglobin level was high at 8.1%. One hundred sixty-three participants (76.5%) had normal VA and six (2.8%) were blind.

The prevalence of DR in this study was 47.4%; 95% CI 40.8%-54.2% (101 participants), with 8.9% (19 participants) having proliferative diabetic retinopathy. Diabetic macula oedema was present in 24 (11.3%); 95% CI 7.5%-16.1%. Duration of diabetes was the most significant (p<0.0001) association found with retinopathy.

Even though 104 participants (51.1%) had the knowledge that diabetes affects the eyes, only 55 (25.8%) had had a dilated eye examination in the preceding twelve months.

**Conclusion:**
A high prevalence of DR among patients attending the adult medical diabetic clinic was found in this study, with only about a quarter of them having had dilated eye examination in the preceding twelve months. The study findings suggest that better advocacy for retinopathy screening and diabetes control needs to be implemented at the UTHs-Adult Hospital in Lusaka.

**INTRODUCTION**
Diabetic retinopathy is a common microvascular complication of diabetes mellitus (DM) [1] and also a leading cause of visual impairment in people aged 20–64 years affecting 1 in 3 persons with diabetes ([2]). The International Agency for Prevention of Blindness (IAPB) reports that 75% of diabetes burden is in low to middle income countries and that DR is emerging among the top causes of vision loss globally [3]. Risk factors for visual impairment that have been identified from studies such as the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) include poor glycaemic control, hypertension, smoking and severity of baseline retinopathy [4]. Controlling blood sugar levels reduces the annual incidence of DR but not the lifetime risk of developing DR as it usually develops over time in all diabetes patients [2]. In most cases of DR, an actual decrease in visual acuity is not noticed until progression to very advanced disease occurs [2]. This delays the presentation to any eye health care personnel [5].

A study from the Copperbelt province of Zambia based on a screening programme found a prevalence rate of DR of 52%, which was higher than average from other studies [6]. In a Malawian cohort of patients from diabetic clinics, DR was the most common primary cause of vision loss (38.6%), followed by cataract (16.5%), and both DR and cataract (3.9%) [7]. Cleland et al. looked at a DR screening programme in Tanzania and of the 3463 people analysed, DR was found in 27.9% of people, maculopathy in 16.1%, Proliferative diabetic retinopathy (PDR) in 2.8%, non-proliferative diabetic retinopathy (NPDR) in 25.1% [8]. In the capital city of Zambia – Lusaka, there was a lack of data on the level of retinopathy in diabetic patients and whether the patients are having regular dilated eye examination done by a health worker trained to perform fundoscopy. This study aimed at ascertaining what the prevalent severity of DR was in patients at UTHs adult hospital medical clinic to determine if there was as high a prevalence of DR at UTHs as seen in the Copperbelt. It also assessed risk factors that were associated with DR and whether diabetes patients were having dilated fundoscopy regularly.

**METHODOLOGY**
This was a hospital-based cross-sectional study carried from 18th December, 2018 to 16th April, 2019 at the University Teaching Hospitals (UTHs) in Lusaka. The UTHs include the Adult and Emergency Hospital, Eye hospital, Cancer Diseases Hospital, Children’s Hospital, and Women and New Born Hospital. Participants were DM patients recruited weekly into the study from the Adult Hospital medical diabetes clinic. Eye examination equipment was set up in a designated room during the clinic and information collected by ophthalmic personnel from the Eye Hospital and the principle investigator. The sample size was 213 participants; calculated using the prevalence formula for a finite population. Inclusion criteria were...
known DM patients who consented to take part in the study. Exclusion criteria included patients with ocular media not clear for classifying fundus photos in both eyes and patients found to have retinal co-morbidities, during fundus imaging, affecting the grading of DR. Every consecutive diabetic patient meeting inclusion criteria was included in the study.

A researcher-administered questionnaire for information regarding the demographic characteristics of the patients, the relevant diabetes medical and ocular history and a section for the findings of blood pressure (BP), Body Mass Index (BMI), pin hole visual acuity (VA) and retinopathy grading was used for data collection. Other tools used included Snellen chart, pin hole, Digital Retinography System (DRS) fundus camera by Centervue, Italy, Sphygmomanometer, weighing scale and height scale, and blood collection consumables. Patients were identified as they were waiting for the physician’s review and informed consent was obtained. Those found to have ocular media not clear enough to get gradable retinal images in both eyes were excluded from the study and referred to a consultant ophthalmologist at the eye hospital for further assessment and management. After measurement of VA, BP and BMI, the participants’ pupils were dilated with one drop of a mydriatic eye drop that had a combination of tropicamide 0.8% and phenylephrine 5%. DRS fundus camera was used once the pupils were dilated to capture retinal images. Both colour and red-free retinal images were captured from both eyes and graded to assess the severity of retinopathy. The worse eye or the only eye with a gradable image was used in the analysis. The principle investigator read all retinal images and graded using the international classification of DR. One consultant ophthalmologist randomly reviewed selected images to ensure quality and adherence to the international standard and protocol for the study.

Data was collected and entered in a Microsoft Excel spread sheet. Analysis was done using STATA version 13.1. Continuous variables were tested for normality using Shapiro-Wilk test. The chi square and Mann-Whitney tests were used to compare no DR to DR depending on the type of variable. To determine the correlation between two normally distributed independent variables Pearson coefficient was used; while Spearman coefficient was used for non-normally distributed variables. In the final analysis to rule out confounders, a multiple logistic regression model was constructed using a cut off of 20% for the variables. Age, HbA1c and use of Anti-HTN medication were included in the final analysis due to significant associations found in several other studies. The model helped identify factors that were associated with DR after adjusting for baseline characteristics. A p-value <0.05 was regarded as significant.

Figure 1: Procedure flow chart
RESULTS

Table 1: Socio-demographic characteristics of participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Proportion [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Median 52 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IQR (25%-75%)</td>
<td>44-63 years</td>
</tr>
<tr>
<td>Sex</td>
<td>Female 150 (70.4%)</td>
<td>Male 63 (29.6)</td>
</tr>
<tr>
<td>Occupation</td>
<td>Not employed 47 (22.07)</td>
<td>Informal employment 109 (81.17)</td>
</tr>
<tr>
<td>Education</td>
<td>None 35 (10.43)</td>
<td>Primary 50 (23.47)</td>
</tr>
<tr>
<td>Smoking</td>
<td>Yes 7 (2.9)</td>
<td>No 206 (86.71)</td>
</tr>
<tr>
<td>Alcohol intake</td>
<td>Yes 33 (15.49)</td>
<td>No 180 (84.51)</td>
</tr>
</tbody>
</table>

Of the 213 study participants, 30 (14.8%) had type 1 DM and 183 (85.2%) had type 2 DM. The median duration of DM was 5 years (IQR = 2-10 years). The median duration of attendance at UTHs adult hospital medical clinic was 3 years (IQR = 6 months to 7 years).

One hundred fifteen (54.5%) participants were taking insulin for DM control while 80 (37.6%) were taking oral hypoglycaemic medication. Twelve (5.6%) participants were taking both insulin and oral hypoglycaemics with 87 (40.8%) participants also taking anti-hypertensive medication.

One hundred twenty four (58.2%) participants did not report any complications arising from diabetes. However, 13 (6.1%) gave a history of diabetic foot, 67 (31.5%) had peripheral neuropathy and 3 (1.4%) had kidney-related complications.

Systolic BP measurements were normal in 117 (54.9%) participants, with 61 (28.6%) having stage 1 hypertension and 35 (16.4%) having stage 2 hypertension levels. Diastolic blood pressure measurements were normal in 142 (66.7%) participants, with 41 (19.2%) having stage 1 hypertension and 30 (14.1%) stage 2 hypertension. The BMI was normal for 78 (37.7%) participants, 69 (33.3%) participants were overweight and 60 (29.0%) of the participants were obese.

When asked if they had had a dilated eye examination in the preceding 12 months, 55 (25.8%) responded positively. The median age of participants who had the examination (58 years) was significantly higher than those who did not (52 years).

Univariate logistic regression analysis revealed that those with tertiary level of education (p=0.038), longer duration of medical diabetes clinic attendance (p=0.009), and those with knowledge that diabetes has eye complications (p=0.034) were more likely to have had a dilated eye examination in the preceding 12 months.

Regarding knowledge about the ocular complications of DM, 104 (51.2%) participants had some idea with poor vision and blindness being the most common responses. There was no statistically significant difference in terms of gender (p=0.203) nor education level (p=0.114) in relation to knowledge about the ocular complications of DM.

Diabetic retinopathy and maculopathy were classified using the ICO international classification of DR. DR was present in 101 (47.4%; 95% CI 40.7% - 54.2%) participants while 112 (52.6%; 95% CI 45.8% - 59.3%) participants had no DR. Eighty two (38.5%; 95% CI 32.1% - 45.3%) had NPDR and 19 (8.9%; 95% CI 5.7% - 13.6%) had PDR. 24 (11.3% with 95% CI 7.6% - 16.3%) participants had DME. No participant had had previous laser treatment for DR.

In the univariate analysis (table 2) the factors significantly associated with DR included duration of DM (p=0.001), duration of clinic 5 attendance (p=0.040), type of DM medication used (p=0.010), DM related illnesses (p=0.001), BMI class (p=0.030) and alcohol intake (p=0.002). In the multiple logistic regression analysis (table 3), duration of DM (p<0.0001), having diabetic foot (p=0.006) and alcohol intake (p=0.005) were maintained as factors found to be statistically significant associations of DR.

For maculopathy, only duration of DM was found to be a statistically significant association (Odds ratio=1.10 with 95% CI 1.03-1.18).
Figure 2: Distribution of DR among participants

Table 2: Univariate analysis of associations of Diabetic retinopathy and maculopathy

<table>
<thead>
<tr>
<th>Variable</th>
<th>No DR</th>
<th>NPOR</th>
<th>POR</th>
<th>p-value</th>
<th>No DME</th>
<th>DME</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age [median years]</td>
<td>51.5 54 52</td>
<td>0.712 0.110</td>
<td>0.027 0.363</td>
<td>0.157</td>
<td>0.371</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>40 18 5</td>
<td>56 7</td>
<td>0.110 0.363</td>
<td>0.563</td>
<td>0.862</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>72 66 14</td>
<td>13 17</td>
<td>0.047</td>
<td>0.762</td>
<td>0.762</td>
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<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>None</td>
<td>26 17 3</td>
<td>40 6</td>
<td>0.241 0.501</td>
<td>0.501</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Formal</td>
<td>26 22 7</td>
<td>52 5</td>
<td>0.027 0.387</td>
<td>0.387</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level (n)</td>
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<td>30 5</td>
<td>0.670 0.035</td>
<td>0.035</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>10 11 6</td>
<td>42 8</td>
<td>0.010 0.001</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Secondary</td>
<td>32 19 4</td>
<td>41 4</td>
<td>0.001 0.001</td>
<td>0.001</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>28 37 7</td>
<td>76 7</td>
<td>0.766</td>
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<tr>
<td>Smoking (n)</td>
<td>No</td>
<td>140 77 18</td>
<td>183 73</td>
<td>0.001 0.001</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2 4 1</td>
<td>9 1</td>
<td>0.010 0.001</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol (n)</td>
<td>No</td>
<td>100 68 11</td>
<td>161 19</td>
<td>0.010 0.001</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12 13 6</td>
<td>28 5</td>
<td>0.001 0.001</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of DM (n)</td>
<td>Type 1</td>
<td>16 10 2</td>
<td>30 0</td>
<td>0.830 0.003</td>
<td>0.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 2</td>
<td>94 72 17</td>
<td>159 24</td>
<td>0.040 0.071</td>
<td>0.071</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of DM (years)</td>
<td>3 7 10</td>
<td>&lt;0.0001 5 10.5</td>
<td>&lt;0.0001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DM medication (n): None 5 1 0 5 1 0 1 | 0.010 0.007 | 0.007 |
Insulin | 62 43 10 | 105 10 | 0.001 0.001 | 0.001 |
Oral hypoglycemic | 44 31 5 | 72 8 | 0.001 0.001 | 0.001 |
Both | 1 7 4 | 7 5 | 0.001 0.001 | 0.001 |
Anti-HTN medication (n): Yes 45 38 6 | 76 11 | 0.001 0.001 | 0.001 |
No | 67 46 13 | 113 13 | 0.001 0.001 | 0.001 |
Other DM-related illnesses (n): | Renal disease | 0 2 1 | 1 2 | 0.010 0.010 | 0.010 |
Diabetic foot | 3 3 0 | 5 5 | 0.010 0.010 | 0.010 |
Peripheral neuropathy | 38 24 5 | 62 5 | 0.010 0.010 | 0.010 |
None | 68 51 8 | 112 12 | 0.010 0.010 | 0.010 |
Duration of medical diabetes clinic attendance (years) | 2 4 3 | 2 3.5 0.071 | 0.071 |
BMI class (n): Normal | 39 32 7 | 64 14 | 0.010 0.010 | 0.010 |
Overweight | 31 36 12 | 60 5 | 0.010 0.010 | 0.010 |
Obese | 39 22 0 | 60 0 | 0.010 0.010 | 0.010 |
HbA1c (%) | 7.5 8.17 9.3 | 2.15 8.0 9.2 | 0.250 0.250 | 0.250 |
BP (n): Norm | 66 41 10 | 107 10 | 0.010 0.010 | 0.010 |
Stage 1 HTN | 20 20 41 | 55 6 | 0.010 0.010 | 0.010 |
Stage 2 HTN | 18 12 5 | 27 8 | 0.010 0.010 | 0.010 |
DBP (n): Normal | 73 55 14 | 127 15 | 0.010 0.010 | 0.010 |
Stage 1 HTN | 24 14 3 | 37 4 | 0.010 0.010 | 0.010 |
Stage 2 HTN | 16 12 2 | 26 5 | 0.010 0.010 | 0.010 |
Table 3: Multiple logistic regression analysis of risk factors associated with diabetic retinopathy

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds ratio</th>
<th>95% Confidence Interval</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.00</td>
<td>0.97 - 1.02</td>
<td>0.826</td>
</tr>
<tr>
<td>Alcohol</td>
<td>3.48</td>
<td>1.46 - 8.26</td>
<td>0.005</td>
</tr>
<tr>
<td>Duration of DM</td>
<td>1.12</td>
<td>1.05 - 1.19</td>
<td>0.0001</td>
</tr>
<tr>
<td>DM medication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>15.77</td>
<td>5.14 - 56.58</td>
<td>0.0001</td>
</tr>
<tr>
<td>Oral hypoglycaemic insulin</td>
<td>23.72</td>
<td>7.81 - 71.37</td>
<td>0.0006</td>
</tr>
<tr>
<td>Both</td>
<td>127.48</td>
<td>514.44 - 3,192</td>
<td>0.0001</td>
</tr>
<tr>
<td>Anti HTN medication</td>
<td>1.33</td>
<td>0.66 - 2.66</td>
<td>0.420</td>
</tr>
</tbody>
</table>

Other DM-related illnesses:

- Renal disease: 23.02, 1.57 - 237.60, 0.002
- Diabetic foot: 6.28, 1.60 - 23.54, 0.006
- Peripheral neuropathy: 3.00, 0.430 - 1.63, 0.601

Duration of medical diabetes clinic attendance: 0.98, 0.91 - 1.06, 0.591

HbA1c: 1.05, 0.90 - 1.22, 0.558

Glycated haemoglobin (HbA1c) findings showed a median value of 8.1%, with the lowest being 4.6% and highest 13%. The median HbA1c level increased with the severity of DR as shown in figure 2 below.

Figure 3: HbA1c levels in different grades of DR

Using the International Classification of Diseases 11 (ICD 11) VA was graded, upon which classification of visual impairment and blindness was determined. One hundred sixty three (76.5%) participants had normal visual acuity, 44 (20.7%) had visual impairment and 6 (2.8%) were blind.

Table 4: ICD 11 class of visual acuity of participants

<table>
<thead>
<tr>
<th>ICD 11 Class</th>
<th>Visual acuity</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal vision</td>
<td>&lt;6/12</td>
<td>168 (76.53)</td>
</tr>
<tr>
<td>Visual impairment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>&lt;6/12</td>
<td>24 (13.27)</td>
</tr>
<tr>
<td>Moderate</td>
<td>&lt;6/18</td>
<td>17 (7.90)</td>
</tr>
<tr>
<td>Severe</td>
<td>&lt;6/60</td>
<td>2 (1.41)</td>
</tr>
<tr>
<td>Blindness</td>
<td>&lt;2/90</td>
<td>6 (2.82)</td>
</tr>
</tbody>
</table>
DISCUSSION

This was a cross sectional study looking at the prevalence of DR and its associated risk factors. Duration of DM, microvascular complications and alcohol intake were found to be associated with DR. The prevalence of DR was found to be 47.42% (95% CI 40.75% - 54.18%) in this study. This result reaffirms the findings of the Copperbelt province study where prevalence of DR was found to be 52% [6]. The median age of participants in this study was 53 years (IQR=44 to 63 years) which was consistent with many studies looking at participants with both type 1 and type 2 diabetes [6,9]. This study had a high ratio of female to male participants (2.3:1). Generally, females are more than males in study populations of type 2 DM or type 1 and 2 combined [10,11]. The number of smokers was very small in this study and no association was found with DR. Smoking is not an established known risk factor for DR, particularly type 2 DM, though it has been associated with DR in type 1 DM [12].

In studies involving the adult population, type 2 DM is more prevalent than type 1 DM [13,14] and this was the case in this study too. The type of DM had no impact on DR in this study. Type 1 DM participants had a median duration of DM of 5 years while for type 2 DM participants it was 5.5 years.

Among the participants, 40.85% were taking anti-hypertensive medication. Among those found to have stage 2 hypertension level systolic and diastolic BP, less than 70% were taking anti-hypertensive medication. However, no significant association was found with any of these three BP parameters and DR in this study. This is comparable to findings from studies by Akpalu (2011) and by Rotimi et al., (2003) from Africa [15,16]. However, major epidemiological studies such as the UKPDS have shown that strict control of BP is associated with reduced risk of DR and it’s progression though the effect wears off with cessation of such control [17]. Other studies also show an association with stage 1 or 2 hypertension level of blood pressure and DR [8,18]. Findings from a review done by Do et el in 2015 showed that strict hypertension control had a modest effect in reducing the incidence of DR by 4 to 5 years but lack of effect on progression of DR over the same time period [19]. Thus, hypertension control in DM patients is advised to reduce the overall morbidity associated cardiovascular disease rather than to reduce progression of DR [20].

Retinopathy, nephropathy and neuropathy are all microvascular complications of DM and have been shown to be present simultaneously in an individual. Three patients had nephropathy in this study and 2 of these had NFPDR while 1 had PDR. Having a DM-related complication was also found to be significantly associated with DR in this study (p<0.0001).

The University Teaching Hospitals are tertiary level referral hospitals for the whole of Zambia. As such most of the DM patients seen are those that were poorly controlled from local health centres or have severe comorbidities. Type 1 DM patients require insulin for adequate glycaemic control while for type 2 DM patients oral hypoglycaemic medication may be enough but about one third need insulin [21]. These two factors can explain the high number of participants using insulin in this study. Unadjusted p-value suggested an association between medication used and DR though this was not significant in the multiple analysis. Some studies report majority of participants taking oral hypoglycaemics [6] while others report higher rate of insulin use, particularly in hospital patients [14,22].

Strict glycaemic control has been shown to reduce the occurrence of DR as presented in the UKPDS study where mean HbA1c was 7.0% in the strict glycaemic control group and 7.9% in the conventional group [23]. A systematic review looking at HbA1c and DM showed significant association with DR at HbA1c levels of 5.8% to 7.3% and suggest a threshold of 6.5% for diabetes-specific retinopathy [24]. In this study, there was no statistically significant association between the overall median HbA1c level and DR. However, the box and whisker plot shown in figure 3 indicates the median HbA1c was progressively higher from the ‘no DR’ to ‘PDR’ groups. The median for the ‘no DR group’ (7.5%) was higher than that of the ‘no DR groups’ in other studies showing generally poor glycaemic control in this study sample [18]. Other studies with similar samples of mostly type 2 DM patients also did not find association between HbA1c and DR [25,26]. Generally, when looking at glycaemic control and DR, evidence is available to show intensive glycaemic control lowers risk of incidence and, to a lesser extent, risk of progression of DR in patients with younger-onset or type 1 disease [27]. For older or type 2 patients, this is not so apparent [28].

A little more than half of the participants (51.1%) in this study had some knowledge about diabetes affecting the eyes though the knowledge was not specific to retinopathy. Sadly, this knowledge gap was seen even among the participants who had a positive medical background. The most common responses were visual impairment and blindness. Other studies have shown a much higher percentage of diabetic patients with knowledge that diabetes affects the eye; 75.62% from a Saudi Arabian study and 89.0% from a Tanzanian study [29,30]. This highlights gaps in sensitisation and dissemination of information at the primary health care level as well as during specialized medical diabetic clinic visits in this setting.

Despite about half of participants knowing that diabetes affects vision, only 28.8% had had a dilated fundal eye examination in the preceding twelve months. This low rate is consistent with other studies- 28.8% in the study by Mumba et al. in Tanzania [29]. Yearly eye screening for DR is the current recommended practice for all diabetics, particularly those with no DR on initial screening [2]. This could be a proxy indicator of physicians eventually referring diabetic patients for fundoscopy overtime though this could also be attributed to patients developing visual complaints.

As seen with other hospital-based studies, the prevalence of DR (47.42%) in this study was higher than findings from population-based studies. This value was closer to the 49% prevalence of DR found in the study by Akpalu et al in Ghana [15] and the 52.0% in the Copperbelt province of Zambia [6]. In contrast, DR was found in only 27.9% in a population-based Tanzanian study on enrolment into a screening programme [8]. The systematic review by Burgess et al had a range of DR from 9.55% to 62.4%, with maculopathy ranging from 1.2% to 31.1% across East and Southern Africa [7]. Grading of DR by means of retinal photographs (used in this study) as opposed to ophthalmoscopy has been found to produce higher frequency of DR detected [31].
Final risk factor analysis revealed duration of DM as the most important risk factor for DR in this study. This is consistent with all studies done analysing risk factors and it is known that all diabetics develop DR overtime [32]. Alcohol intake and diabetic foot were also found to be associated with DR in our study; though the 95% confidence intervals were not even and slightly wide suggesting less significance than indicated by the p-value. A UK primary-care based study did find an association of alcohol intake with DR [33]. According to a meta-analysis study in 2016 by Zhu et al., alcohol intake was not associated with increased risk of DR, even in subgroup analysis of type of alcohol [34]. No African study was part of the meta-analysis though. In our study, no quantification of type and frequency of alcohol intake was done and this would need to be further studied to explore any real association with DR.

CONCLUSION

From this study, a high prevalence rate of DR at 47.42% (95% CI 40.75% - 54.18%) was seen among patients attending the UTHs-Adult Hospital medical diabetic clinic in Lusaka. NPDR was present in 38.5% and PDR in 8.92% while 11.27% (95% CI 7.46%-16.13%) had diabetic macula oedema. Duration of diabetes was the most significant association found with retinopathy. Median HbA1c was 8% which showed poor average glycaemic control among participants. Even though 51.1% had the knowledge that diabetes affects the eyes, only 25.82% had had a dilated eye examination in the preceding twelve months

RECOMMENDATIONS

From these findings, it is recommended that more sensitisation programmes in the primary health care facilities on need for regular retinal examinations in diabetic patients are needed. Also, regular HbA1c testing needs to be used as a means to assess glycaemic control in patients attending the medical diabetic clinic. This includes advocating for supportive laboratory services. Another recommendation is to scale up country wide DR screening using retinal photography across Zambia. This includes use of telemedicine for interpretation of images from areas with trained photographers but not trained image graders or ophthalmologists. Further studies are also needed with larger sample sizes for a definite risk factor analysis in both hospital-and community-based settings in Lusaka.
CASCADING SCREENING FOR DIABETIC RETINOPATHY AT THE UNIVERSITY TEACHING HOSPITALS: STRATEGIES TO OVERCOME BARRIERS

Research Article

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3Department of Ophthalmology, School of Medicine and Clinical Sciences, Levy Mwanawasa Medical University, Lusaka, Zambia
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5Provincial health office, Ministry of Health, Lusaka, Zambia
6Directorate of Clinical Care and Diagnostic Services, Ministry of Health, Lusaka, Zambia

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ABSTRACT

Objective: To develop a diabetic retinopathy strategy for early detection of sight-threatening diabetic retinopathy in Zambia.

Background: The Ministry of Health (MoH), Zambia, embarked on a programme to scale up the initiative for Universal Health Coverage of services across the continuum of health care throughout the country. The University Teaching Hospitals (UTHs) was tasked to play a pivotal role in this noble cause in line with MoH’s vision of bringing health as close to the family as possible. A National Diabetic Retinopathy Screening (DRS) programme was commenced in 2012 in collaboration with the Frimley Park Hospital of the United Kingdom (UK).

Methods: The DRS programme is based on fundus camera screening using the UK protocol. This is both community and hospital based. The idea was to develop strategies that would ensure the capture of all diabetic patients in the country and have them screened for diabetic retinopathy (DR). A national Diabetes Mellitus (DM) register was also to be created where all the DM patients would be registered and accounted for. The UTHs – Eye Hospital (UTHs – EH) was to implement the programme at the University Teaching Hospitals (UTHs), in Lusaka Province and oversee the roll out the national DRS programme through the National Eye Health Coordination (NEHC) office. In this endeavour, in 2018, the UTHs – EH introduced a weekly DRS screening clinic at the medical clinic of the UTHs – Adult Hospital (UTHs – AH) to increase the uptake of DRS by all the DM patients attending the diabetic clinic.

Results: A total of 1517 DM patients had both their eyes screened for DR at the UTHs from January 2016 to June 2019 of which nine hundred and ninety-three (993) were screened at the UTHs – EH compared to 524 (34.5%) screened at the UTHs – AH. Screening at UTHs – AH started in 2018. For the years 2016 and 2017, 36.9% (560/1517) participants were screened compared to 43.2% (656/1517) in 2018 of which 50.6% (332/656) were screened at the UTHs – AH and 49.4% (324/656) at the UTHs – EH. Quarters one and two of 2019 saw 63.8% (192/301) participants screened at UTHs – AH compared to 36.2% (109/301) at the UTHs – EH. Overall, 57.2% (524/957) participants were screened at the UTHs – AH in 2018 and 2019 implying that the setting up of this service significantly increased the uptake of DRS by 57.2%, p < 0.0001. There was an increase of the patients attended to by 63.7% from 102 in quarters one and two in 2016 to 167 in the same quarters in 2019. The hosting of the DRS clinic by the medical clinic also enhanced collaboration in the management of DR between ophthalmologists and physicians at the UTHs. Nine hundred and twenty-two (922) participants screened had DR making the prevalence of DR 60.8%.

Conclusion: The 57% more DM patients screened at the UTHs – AH demonstrated a huge need of following the DM patients to the medical clinic in order to increase the uptake and compliance to have DR screening. Thinking without the box strategies including collaboration of all disciplines involved in the DM management is vital in scaling up the DRS and preventing blindness due to DR. The study demonstrated the importance of creating convenience for the patients and making the service not only relevant but readily available to the public.

Keywords: Diabetes Mellitus, Diabetic Retinopathy Screening, Prevalence

INTRODUCTION

Background

Diabetes mellitus (DM), commonly known as diabetes, is a group of metabolic disorders characterized by high blood sugar due to either the pancreas not producing enough insulin (TYPE 1), or the cells of the body not responding properly to the insulin produced (TYPE 2) [1]. With the rise of a more sedentary lifestyle in both developed and developing countries, the global prevalence of DM is increasing rapidly. Diabetes prevalence in Zambia was reported at 6.2% in the population aged 20 to 79 years [3].

In the United States of America (USA) and UK, diabetic retinopathy is an important cause of visual impairment and blindness among adults aged 20–74 years [4]. About 50–73% of those with visual impairment or blindness because of DR can be prevented by early detection and treatment of risk factors, and by photocoagulation [5,6]. With timely laser treatment and intravitreal anti-vascular endothelial growth factor (VEGF) therapy, severe vision loss from DR can be reduced by 90% [7,8,9]. Diabetic retinopathy is not only a blinding condition but also affects visual functions that affect performance of daily activities like contrast sensitivity [10].

In the Copperbelt province of Zambia, a population-based study on 2153 diabetic participants identified at various health centres and recruited in the DRS programme found some form of DR in 52% of participants and 36% had sight-threatening DR [11]. The reported prevalence rate was higher than most estimates from other studies; be it hospital-based or population-based. Several classification systems exist for grading severity of DR. In Zambia
the United Kingdom Diabetic Retinopathy Grading System (UKDRGS) using fundus photos is used (Table 1). In this study, the UKDRGS was used [11].

Table 1: Grading of DR based on retinal images

<table>
<thead>
<tr>
<th>R</th>
<th>Retinopathy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>None</td>
<td>No abnormalities / No DR</td>
</tr>
<tr>
<td>R1</td>
<td>Background</td>
<td>• Microaneurysm(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Retinal haemorrhage(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Venous loop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Any exudate in the presence of other features of DR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Any number of cotton wool spots (CWS) in presence of other features of DR</td>
</tr>
<tr>
<td>R2</td>
<td>Pre-proliferative</td>
<td>• Venous beading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Venous redundancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Multiple blot haemorrhages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Intraretinal microvascular abnormality (IRMA)</td>
</tr>
<tr>
<td>R3</td>
<td>Proliferative</td>
<td>• New vessels on disc (NVD)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New vessels elsewhere (NVE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New pre-retinal or vitreous haemorrhage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New pre-retinal fibrosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New tractional retinal detachment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M</th>
<th>Maculopathy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M0</td>
<td>None</td>
<td>No maculopathy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Any microaneurysm or haemorrhage within 1DD of the centre of the fovea if associated with a best VA of ≤ 6/12 where the cause of the reduced vision is known and is not diabetic macular oedema.</td>
</tr>
<tr>
<td>M1</td>
<td>None</td>
<td>Exudate within 1-disc diameter (DD) of the centre of the fovea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Group of exudates within the macula</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Retinal thickening within 1DD of the centre of the fovea (if stereo available)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Any microaneurysm or haemorrhage within 1DD of the centre of the fovea only if associated with a best VA of ≤ 6/12 (if no stereo)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• CSMO - Retinal thickening at or within 500 microns of the centre of the macula</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• CSMO - Hard exudates at or within 500 microns of the centre of the macula, if associated with thickening of the adjacent retina (not residual hard exudates remaining after disappearance of retinal thickening)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• CSMO - A zone or zones of retinal thickening one-disc area or larger any part of which is within one-disc diameter of the centre of the macula</td>
</tr>
</tbody>
</table>

Diabetic Retinopathy Screening

Timely screening and treatment for DR can prevent morbidity. As early DR is asymptomatic, the International Diabetic Foundation (IDF) guidelines recommend early detection of DR by means of DR screening which is very effective in the proper management of DR [19]. It is only through screening that diagnosis and treatment can be made at an early stage and prevent sight threatening DR [20]. The importance of eye screening programme is to reduce the risk of sight loss amongst people with diabetes by the prompt identification and effective treatment if necessary, of sight-threatening DR, at the appropriate stage during the disease process [21].
Feasible and efficacious methods for increasing screening follow-up rates include patient education, a streamlined referral and scheduling process, and collaboration with local ophthalmologists and primary care providers [18]. Diabetic patients should be educated on the importance of regular eye examinations to detect early retinopathy [18, 20]. Even with the control of retinopathy risk factors such as high blood pressure, high serum cholesterol, poor diabetic control, smoking, obesity, and renal disease, regular ocular examination is highly recommended [20]. This is because long duration of the disease is probably the most significant risk factor for retinopathy [21]. Since diabetes is by nature a chronic ailment, most patients ultimately develop retinopathy in the course of the disease.

Prevention of visual loss in DR has improved considerably during the last decade, especially in northern Europe due to robust screening programmes in place [22]. Patient compliance with DR screening is not optimal, as shown by attendance rates ranging from 32 to 85% [24,25,26,27,28]. To increase DR screening attendance, insight into incentives and barriers to retinopathy screening is necessary. However, longer diabetes duration, older age and diabetes-related visual problems are associated with screening compliance [28,29]. In the USA, financial barriers are also often reported [27,28,29,30]. Nevertheless, the main barrier for compliance was the patient’s belief that they do not have DR [31]. Other factors were embarrassment about poor glycaemic control and fear of ophthalmological examination and treatment [32]. Many conclude that patients’ lack of awareness (due to lack of education/information) is the main obstacle to attend a screening programme [26,32,33,34,35]. In view of the major investments in screening and treatment programmes, developing interventions to reduce non-compliance should be a priority [23]. Another barrier is the making of appointments for eye screening at the eye facilities which be situated far from the medical clinic and could have a programme that is not aligned to favour immediate attention of the DM patients. There is also the barrier of travelling long distances to go for eye check-up. These barriers result in low uptake and follow-up rates of DM patients for DR [22].

Several types of screening programmes have been designed throughout the world to meet the DR problem. We report on our active screening programme for diabetic eye disease and describe the sight and eye condition of the diabetic patients who have been involved in this programme.

**METHODS**

**Study design**

This was a retrospective study.

**Study duration**

January 2016 to June, 2019

**Study site**

The study was carried out at the University Teaching Hospitals (UTHs) in Lusaka. The DM patients in this study were recruited weekly from the medical clinic (clinic 5) of the Adult Hospital and the outpatient clinic at the Eye Hospital.

**Study population**

All diabetes mellitus patients seen at the medical and eye clinics at the UTHs

**Inclusion criteria**

All patients with a diagnosis of diabetes mellitus attending the medical clinic at the UTHs – AH and UTHs – EH were eligible for DR screening programme and could participate. Fundus photographs taken were graded in accordance with the DR grading system used in the UK National Health service (NHS). Visual impairment data were collected from visual acuity measurements recorded using Snellen chart.

**Exclusion criteria**

None was excluded

**Study sample**

All diabetes mellitus patients seen at the medical clinic and the eye clinic who have not had it done and those due for their annual DRS. For the study, no patient was recruited more than once.

**Sampling technique**

Every consecutive diabetic patient meeting inclusion criteria was included in the study.

**Data collection instruments**

A researcher-administered questionnaire adapted from the current form used in screening programme at UTHs - Eye Hospital and Adult Hospital. The questionnaire contained information regarding the demographic characteristics of the patients, the relevant diabetic medical and ocular history. A section for the findings of blood pressure, visual acuity and retinopathy grading was included. Other tools included a Snellen chart with pinhole, Digital Retinography System (DRS, Centervue, Italy) fundus camera and manual Sphygmomanometer

**Data collection procedure**

**PROCEDURE:**

Diabetic patients’ records were recruited to be included in the study at the adult hospital weekly medical clinic for diabetes and other endocrinology conditions.

**Data analysis**

Data was collected and entered in Excel spread sheet. Analysis was then done using SPSS version 24. Continuous variables were tested for normality using Shapiro-Wilk test. The chi square and Mann-Whitney tests were used to com-
pare no DR to DR depending on the type of variable. To determine the correlation between two normally distributed independent variables Pearson coefficient was used; while Spearman coefficient was used for non-normally distributed variables. In the final analysis to rule out confounders, a multiple logistic regression model was constructed using a cut off of 20% for the variables. Age, HbA1c (in some patients) and use of Anti-HTN medication were included in the final analysis due to significant associations

## Table 2: Gender versus Screening Centre, N = 1,517

<table>
<thead>
<tr>
<th>Sex</th>
<th>Eye Hospital</th>
<th>Adult Hospital</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number %</td>
<td>Number %</td>
<td>Number %</td>
</tr>
<tr>
<td>Male</td>
<td>380 25.1</td>
<td>170 11.2</td>
<td>550 36.3</td>
</tr>
<tr>
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<td>354 23.3</td>
<td>967 63.7</td>
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<td>524 34.5</td>
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## Table 3: Year Seen versus Screening Centre, N = 1,517

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<tr>
<td>Total</td>
<td>993 65.5</td>
<td>524 34.5</td>
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## Figure 1: Year seen versus Screening Centre

The University of Zambia Biomedical Research Ethics Committee (UNZABREC) approved the study (reference number 169-2019) and was carried out in compliance with the Helsinki Declaration (2006). Further approval was obtained from Ministry of Health of Zambia through the UTHs to use the data capture records. Limitations of the study

This study was a retrospective one and some data could not be found.

### Results

Demographic details

A total of 1517 diabetic patients were screened from January 2016 to June 2019. Of the 1517 patients 93.8% had at least one eye of gradable quality for statistical analysis. The male patients represented 36.3% (550/1517) and the female counterparts 63.7% (967/1517). Mean age was 55. (SD 14.1), median age was 58 (SD(14.1) and range was 66 years. Mean reported duration of diagnosed diabetes was 4 years (SD 3.1), median was 5 years and range was 45 years.

The clinical characteristics of the patients included in statistical analysis were: type 1 diabetes 10.5% (160/1517), type 2 diabetes 80.6% (1223/1517) and unspecified diabetes 8.9% (134/1517). The females had more type 2 diabetes at 63.8% (780/1223) than their male counterparts, 36.2% (443/1223). However, there was no statistical difference between the females and the males, p = 0.665; table 5. The type 2 diabetes patients had suffered more from hypertension 43.7% (534/1223) than the type 1 patients 25.0% (40/160) and this was statistically significant, p < 0.001; table 5.

Family history of diabetes was positive in 51.5% (781/1517) and 48.5% (736/1517) reported no family history of diabetes. Family history was statistically significantly different between the types 1 and 2 diabetic patients with 53.2% (649/1223) of type 2 diabetes having a positive family history compared to 40.5% (64/160) of the type 1 cohort; table 5. Of the 160 type 1 diabetes patients, 89.4% (143/160) were on insulin compared to 32.3% (395/1223) of the type 2 diabetes patients. The majority 61.0% (746/1223) of the type 2 diabetes patients while 2.6% (32/1223) were on both oral hypoglycaemics and insulin.

Diabetic retinopathy

The prevalence of DR was graded based on the worst affected eye and the results are shown in Table 6. Sixty point eight per cent (60.8% (922/1517)) of all DM patients (type 1, type 2 and type unspecified) showed evidence of DR. Forty one per cent of patients graded (41.0% (623/1517)) had sight threatening DR. Five point seven per cent (5.7% (86/1517)) of all patients were graded as having proliferative DR which was distributed as 3.8% in type 1 diabetics (6/160) compared to 5.8% (71/1223) of type 2 diabetics (p = <0.001).

Prevalence of sight threatening DR was 31.3% (50/160) in type 1 diabetics compared to 43.1% (526/1517) of type 2 (p = <0.001).
Table 4: Age Group versus Screening Centre, N = 1,517

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Figure 2: Participants attended to according to age group
### Table 5: Type of DM versus other parameters

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### Table 6: Prevalence of DR

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DISCUSSION

The DR screening programme at the UTHs meets the World Health Organization criteria for screening programmes, which stipulates that early DR must be recognized, acceptable treatment options available and recognize DR as an important public health concern [36]. Efforts to increase patient screening for DR should accompany efforts to increase patient education regarding the disease. This is the practice currently at the UTHs. Despite efforts to educate people about DR in USA in 2012, the national survey showed that 73% of adults aged 40 and over with DR were unaware of their condition [37]. At the UTHs only 25.7% of the participants were not aware of the DR challenge. This was particularly so in patients with less severe DR, shorter diabetes duration, and lack of a recent eye examination just as was reported in other studies [37]. This shows that eye health education and promotion must be an ongoing programme. Some studies have shown that follow-up rates increase most with education. A randomized, controlled study in 1999 showed that intensive education to an intervention group increased follow-up appointment rates to about 54%, from about 27% [38]. This should include the sensitisation and education of physicians and nurses dealing with DM patients in the medical departments. This proved to be very crucial in improving uptake at the UTHs by setting up a DR screening facility at the medical clinic. Health promotion was also critical in this exercise which further improved the uptake of the DR screening services.

Current DR screening guidelines recommend a retinal examination of at least once per year in type 1 diabetics 5 years after diagnosis whereas Type 2 diabetes patients should be examined immediately at the time of diagnosis and at least annually thereafter. More frequent examinations are advised for patients with progressing retinopathy [10]. The retinal examination should be conducted by an ophthalmologist, optometrist or a medical licentiate in ophthalmology (known as ophthalmic medical practitioner (OMP)) who should look through a dilated pupil using the indirect or direct ophthalmoscope or slit lamp biomicroscopy [10]. This is the practice at the UTHs.

Disparities in screening rates exist between ethnic, socioeconomic, and geographical groups nationally and in North Carolina [39]. A North Carolina survey of people with diabetes showed that approximately 70% of non-Hispanic whites and African Americans received eye examinations in the year before the survey, compared to 61% of Native Americans and 52% of Hispanics [39]. The study did not investigate the details of possible disparities among the people seeking DR services.

Screening rates also vary by geographic location, with rural populations having lower rates of screening, likely due to issues with access to care [40]. In this study 81.5% were from the urban setting and 18.5% from the rural setting/high density areas. Diabetes patients with retinopathy who have access to retinopathy screening at or near the office of their primary care provider may more likely be screened out of convenience compared with those who are referred to an eye health care specialist [41]. This tends to be the case in the hospital settings as well were we saw that uptake improved by 57% when the screening was introduced at the medical clinic. Other potential barriers to screening include financial difficulties and language differences [42]. This was not a barrier in our case.

Improving screening rates for DR can improve focus for research and inform policy. This can also help in enhancing interventions utilized in different communities to increase patient and provider awareness, collaboration with community-based programmes and disciplines, using electronic medical records and automatic reminders, utilizing mobile diabetes clinics, and providing services in multiple languages [42]. The University of North Carolina’s management of diabetes patients is a current example of a health care system utilizing electronic medical records, automatic reminders, and interdisciplinary collaboration [18]. The UTHs have to introduce electronic data capture and records for easy access and to prevent loss of records and to promote interdisciplinary collaboration. This should be escalat-ed to the whole country in order to capture all DM patients and screen them for DR and later store data for planning and research purposes.

In many locations around North Carolina, diabetes patients were seen for initial eye examinations; retaining these patients for their follow-up has been a bigger challenge [18]. This difficulty in following up with patients is not just a USA phenomenon; a study by Keenum et al. based largely on an African American population in an urban setting, less than 30% of the study participants adhered to their recommended follow-up ophthalmic examinations [43]. These patients had access to a health care centre housing both ophthalmology and primary care physicians in the same building that welcomed patients, including those without insurance [43]. Poor compliance was more so in younger patients [43]. This is what was implemented at the UTHs where a one stop DR screening clinic was created were patients were attended by the physicians and soon after that the ophthalmic team took over and conducted a thorough DR screening. This collaboration strategy led to uptake increase of 57%.

The strategy also created convenience for the patients to be attended to and patients were not required to make appointments of being attended at a later date at the UTHs EH.

The fact that this study minimized the access barriers to immediate screening and aided with scheduling follow-up, suggests that additional barriers to DR screening can be overcome through more collaboration with all the stakeholders dealing with DM. More research is needed to elucidate factors involved in low uptake and follow-up rates. Anecdotal data at the UTHs EH showed that only 25.0% of the DM patients adhered to the recommended follow up plans.

CONCLUSION

A one stop DR screening clinic is fundamental in improving the uptake of DR services. Cascading screening for DR requires effective strategies such collaboration between the physicians and the ophthalmologists within the hospital setting. This strategy increased uptake and follow up of DR patients at the UTHs by 57%. This led to early detection of DR and early intervention in case of sight threatening DR. Fundus photography improves DR screening and retention because screening will be done by other medical personnel and ophthalmologists will grade the photos later and come up with management plans.
RECOMMENDATIONS

Fundus photography telemedicine provides an alternative strategy for obtaining the retinal examination. This method involves a trained photographer taking retinal images and sending them to a remote trained reader (typically an ophthalmologist or DR graders) for interpretation. Fundus photography telemedicine has been shown to have acceptable sensitivity and specificity for screening of diabetic retinopathy compared to in-person screens. It is also cost-effective and generally well-liked by patients. System alerts can also be used in letting primary care providers know when eye examinations are due and when they have been completed, giving them the opportunity to remind and counsel patients. Putting up fundus photography across the country and training people to capture the images for transmission to the DR grading centre will prevent patients from travelling long distances to be screened.

One way of implementing tele-medicine and tele-screening is by utilisation of the training hubs for the Levy Mwanawasa Medical University (LMMU). This will enhance both training and screening of DM patients for DR and the images will be analysed and interpreted from the DR centre at LMMU.

Acknowledgments

Potential conflicts of interest. All authors have no relevant conflicts of interest.


Awareness and knowledge of glaucoma among eye patients attending the University Teaching Hospitals Eye Hospital

Research Article

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**ABSTRACT**

Aim: To assess the awareness and knowledge levels of glaucoma among eye patients attending the University Teaching Hospitals Eye Hospital.

Background: Awareness and knowledge on glaucoma can be vital in the fight against blindness due to glaucoma. Spread of knowledge regarding some well-recognized risk factors for glaucoma may encourage more awareness. For instance, a risk factor such as a positive family history of glaucoma, raises awareness because it encourages a search for more information regarding the disease and its assessment.

Methods: This was a cross-sectional study to assess awareness and knowledge levels of glaucoma. A total of 1,714 participants aged 18 to 98 years were recruited for the study. Respondents “having heard of glaucoma” even before they were contacted/recruited for the study were defined as “aware” and respondents having some understanding of the glaucoma disease were defined as “knowledgeable”.

Results: 1,625 (94.8%) subjects completed a questionnaire that assessed their awareness and knowledge level of glaucoma. Overall, 1,162 (71.5%; 95% CI: 70.7 – 73.9) participants were aware of glaucoma. In describing the changing dynamics regarding HIV infection patterns in Zambia, Michelo et al. (2006) argues that “life-styles, cultural practices and communication patterns may significantly differ by educational attainment. However, whenever change happens, it does most probably begin with the higher educated groups”.

**INTRODUCTION**

Owing to the asymptomatic nature of glaucomatous progression, glaucoma may remain undetected in most of the cases until it reaches an advanced stage [1]. This finding highlights the high burden of disease despite the existence of many effective treatments [1,2]. It is estimated that approximately 90% of glaucoma-related blindness is preventable with proper early treatment [3]. One of the most important and effective actions for early detection of glaucoma and its management may be raising public awareness and knowledge levels regarding the disease. Different levels of glaucoma awareness have been reported in different populations [4-9]. Published studies from developing countries indicate low levels of awareness, [4-6] while those from developed countries suggests higher levels of awareness [7-9]. Spread of knowledge regarding some well-recognized risk factors for glaucoma may encourage more awareness. These include a positive family history of glaucoma, which is associated with higher glaucoma awareness [5,7,10]. This is because the presence of this risk factor encourages a search for more information regarding the disease and its assessment. The relatives have been reported as an important source of information regarding glaucoma [11]. However, a high awareness level does not indicate that the individual has complete knowledge regarding glaucoma or enough understanding of the disease. For example, several studies indicate that most individuals do not have an accurate understanding of this disease despite being aware of this disease [6-9]. Almost 40% of the study participants had inadequate knowledge of glaucoma [11]. In describing the changing dynamics regarding HIV infection patterns in Zambia, Michelo et al. (2006) argues that “life-styles, cultural practices and communication patterns may significantly differ by educational attainment. However, whenever change happens, it does most probably begin with the higher educated groups”.

**MATERIALS AND METHODS**

Study area and population

A cross-sectional survey of 1,714 participants aged 18 to 98 years old was conducted on POAG at the UTHs Eye Hospital in Lusaka, Zambia. The UTHs Eye Hospital is the national referral eye hospital which provides ophthalmological surgical and clinical services. The UTHs’ Eye Hospital is estimated to cater for more than 21,000 clients annually for both routine and morbidity driven health care. The clients that attend this clinic come from across the country and include both self- and system-referrals, representing all age groups and all ethnic groups.

A systematic random sampling using 50% - time sampling was employed
which meant that of the 220 (on average) eye patients seen in the outpatient eye clinic every month, 110 were to be picked to participate in the study. This translated to a minimum 1320 participants to be recruited into the study for a period of twelve months. To cater for attrition and assuming a response rate of 80%, the sample size of the study pegged at 1,714 participants. Only 1625 (94.8%) eye patients consented to study participation of which 309 had glaucoma.

General awareness regarding glaucoma among patients was assessed using the following broad questions:

i. If they had previously heard of glaucoma
ii. If they were aware of glaucoma running in families
iii. If they knew about the role of intraocular pressure in causing glaucoma
iv. If the visual loss due to glaucoma is irreversible or not and that it causes blindness
v. If they were aware of any treatment modalities available for glaucoma.

We defined “awareness” as having heard about the disease. Awareness was accordingly classified. Having glaucoma knowledge was classified based on the other responses provided for the questions above.

Ethical statement

The University of Zambia Biomedical Research Ethics Committee approved the study (reference number 013-08-12). Further approval was obtained from Ministry of Health of Zambia through the UTH

RESULTS

Of the 1,714 patients, 89 (5.2%) did not accept to be in the study due to various reasons. Therefore, a total of 1,625 people were screened giving a 94.8% response rate.

A total of 1,162 (71.5%; 95% CI: 70.7 – 73.9) participants were aware of glaucoma and 899 (55.3%; 95% CI: 51.3 - 72.1) had some knowledge about glaucoma (Tables 2 and 3).

Awareness of glaucoma was not statistically significant in terms of age (P =0.43) and gender (P =0.87). Literate participants were four times more likely to be aware and seven times more likely to be knowledgeable than illiterate participants (P value < 0.001). The level of education had a significant association with both awareness and knowledge (p=0.001). In addition, participants who were related or known to glaucoma patients were more likely to be aware and knowledgeable than other participants (Odds ratio: 4.11; 95% CI: 2.12 – 5.45).

A total of 199 (12.2%; 95% CI: 10.4 - 17.5) participants understood the risk of familial predisposition to glaucoma. Awareness about the irreversible nature of vision loss in glaucoma was noted in 331 (20.4%; 95% CI: 17.9 - 25.8) of the respondents.

Five hundred and fifty-one (33.9%; 95% CI: 28.1 - 38.3) responded that glaucoma could be treated and 625 (38.5%; 95% CI: 37.2 - 40.4) new that glaucomatous eyes could become blind. Interestingly, 826 (50.8%; 95% CI: 44.7 - 56.7) of the respondents believed that glaucoma was the same as trachoma.

One hundred and fifteen respondents (7.1%; 95% CI: 3.9 - 10.4) considered that screening could prevent glaucoma, but only 517 (31.8%; 95% CI: 27.9 - 36.1%) had undergone screening/consulted an ophthalmologist in the previous year. Source of information for 343 (21.1%; 95% CI: 17.4 - 24.7) participants was ‘word of mouth’ from family or friends. Another 1,031 (63.4%; 95% CI: 59.1 - 68.3) participants had received information from visiting hospitals, medical personnel, eye camps or other healthcare recourses. Mass media was source of information for 251 (15.4%; 95% CI: 11.9 – 20.2) of the participants.

No associations were found between gender and awareness or knowledge of glaucoma (p =0.765) or age (p = 0.875). 258 (76.3%; 95% CI: 72.1 – 79.3) participants were aware of glaucoma and the same number (258) of participants had some knowledge about glaucoma (Tables 1 and 2). There was a positive association between glaucoma awareness and education level (p<0.0001).

### Table 1: Gender distribution of participants; N = 1625

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
<th>Proportion (%)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>46.4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>53.6</td>
<td>4.2 (2.1, 7.2)</td>
</tr>
</tbody>
</table>

### Table 2: Awareness of glaucoma; glaucoma patients vs non-glaucoma patients N=1625

<table>
<thead>
<tr>
<th>Glaucoma awareness</th>
<th>Yes (%)</th>
<th>Total Yes Average (%)</th>
<th>P - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucoma patients</td>
<td>90 (%)</td>
<td>1,162 (71.5)</td>
<td>0.033</td>
</tr>
<tr>
<td>(n=309)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No glaucoma patients</td>
<td>67.4</td>
<td>887</td>
<td></td>
</tr>
<tr>
<td>(n=1,316)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

The study looked at awareness and knowledge of glaucoma in patients with glaucoma and those without glaucoma. The process of behavior changes, which culminates in action and maintenance, requires awareness and knowledge as its starting point [13]. Glaucoma is a highly prevalent ocular disease with a natural course that ultimately leads to blindness as compliance with treatment may improve with excellent patient knowledge and awareness. It may also lead to awareness among the patients’ relatives and encourage them to participate in screening programmes. Low levels of awareness of glaucoma highlight the need for public education regarding this disease. It was discovered that knowledge regarding this condition was insufficient in both the glaucoma patients and those without glaucoma. Early diagnosis and institution of treatment can result in reduction of visual impairment and blindness, as the main predictor of eventual blindness is a late presentation of the disease. Awareness was defined as having heard about the disease. Our results indicate that 89.0% of patients with glaucoma and 67.4% of those without glaucoma were aware of glaucoma. The most striking result from our study is that only 89.0% of the cases (patients with) of glaucoma were aware of the disease. The glaucoma knowledge was high (64.5%) in our study compared to studies from Australia and India who respectively reported that 29% and 40.6% of the participants had knowledge regarding glaucoma [14,15]. This difference with our study may be attributed to the slightly high literacy rate in the country which stands at 63.4% [16]. There are some differences in awareness of glaucoma in different areas and nations. For instance, a study from Melbourne, Australia, reported awareness of glaucoma in 76% of the general population, while a population-based study from Nepal reported a very low (2.4%) level of glaucoma awareness [4,17]. In a study in Barbados, 51% of participants with glaucoma were unaware of their diagnosis compared to our study where 53.6% were aware of their diagnosis [18]. The 71.5% observed level of glaucoma awareness in this study is consistent with the data in published reports from the United States, which indicate that 70–93% of participants attending eye clinics have heard about glaucoma [7,19,20]. In another survey from Australia, 93% of 3,654 adult study participants had awareness regarding glaucoma [14]. Costa et al. (2006) and associates assessed and compared awareness regarding glaucoma in two groups of study participants. One group consisted of high level of educated American patients with glaucoma, while the other comprised low level of educated Brazilian patients with glaucoma. The authors found significant differences between these two groups and concluded that differences in educational level lead to this disparity [21]. In this study, the high number of participants with secondary and tertiary education may have led to the high rate of glaucoma awareness. This correlates well with national literacy levels which stands at over 60%. The findings of a study conducted by Gogate and colleagues from India are consistent with this idea. In that study, which found lower levels of glaucoma awareness, most study participants were less educated [22]. Our results indicate that level of education is the strongest explanatory variable for glaucoma awareness.

In describing the changing dynamics regarding HIV infection patterns in Zambia, Michelo et al. (2006) argues that “lifestyles, cultural practices and communication patterns may significantly differ by educational attainment. However, whenever change happens, it does most probably begin with the higher educated groups [12]. Therefore, the lower risk levels of glaucoma seen among higher educated groups may be a stage of progression. On the other hand, we are aware that there is no other study that has made this observation on the association of education and prevalence of POAG, thereby calling for additional observational studies on this factor. In addition, the glaucoma patients should also be encouraged to persuade their relatives to seek glaucoma-screening examinations. Certainly, this would lead to early diagnosis of the glaucoma in the relatives. Patients who were unaware of their diagnosis were most probably unaware of the possibility of glaucoma being a heritable disease. In this study, only 199 of 1,625 (12.2%) participants believed that a positive family history was a risk factor for glaucoma. This may indicate the necessity of urgent action regarding patient knowledge of glaucoma and the need to provide patients with useful information regarding inheritance of glaucoma. Lack of awareness regarding heritability of glaucoma has been reported to vary from 21% to 68% [11,23]. Deokule and associates found that 41% of patients with glaucoma were aware of a risk for glaucoma in their family members, even though 45% of their family members were not screened for glaucoma [24]. Therefore, providing information to patients with glaucoma regarding the heritability of glaucoma and necessity of screening of their family members is crucial. This would encourage patients to inform their family members regarding the prognosis of glaucoma and their higher chance of being affected by this blinding disease compared to the general population. To achieve this, clinicians should periodically ask their patients about the awareness of their relatives regarding their diagnosis and whether their family members have participated in glaucoma-screening examinations. The slightly low level of knowledge among the patients and non-patients highlights the importance of education for enhancing overall knowledge of glaucoma. This knowledge may encourage these individuals to seek glaucoma-screening examinations and help reduce the number of severe cases of this blinding condition.

In a study from Germany, participants’ relatives were the main sources of information regarding glaucoma [25], while mass media was found to be the main source of information in a study from India [1]. In the current study, study participants declared that close acquaintances were their main source of information. Our observations may be due to selection bias, as all of our study participants were hospital recruited. This should be considered when interpreting the results of our study. There are inconsistent findings regarding the relationship between gender and awareness of glaucoma. In a few studies from various countries, lack of glaucoma awareness was associated with male gender [13,26], while the opposite has been reported in other studies [4,27]. Other studies found no gender differences associated with knowledge or awareness of glaucoma [14,25,28]. This study equally found the same.

CONCLUSIONS

The awareness and knowledge levels of glaucoma were fairly low. These findings suggest that there is a need for health education in this Zambia population to
increase their level of awareness and knowledge of glaucoma. Education level was found to be a predictor of knowledge and awareness of glaucoma. Inadequate knowledge in the general population may be an important cause for failure to detect glaucoma early and may result in blindness from the disease.

**RECOMMENDATIONS**

Community sensitization and education would be an effective and feasible public health strategy to enhance knowledge and awareness of glaucoma, especially among individuals with a family history of the disease. This approach may ultimately reduce loss of vision due to glaucoma. As awareness about glaucoma can lead to early detection, a very important step in preventing glaucoma-related blindness; [29] similarly educating masses will cardinal in improving awareness. Furthermore, there is a need to identify interventions that reinforce people's attitude above the perceived level of awareness about glaucoma and to devise strategies that can influence behavior to the risk of blindness from glaucoma.


