VISION FOR SLEEP AND HEALTH

Establishing the eye as the light of the body

BY

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LAUTECH STAFF

Dedication

My five parents:

Pa J.Abioye Kuteyi, Madam A. A. Kuteyi (Sun re o)

Chief M O Adeoti. Mrs E O Adeoti (Sun re o)

and J. Olajide Adeoti

Introduction

I am extremely happy to stand here today to deliver the 13th inaugural lecture of our great institution. This is the first inaugural lecture from the Faculty of Clinical Sciences and from the first female lecturer in this University. In fact it is the first inaugural lecture to be delivered by one of the pioneer staff of the College of Health Sciences in Osogbo (CHS).

I came to LAUTECH when the state owner Governments decided to bring College of Health Sciences and the Teaching hospital to Osogbo. I was the pioneer Chief Consultant of the Mercyland Specialist Hospital where the CHS was initially situated and I was simply seconded to LAUTECH and later transferred there fully. The CHS, Osogbo started with only a few of us namely, Prof. Ogunbode (who doubled as Chief Medical Director and Provost), Dr Nasiru, Prof. Olatubosun, Prof M. A Fafunso, Dr Adenle, Dr Olaosebikan, Prof. Adeyeba (our first indigenous Professor), Dr Faniyan (blessed memory), Prof. Adeniyi, Prof. Adeoti, Dr. Afolayan, Dr Ajaiyeoba, Dr Mrs. Akinwusi, Dr Olaniyi and Mr Wojuade (the then College secretary). Other members of staff of the College of Health Sciences in Osogbo today were recruited much later on.

Today, I will be going through the relationship between the eyes, sleep and health and what happens when this relationship is impaired. This lecture will cover how to care for the eyes in order to sleep well and have good health.

The Vice Chancellor Sir, with your permission, before I deal with the topic of today, I want to pay homage to my secondary school, St. Margaret girls' grammar school, Oke Oye, Ilesha that laid the foundation of my life. My time in this school helped formulate some of my guiding principles which are "Excellence and doing the right thing at the right time all the time".

In those days, best students were recognized by calling them out in an assembly to receive prizes. I therefore determined I was going to get all the prizes for science subjects every year and that I did, though one of my mates competed vigorously with me and took some. My parents of blessed memory were hard working and they ensured their children had good education despite all odds.

As part of excellence, students of St. Margaret girls' grammar school in those days wore uniforms that were well starched and ironed that you can hardly bend them when you try. The color was green and you can see yourself through them without seeing what is underneath. They stand out very neat and firm like that of soldiers. In fact, that led to my interest in the army. I would have joined the army but as God would have it, I ended up in Medicine. Even at that, I still wanted to join as a medical student but my friends discouraged me.

To the topic of today, as a child in my secondary school days, I wondered why the eyelids close while we sleep but I got no answers.

Ironically, this early question did not arouse my interest in Ophthalmology. It was my husband that influenced my specialization in Ophthalmology otherwise I would have gone into Community Medicine.

However, the training in Ophthalmology only partially addressed this question. I therefore decided to examine the connection between the eyes, sleep and health after specialization.

Today, we will look at this connection.

I am aware of a mixed audience of academics and the public and I will therefore try to simplify the connection between the eyes, its disorders, sleep and health.

I apologize for occasional big Medical terms.

We see and sleep normally (sleep-wake cycle) only when the light rays entering the eye are properly directed to the appropriate place in the retina (the nerve layer that lines the back of the eye and senses light) and processed to the brain where it is interpreted. The visual (sight) cortex is located in the occipital cortex (the area of the brain that recognizes what we see) while the internal clock that regulates many biological processes in the body such as the 24 hour sleep-wake cycle is in the suprachiasmatic nucleus (SCN) in the hypothalamus. Impulses from the retina pass in the optic nerve to reach these two centers.

We will look at these facts shortly.

Figure 1: The human eye

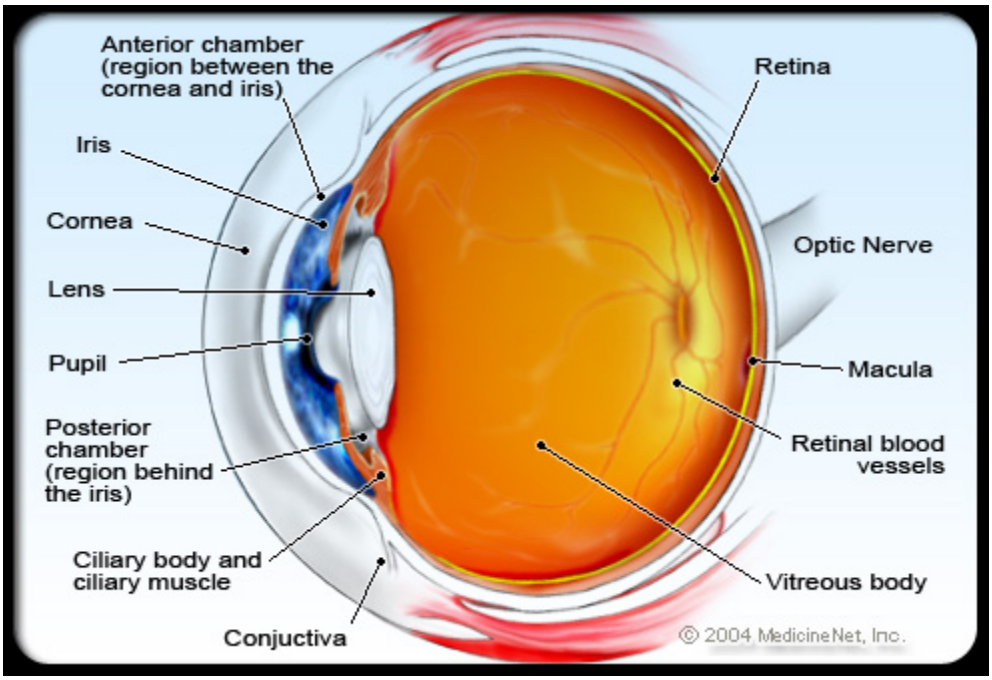
We all know where our eyes are, right? Well, just in case, our eyes are two structures situated in the front and upper part of the head and protected by the bony orbits. They are delicate structures that should be guarded very jealously as their loss may lead to serious problems, even death. Each eye has three coats (Figure 2). The outermost is transparent anteriorly and called cornea while the remaining part is white and opaque (sclera). The intermediate coat or uvea is choroid posteriorly, ciliary body and iris anteriorly. The innermost coat is the retina which contains the cells responsible for receiving light rays and processing them into

impulses that are carried to the brain through the nerve fibres in the optic nerve. We see well when light rays are allowed to enter the eye and they are refracted or bent to focus on the neurosensory retina.

In the absence of other pathologies elsewhere, all the structures between the cornea which is the first point of contact with light rays and the neurosensory retina must be clear and functioning normally for each person to see well.

The epithelium of the ciliary body mentioned above is responsible for the secretion of aqueous humour-the fluid in the anterior chamber of the eye. This fluid exits the eye through channels located in the angle of the anterior chamber. This channel consists of trabecular meshwork, canal of Schlemm and the episcleral veins. For the intraocular pressure to be maintained at normal levels there must be a balance between the rate of production and exit of aqueous humour.

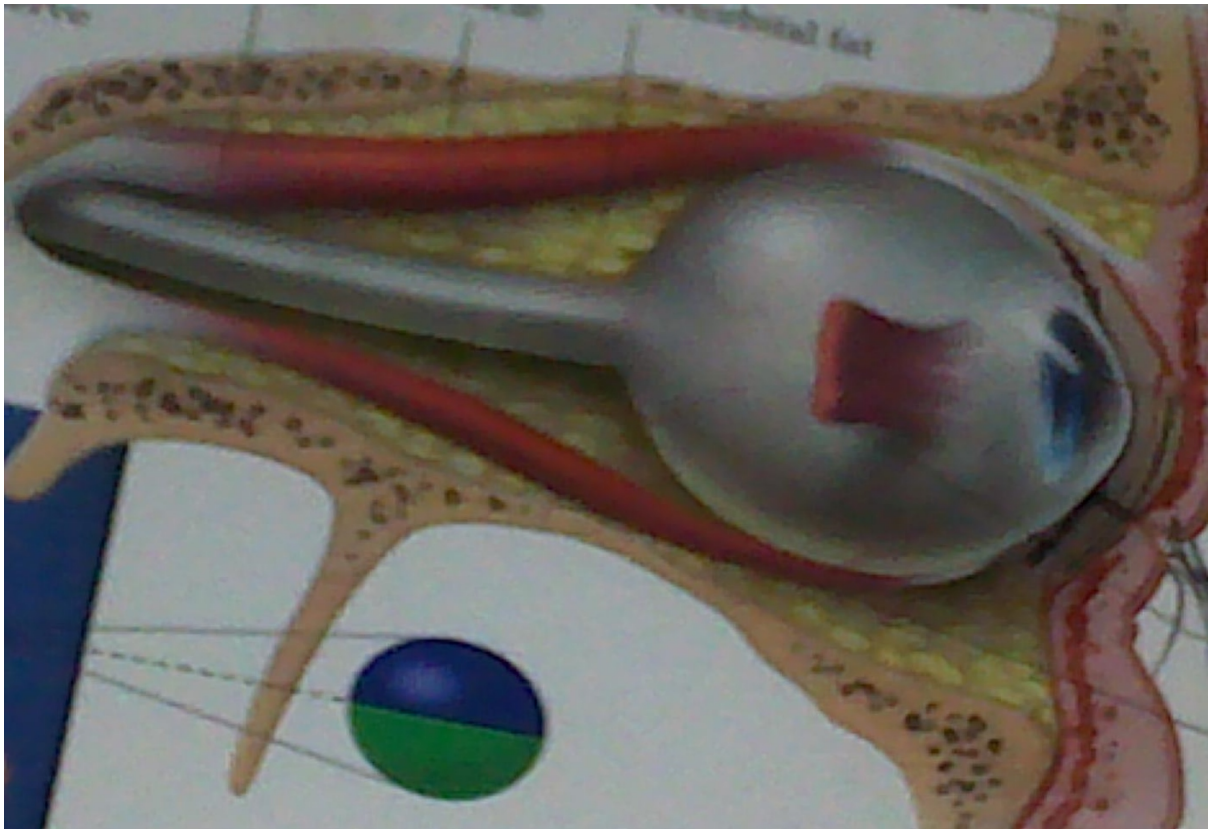
Figure 2: The eye and vision:



Courtesy: Medicinenet.com

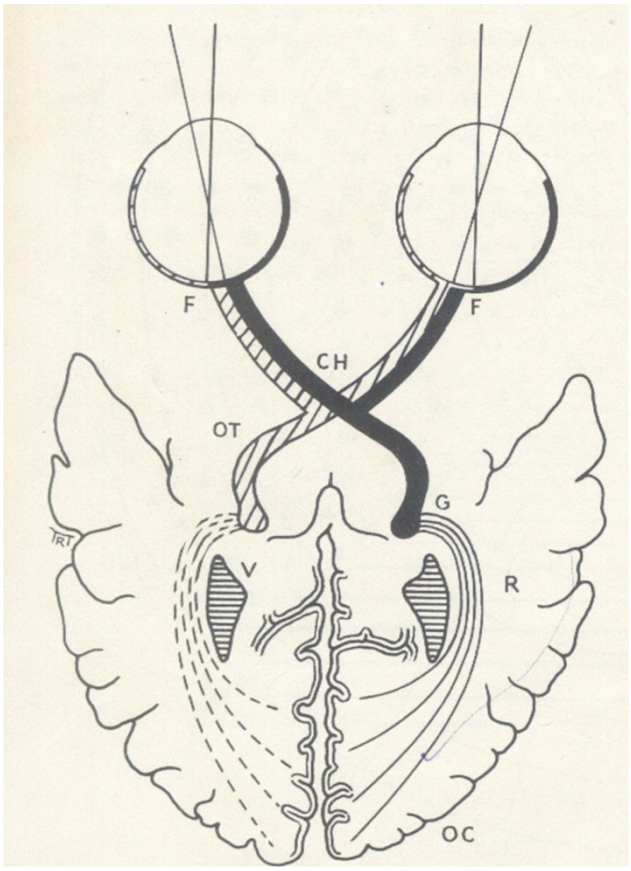
Figure 2 shows the antero-posterior section of the eye which illustrates the structure of the eye and the optic nerve which connects the eye and the brain.

Figure 3: Eyeball and optic nerve



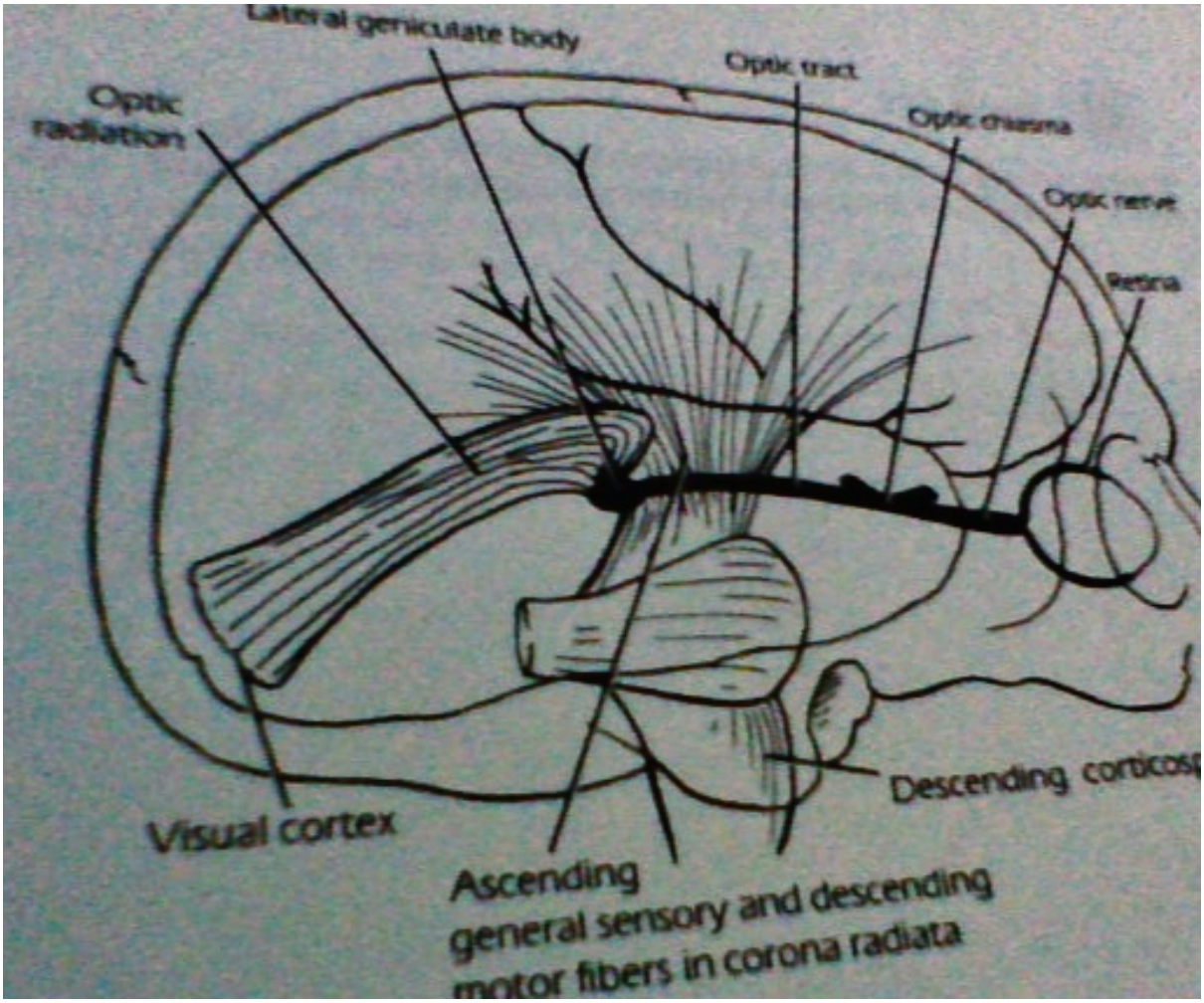
The optic nerve shown in figure 3 takes along impulses from the neurosensory retina, becomes the optic chiasm, tract and radiation and delivers the impulses into the occipital cortex which interprets what the eye sees. This is the visual pathway shown in figures 4 and 5.

Figure 4: Visual and sleep pathway.



Apart from visual fibres, this pathway also carries impulses to the suprachiasmatic nucleus (SCN) located in the hypothalamus above the chiasm. The SCN serves as internal clock that regulates many biological processes in the body such as the sleep-wake cycle.

Figure 5: Visual pathway.



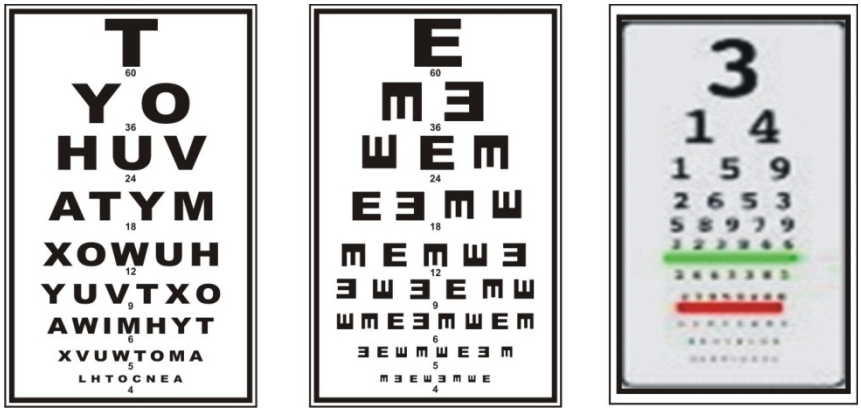
This diagram shows the visual pathway as it goes and crosses the general motor and sensory systems of the cerebral cortex.

The eye is the gateway to the body. It serves as a window through which all the maladies that affect man can be seen. The sense of seeing therefore is one of the very important senses in the body. The eye has been variously referred to as the light of the body. When this light is turned off the whole body is in darkness and nothing is perfect any longer, sleep-wake cycle is disturbed and the affected person develops health issues that can even lead to death. The loss of the ability to see therefore is a serious physical and emotional condition, which prevents the afflicted individual from functioning adequately within the society thus causing serious socio-economic consequences on the communities involved. This loss of function of

the blind person(s) is especially serious in developing countries where there are little or no facilities for the rehabilitation of the blind.

The act of seeing or vision can be assessed medically by using different tests. The most frequently used is a standardized chart called Snellen's chart (figure 6). The vision is good or reasonable if the person can read up to the 6/18 or 20/60 line in both eyes or it is manageable if he can read up to the 6/18 or 20/60 line in at least one eye.

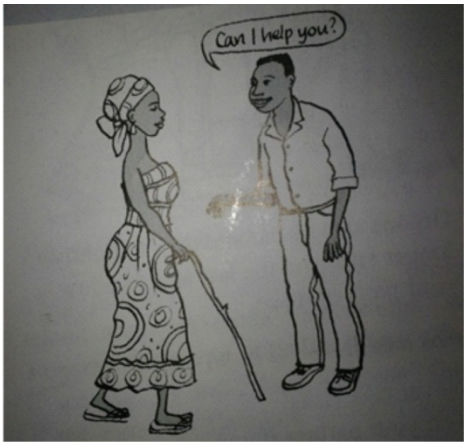
Figure 6: Snellen's charts.



These charts enable reproducibility of vision anywhere in the world.

Blindness

Figure 7: diagram showing a blind person.



Courtesy: Community eye health. 2003; 16(45):7

In popular conversation, blindness refers to inability to see, thus preventing the individual from performing his/her usual day to day tasks. If we all close our eyes for one second, we will all experience what the blind person goes through. At this period, no vision-related information goes to the brain and so nothing is seen.

More technically, blindness may be defined as a condition in which little or no light impulses reach the occipital cortex and suprachiasmatic nucleus.

The medical or diagnostic definition of blindness varies from one country to the other due to varying concepts. For purposes of uniformity and comparison, the World Health Organization (WHO) proposed a scale of visual impairment and blindness in the tenth Revision of International classification of diseases (Geneva WHO, 1992). However, a more appropriate definition has been proposed (Lalit Dandona, Rakhi Dandona, 2006 and World Health Organization, 2010) which takes into consideration, a large proportion (38%) of blindness due to uncorrected refractive error. This new proposal defines blindness as a presenting visual acuity poorer than 6/60 in the better eye or visual field worse than 10 degrees from fixation in the better eye.

Given these revised and proposed definitions, the number of blind persons in the world would be about 57 million (Lalit Dandona, Rakhi Dandona, 2006) and without intervention; the number of individuals with blindness might reach 76 million by 2020. (Pizzarello, Abiose, Ffytche, et al. 2004).

However, available data on prevalence of blindness using existing WHO definition was 0.2% in France, 0.7% in Eastern Europe, and between 0.2 and 0.4% in the United States; in sub-Saharan Africa it was estimated at 1.4%. (Eballé, Mvogo, Koki, et al, 2011; Auzemery, Negrel, 2002) and A**deoti, (**2004) found a prevalence of 1.18% in a tropical African population.

In the population aged 40 years and above, prevalence of blindness ranges between 4.2% and 9.9% (Kyari, Gudlavalleti, Sivsubramaniam, et al, 2009; Kolawole, Ashaye, Adeoti, et al, 2010; Ndife, 2003; Patrick-Ferife, Ashaye, Osuntokun, 2005).

Prevalence therefore, increases with age for many reasons such as increasing age of the population and common causes such as cataract that are age-related.

Blindness is a well known public health problem (Adeoti, 2004; Babalola, 2003; Onakpoya, 2007; Adegbehingbe, 2007; Adio, 2006; Oluleye,2006; Mpyet, 2005; Oluleye, 2004; Dawodu, 2003; Abdul, 2002; Rabiu, 2001; Ezepue, 1997, Fafowora, 1996; Adeoye, 1996; Umeh, 1996.)

It is obvious from the aforementioned that there are more blind persons in developing countries than developed countries. In fact, eighty percent of the blind live in developing countries where chronic economic deprivation is exacerbated by the added challenge of failing vision. Majority of these blind persons lost their sight to diseases that are treatable or preventable.

What are the causes of blindness?

Uncorrected refractive error

Refractive errors are conditions in which incident parallel rays of light do not come to a focus on the neurosensory retina resulting in blurred images. They have been revealed to be very common in our environment. **Adeoti,** Egbewale, 2008; Adefule-Ositelu,1995; Olurin, 1973; Nworah, Ezepue, 1992.

There are many people who are blind as a result of uncorrected refractive error and many of them don't even know that this can easily be treated with glasses, contact lenses or laser.

Refractive errors have been recognized as causes of treatable blindness. (Memon, 1992). Infact, a quarter of blindness and half visual impairment cases can be alleviated by providing just a pair of glasses. (Hugh, 2000).

There are different types of refractive errors namely: myopia (short sightedness), hypermetropia (long sightedness), astigmatism, anisometropia and presbyopia (failure of accommodation in old age). As a person ages, such as at 40 years and older, his accommodation for near things such as prints becomes weak and he begins to move his book away from him to see well. This is presbyopia and all he needs to do is see the specialist for examination and refraction. He needs examination and not just glasses because he is aging and he may in fact have diseases that are age-related and which may be silent such as glaucoma. We should therefore insist on eye examination all the time by specialists before taking glasses.

Refractive errors are the commonest visual problem in Nigerian adults (**Adeoti**, Egbewale, 2008; Adefule- Ositelu, 1995) and common causes of visual impairment and eye ache. (Negrel, Minassian, Sayek, 1996; Attebo, Mitchell, Smith,1996).

Genetics, race and lifestyle have been found to play important roles in their prevalence and types. In Nigeria, the prevalence and types of refractive error vary between regions with prevalence rate ranging between 20 and 54% (Olurin, 1973; **Adeoti,** Egbewale, 2008) in the South-West while in the east, it was as high as 80% (Nworah, Ezepue, 1992). It affects approximately one third of persons 40 years or older in the United States and Western Europe, and one fifth of Australians in this age group. (Kempen, Mitchell, Lee, et al., 2004). With regards to types of refractive errors, our study in year 2008 revealed myopia (short-sightedness) to be the most common in most places in Osun state (**Adeoti**, Egbewale, 2008; Adefule-Ositelu,1995; Olurin,1973). However, hypermetropia (long sightedness) predominated in some places in the east (Nworah, Ezepue, 1992). Astigmatism was found in 25.0% of refractive cases in Osogbo. (**Adeoti**, (2006) while anisometropia (a difference in refraction of the two eyes) was found in 44.81% of refractive errors. (**Adeoti,** Egbewale, 2006).

The simplest treatment of refractive error is prescription of glasses.

Figure 8: Glasses

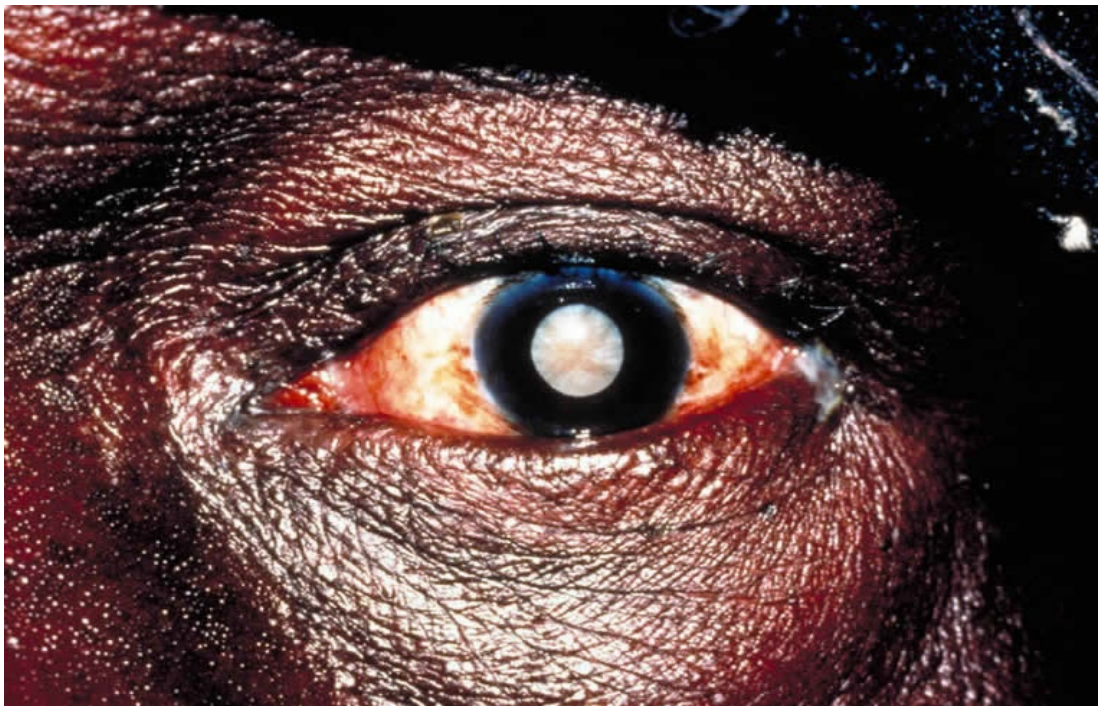
There are no side effects when the strength of the given lens is correct. However, some people refuse to come for treatment citing superstitious reasons. Even when they do, they refuse to use the glasses as advised. Parents especially may not allow their children to obtain glasses. **Adeoti**, (2009) found reasons for not using prescribed glasses to include, dislike 46 (60.53%), sunken eyes 18 (23.68%), what people will say 9 (11.84%) and others 3 (3.95%) such as taboo and deterioration of sight. Also, 102 (51.52%) participants in that study will not

allow their children to use prescribed glasses. Their reasons being that glasses will adversely affect the eyes by making it sunken or worsen existing problems 54(52.94%), or too young to use glasses 44(43.14%) and some (3.95%) would not just accept glasses for their children for no reason.

At this point, I should say that treatment of refractive errors should be accepted when needed especially in children. Glasses, when correctly done and worn do not cause problems. It only assists the eyes to relax and see well.

Cataract:

Figure9:Cataract



Cataract is the world's leading cause of blindness accounting for about 50% of blindness. (**Adeoti,** 2004; Kolawole, Ashaye, **Adeoti,** et al, 2010; Kolawole, Ashaye, …. **Adeoti C.O.**, 2012).

It has varying causes, senility (old age) being the commonest. Other causes include:

- ✓ Trauma,
- ✓ Drugs such as steroids,
- ✓ Heredity,
- ✓ Inflammation,
- ✓ Metabolic diseases,
- ✓ Malnutrition,
- ✓ Infections in pregnancy and so on.

Blindness from cataract is treatable. Many patients still do not know this and they remain blind. (Ubah, Isawumi, **Adeoti**, 2013; Mpyet, Dineen, Solomon. 2005).

The department of Ophthalmology in LAUTECH has joined the global initiative of eradicating blindness due to cataract by carrying the gown to town. The department has conducted community outreaches to treat cataract blindness. (Isawumi, Soetan, … **Adeoti**, 2009).

The Vice- Chancellor Sir, it will interest you to note that so far we have done about 2500 surgeries during these programs. We are still working to eliminate blindness in our environment.

Glaucoma

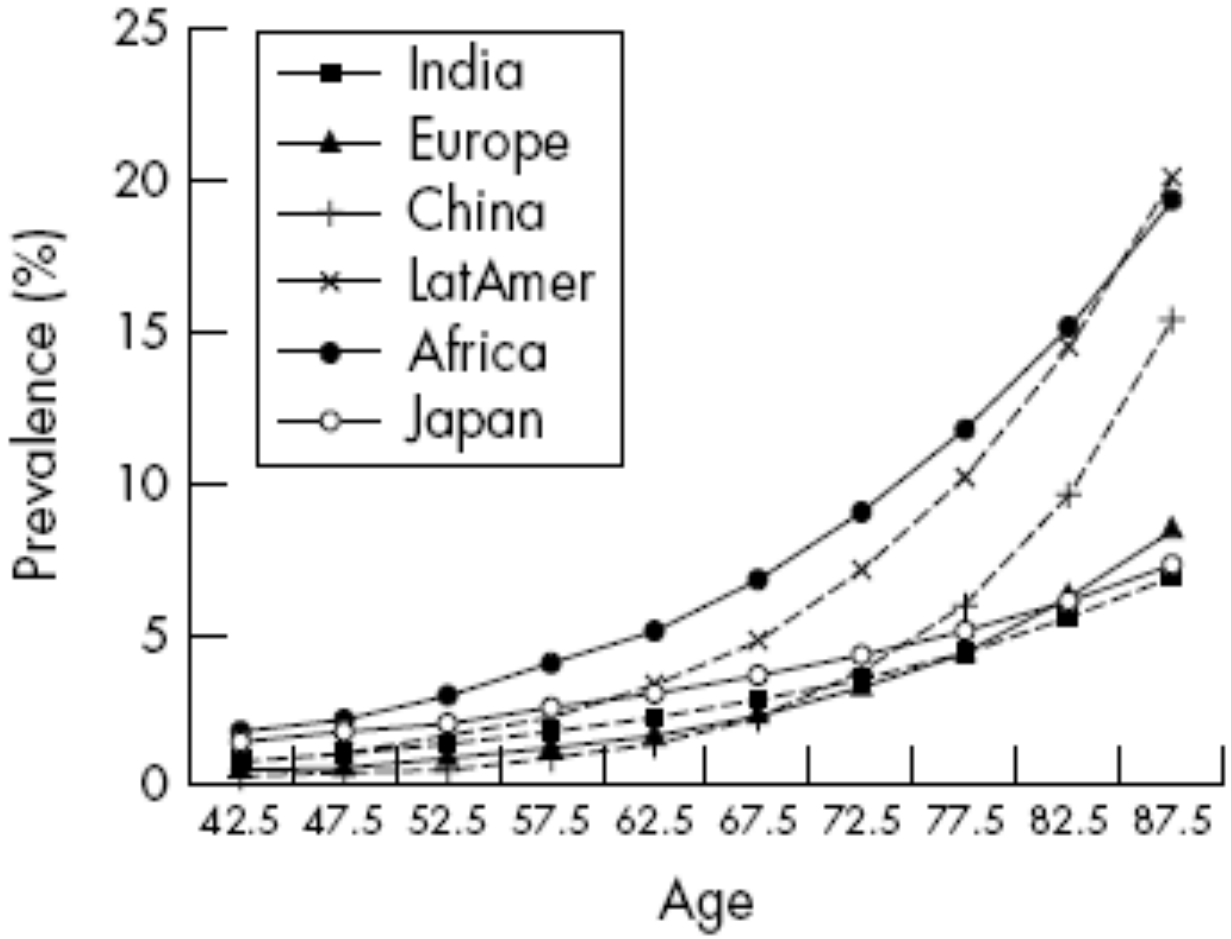
This is a common cause of blindness. It follows cataract and refractive error as a cause of visual impairment.

There are many types of glaucoma. In this environment, the commonest is the one that is chronic, usually painless and asymptomatic until considerable vision and/or visual field have been lost. This is the chronic open angle glaucoma which accounts for about 4.5 million blind world-wide.(Quigley and Broman, 2006). It is thus a silent blinding disease (**Adeoti**, 2007) or

'adakefoju' (**Adeoti,** 2007b) as we popularly call it in glaucoma awareness programs. However, the perceptive patient may become aware that something is wrong with his or her eyes in the late stages of the disease. There may be difficulty obtaining satisfactory spectacle correction and difficulty in seeing clearly in conditions of poor lighting. They frequently change glasses.

In our study in the South-West, about 15-20% of those blind in the population examined had glaucoma (**Adeoti,** 2004; Adeoti et al., 2008; Kolawole, Ashaye, **Adeoti**, et al, 2010). In a population-based study of people aged 40 years and above in Oyo state, Nigeria, primary open angle glaucoma was found in 6.2% and primary angle closure glaucoma in 0.2%. (Ashaye, Ashaolu,…..**Adeoti,** 2013). Secondary glaucomas are also found in our environment with couching and neovascular process being the main causes. (Ashaye, **Adeoti, 2006;** Ashaye, Ashaolu, ….**Adeoti,** 2013). Prevalence of glaucoma increases significantly with increasing age (Figure 10).

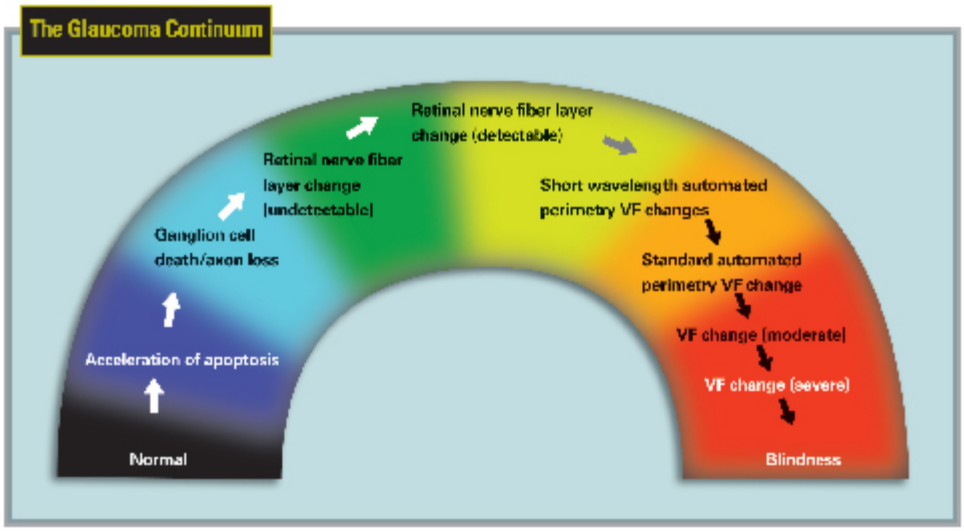
Figure 10: Prevalence of COAG (Quigley and Broman, 2006)



It is therefore necessary for people aged 40 years and above to regularly examine their eyes before blindness sets in.

Glaucoma is a neurodegenerative disease of the optic nerve that can progress from undetectable disease, asymptomatic disease to functional impairment. (Weinreb, Khaw, 2004; Yucel, Zhang, 2003). Patients present to ophthalmologists at various stages of a continuum (Figure 11) that is characterized by accelerated retinal ganglion cell death, subsequent axonal loss and optic nerve damage, and eventual visual field loss.(Perspective, 2004).

Figure 11: Glaucoma continuum



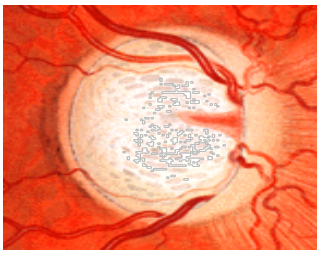
Courtesy: www.revophth.com

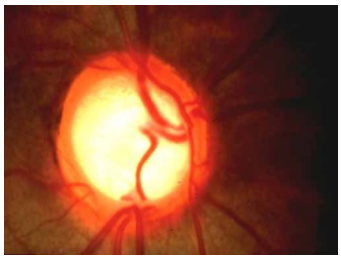
In other words, glaucoma causes blindness by destroying nerve fibres which take information to the brain and responsible for the sense of vision or sight. Like other causes of blindness, it also disrupts the control of the sleep-wake cycle.

The exact origin of this disease complex is still unknown. Many theories have been propounded. Some have said the problem originates from the midbrain to affect the visual pathway. Others said it primarily originates in the eye. However, where ever it may start, the endpoint is an optic neuropathy (Nerve damage) which causes the visual impairment. This is recognized by examining the anterior end of the optic nerve in the inside of the back of the eye (Figures 12 and 13).

Figure 12: Normal optic nerve head

Figure 13: Glaucomatous optic nerve heads





Many groups of people have been found to be at risk of developing glaucoma.

Who are at risk of developing the disease?

- Ocular hypertensives: these are people who have higher than normal intraocular pressure (IOP).
- Family members of glaucoma patients. If a family member has had a blinding condition, others must check their own eyes regularly.

- Those above 40 years of age since chronic open angle glaucoma is mainly a disease of the elderly.
- Those of African descent.
- Diabetics. These are people who have a higher than normal blood sugar as a result of failure of glucose metabolism.
- Systemic hypertensives - those who have high blood pressure.
- Hypotensives – those who have low blood pressure.
- Smokers.
- Myopics. These are the short sighted individuals.
- Those who indulge in prolonged steroid use. This is frequent in those who use steroids for muscle building.
- Those who have vasculitis – a disease of blood vessels.

  There should be a high index of suspicion in at risk groups and regular eye examination by ophthalmologists must be done once or twice yearly.

The only modifiable of these risk factors proven to have been helpful is reducing the intraocular pressure (IOP). Recently completed long-term clinical trials provide convincing evidence that lowering intraocular pressure prevents progression at both the early and late stages of the disease. The degree of protection is related to the degree to which intraocular pressure is lowered (Weinreb, Khaw, 2004).

There is need to emphasize that glaucoma is the most common and important cause of irreversible blindness worldwide. It is important because the commonest type is a silent disease and when it causes blindness, only God can restore vision. In other words, blindness from glaucoma is not humanly curable as of the moment. Progression to blindness can only be prevented or slowed down if it is diagnosed or discovered early. However, there are hopes

for future remedy. Several studies are currently looking at neuroregeneration, neuroprotection and some drugs have been found to offer some neuroprotection to the retina.

How then can glaucoma be diagnosed early so that blindness can be prevented?

1. By recognizing those at risk of developing the disease and monitoring them regularly.

2. Regular eye check by a specialist especially after 40 years of age since chronic open angle glaucoma is mainly a disease of the elderly.

3. High index of suspicion by all healthcare workers (general practitioners, optometrists, family physicians, surgeons, etc) who should ensure that patients especially the high risk groups and all those above 40 years of age have routine fundoscopy done no matter the ailment. It is thus important that the medical curriculum should ensure that enough time is given for the training of students to recognize a glaucomatous optic atrophy.

How can blindness be prevented if glaucoma is detected?

1. Prompt treatment to slow down progression of disease to blindness.

2. Compliance with treatment. Many patients stop their drugs and move from one doctor to another because they expect a cure from the drugs given. However, there is no cure for this disease at present. Progression can only be prevented or slowed down. Therefore, whatever damage has been caused cannot be humanly reversed at the moment.

The specialist doctor's advice should be followed strictly. There are many ways of treating this disease. The specialist will decide what is best for each case. However, one can be advised to use drugs, surgery or laser. Each case is given the option best for the case. Surgery has been proven to be effective in the prevention of blindness from glaucoma. (**Adeoti**, Ashaye, (2005).

3. Ensure good physical health, control hypertension, diabetes mellitus, arthritis, vasculitis and hypotension.

4. Avoid things that can be toxic to the eye nerve such as alcohol, smoking and cola.

5. Do not indulge in self medication. Use only medically prescribed drugs.

The best that can be done is to take the bull by the horn and fight the disease. Hence, the advice of the specialist should be strictly followed. It is better to accept that there is at present, no humanly possible cure for this disease or the blindness it causes. The progression to blindness can only be slowed down.

Diabetic Mellitus

Diabetes mellitus is characterized by sustained hyperglycemia secondary to lack of or diminished efficacy of endogenous insulin. It causes significant morbidity and mortality in multiple systems of the body. It is no longer a disease of the affluent or industrialized nations. (King, Rewers, 1991).

The highest prevalence is found among the populations of developing countries and in migrant and minority communities in industrialized countries. In the UK, 1%–2% of the population is affected, and in Nigeria it is estimated that about two million people have diabetes, though only approximately half of them are aware of it. (King, Rewers, 1991). Diabetic eye disease is becoming an increasing problem in developing countries, due to longer life expectancy and a higher incidence of diabetes. (King, Rewers, 1991).

In a study in Southern India, an average of 45 patients per month presented with advanced diabetic retinopathy (Sharma, 1996). Only a few of these patients were referred for examination, the others were picked on routine eye examination for other things. This suggests there is a need to improve awareness amongst the community and health care

professionals. (Sharma, 1996). All diabetics must have regular and comprehensive eye examination.

In the eye, manifestations of diabetes mellitus are found in almost every part – orbit and lids, the anterior and posterior segments. Most previous authors have concentrated on diabetic retinopathy (Nwosu, 2000); Jenkins, Mayon-White, 1996) but this disease can affect virtually every part of the eye and sometimes can significantly affect vision. Primary care physicians and other allied healthcare professionals who are first in contact with patients can easily examine the anterior segment of the eye for features of diabetes mellitus. They are therefore enjoined to familiarize themselves with the anterior segment features of diabetes mellitus (**Adeoti**, Isawumi, Ashaye, et al, 2012) and refer affected patients to specialists for posterior segment assessment.

Diabetes mellitus causes blindness in many ways including cataract, glaucoma, and retinopathy. Adeoti et al. (2012) found cataract in 65.75% of patients studied.

Age-related macular degeneration:

Macular disease commonly affects elderly people and the commonest type is referred to as age-related macular degeneration (ARMD). ARMD, a multifactorial and polygenic disease; is an important cause of global blindness accounting for about 9% of cases (Yorston D, 2006).

It is the leading cause of severe visual loss among people older than 65 years in the developed world (Friedman, O' Colmain, Muñoz, et al, 2004; VanNewkirk, Nanjan, Wang, et al, 2000).

It affects more than 1.75 million individuals in the United States and owing to the rapid aging of the US population, this number will increase to almost 3 million by 2020 (Friedman, O' Colmain, Muñoz, et al, 2004). Its prevalence increases with age, affecting up to 25% of the population aged 75 years and above.

In developing countries with lower life expectancy, unavailability of necessary technology and manpower, diseases such as cataract, glaucoma, infections, refractive errors are common causes of blindness while in developed countries, owing to rapid aging, availability of adequate technology and manpower to treat other causes of visual impairment, macular degeneration is an important cause of blindness (Friedman, O' Colmain, Muñoz, et al, 2004; VanNewkirk, Nanjan, Wang, et al, 2000). However, some studies have shown that macular degeneration is now more prevalent than earlier believed in developing countries (**Adeoti, Onakpoya, 2014;** Krishnaiah, Das, Nirmalan, et al, 2005).

The pathogenesis of this disease is not well known. Apart from aging, varying degrees of genetic and environmental factors are also implied. Several risk factors have been implicated in the pathology of ARMD such as nutrition deficient in macular carotenoids like lutein and zeaxantin which are strong antioxidants that act as filters to high energy blue light and also neutralize light-generated free radicals, (Szostak, Szostak-Wegierek, 2008; Chong, Robman, Simpson, et al, 2009; Chong, Kreis, Wong, et al, 2008), family history (Chakravarthy, Wong, Fletcher, et al, 2010), smoking (Levai, Horge, Genoveva, 2008; Neuner, Wellmann, Dasch, et al, 2007; Leveziel, Delcourt, Zerbib, et al, 2009) and alcohol especially heavy intake (more than three standard drinks or 20g per day) (Chong, Kreis, Wong, 2008; La Torre, Pacella, Saulle, et al, 2013; Adams, Chong, Williamson, et al, 2012).

ARMD is a progressive late-onset degenerative disease affecting central vision, and can impair important activities, such as driving and reading (Nwosu, 2000).

It is therefore necessary for people especially the aged and those that have family history of ARMD to avoid established risk factors such as smoking, its vapour and alcohol and take recommended dietary supplements such as carotenoids.

Injuries/Trauma.

Although injury may often involve one eye, blinding ocular injuries have been found to be common in developing countries (Bello, **Adeoti,** 2002; **Adeoti,** Bello, Ashaye, 2004) in the elderly during farm-related activities, (Onakpoya, Adeoye, **Adeoti**, et al, 2010) in vulcanizers, (Ubah, **Adeoti,** 2009), in school children from play and bunk-related hazards (**Adeoti,** Ashaye, Ubah, 2010)**,** during new year and Christmas periods from banger-related injuries.(**Adeoti**, Agbeleye, Isawumi, 2013).

Figure 14: Banger injury (**Adeoti,** Agbeleye, Isawumi. (2013)

This was a student who presented with a 9 day history of loss of vision LE following a banger injury (31/12/12) as a passerby while returning from the mosque. There was immediate bleeding and loss of vision. Visual acuity was NLP. The eye was badly traumatized.

Patient had a left evisceration with implant insertion.

Figure 15: Bunk-related injury (**Adeoti,** Ashaye, Ubah, 2010)

This was a secondary school student who fell off his unguarded bunk in school and injured his eye.

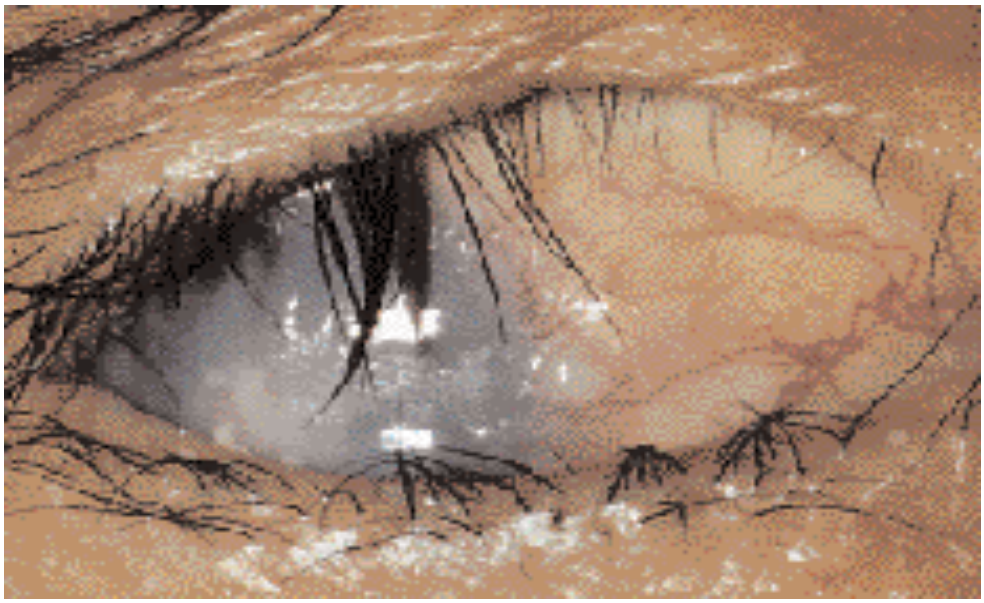
As you can see, many blunt or penetrating eye injuries can be avoided. Bangers can be banned. Bunk beds can be guarded to prevent injuries. Protective devices can be worn on the farms to prevent injury. Safety belts can be worn voluntarily to prevent accidental trauma to the eye in road traffic injuries.

Trachoma

Trachoma is the leading cause of infectious blindness worldwide (Resnikoff, Pascolini, Etya'ale, et al, 2004). It is caused by Chlamydia trachomatis and usually results in chronic inflammation of the eyelids. Infection occurs mainly in children with a peak around 1-5 years of age. Chronic inflammation of the eyelids results in scarring of the conjunctiva which leads to in turning of the lid and lashes (entropion and trichiasis). The in turned eyelashes damage

the cornea thereby causing severe pain, corneal opacity and consequent vision loss (Bowman, Jatta, Cham, et al, 2001).

Figure 16: Trachoma trichiasis and blindness



This figure shows trachoma trichiasis and corneal scarring.

Active trachoma inflammation affects mainly children and women, and cicatricial trachoma affects on average women three times more than men due to the prolonged contact of women with infected children (Courtright, West ,2004; WHO, 2003).

The disease is known to be highly correlated with poverty, lack of personal and community hygiene, limited access to healthcare and water. It is prevalent in Africa, Asia and some parts of Latin America, the Middle East and the Western Pacific (Polack, Brooker, Kuper, et al., 2005). In 2003, the WHO estimated that 84 million people were suffering from active trachoma, and 7.6 million were severely visually impaired or blind as a result of trachoma (Frick, Basilion, Hanson, et al., 2003).

In 1997, the WHO established the Alliance for Global Elimination of Trachoma (GET) by the year 2020 (Mariotti, Prüss, 2001). The elimination strategy can be summarized with the acronym SAFE, which stands for:

- S Surgery for trichiasis,
- A Antibiotics,
- F Facial cleanliness and
- E Environmental change, including provision of clean water and latrines (Gambir, Basanez, Turner, et al., 2007; WHO, 2007).

This strategy has yielded results which are evident in the report of a survey showing a reduction to about 40.6 million people suffering from active trachoma, and 8.2 million having trichiasis. This survey also revealed 48.5% of the global burden of active trachoma are now concentrated in five countries: Ethiopia, India, Nigeria, Sudan and Guinea. (Mariotti, Pascolini, Rose-Nussbaumer, 2009).

Other causes of blindness:

Other causes of blindness include river blindness (Onchocerciasis), other infective corneal opacities, drugs, diseases in pregnancy among others.

Global response to the burden of blindness:

There is no gainsaying the great burden of blindness especially in developing countries. This prompted the World Health Organization (World Health Organization, 1997) and Non Governmental International agency for the prevention of blindness to launch the vision 2020 in 1999 (Pararajasegaram R., 1999; Resnikoff S, Pararajasegaram R.,2001)..

VISION 2020 is an initiative aimed at eliminating avoidable blindness in the world by the year 2020. This initiative is targeted at the world's leading causes of avoidable blindness

which includes cataract, trachoma, onchocerciasis, childhood blindness (including vitamin A deficiency) and refractive error. In developed countries where these diseases have been controlled, glaucoma and diabetic retinopathy are included among the targeted conditions. To achieve these goals, VISION 2020 requires the training of adequate numbers of eye care providers at all levels and the establishment of critical infrastructure and appropriate technology. Technically, in order to achieve these goals, programs such as cataract surgical outreaches to eliminate cataract blindness, distribution of low cost glasses for refractive errors, mass distribution of Vitamin A to eliminate childhood blindness due to Vitamin A deficiency, mass distribution of ivermectin in areas endemic for onchocerciasis are in place. In addition to this, in 2013 the World Health Assembly approved the 2014-19 Action Plan for the universal access to eye health, a roadmap for Member States, WHO Secretariat and international partners with the aim of achieving a measurable reduction of 25% of avoidable visual impairments by 2019.

As part of preservation, restoration and rehabilitation of sight in children, the WHO has also since year 2004 partnered with Lions Clubs International to establish a global network of many childhood blindness centers in more than 35 countries. This unique and innovative global project has served so far more than 150 million children.

It is hoped that by year 2020, unnecessary blindness would have been drastically reduced and there will be sight for all.

Sleep

Why are the lids closed in sleep?

The work of God is perfect. Everything He did was good and for a purpose. Just like the nose is for breathing, the ears for hearing, the eyes are made to enable us see the world in its beautiful form. When we sleep, we do not see anything and so there is really no need to keep the eyes open in sleep. Nature has therefore done it in such a way that the eye lids come together to protect the eyes from danger such as insects crawling on the eyes which can damage the delicate structure called cornea in the eye.

Secondly, light regulates sleep-wake cycle by reducing the production of a chemical/hormone in the brain called melatonin. This chemical is responsible for sleep. Therefore, if the lids allow light to enter our eyes, this hormone will not be produced and we will have sleep disturbance. In blindness, especially where the visual pathway is involved, little or no light rays reach the brain and melatonin is produced abnormally which leads to disturbances in the sleep-wake cycle. (**Adeoti,** 2010). Affected persons have disturbed/fragmented sleep which results in day naps while they stay awake in the night.

Thirdly, by closing our eyes in sleep, we keep the cornea wetted so that it does not dry up and cause exposure keratopathy - a disease of the eye caused by exposing the eye to drying.

Sleep, like breathing is a vital process for humans and animals. Insufficient/disordered sleep impairs cognition and has been linked to a variety of diseases. Generally, about 10-20% of the population has been estimated to suffer from loss of sleep at night and about 50% of adults over 65 years have some type of sleeping disorder.

Adeoti (2010) found sleep-wake disorder in 81.2% blind patients. However, this was commoner and more severe in patients with diseases affecting the visual pathway. The

estimated prevalence of syndromes of sleep-wake disorders in the United States of America is about 50 to 70 million (National Institutes of Health, 2003) and those who suffer from chronic sleep disorders have been found to have impaired daily functioning, compromised health status, and diminished quality of life. (Harsh, Hayduk, Rosenberg, et al, 2006).

In a qualitative study (Ashaye, Ajuwon, **Adeoti,** 2006). in Iddo, Oyo state, there was a consensus of opinion among group discussants and informants that there are severe social and economic consequences of blindness which includes loss of sleep amongst other things.

Sleep, like many physiologic functions follows a circadian rhythm which is controlled by a complex group of biological processes that serve as internal clock. This clock called the suprachiasmatic nucleus (SCN) is a pair of pinhead-sized brain structure that together contains about 20,000 neurons and is located in the hypothalamus above the chiasm in the brain. Environmental factors such as light and dark circles, temperature, social cues, rhythmic feeding and awareness of time, known collectively as zeitgebers also influence the sleep-wake cycle. Light is one of the most important stimuli that influence the sleep-wake cycle (Wever, 1989; Lewy, Wehr, Goodwin, et al, 1980; Arendt, Broadway, 1987). Light that reaches the retina photoreceptors travel along the optic nerve to the SCN and from there, signals travel to several brain regions including the pineal gland which responds by switching off production of the hormone melatonin. In darkness, the level of melatonin increases, making people feel drowsy.

Melatonin or 5-methoxy-N-acetyltryptamine is a naturally occurring hormone found in most animals including humans (Caniato, Filippin, Piovan, et al, 2003). In higher animals and humans it is produced by pinealocytes in the pineal gland and also in the retina, lens and gastrointestinal (GI) tract. It is also synthesized by plants such as rice. Melatonin produced by the pineal gland acts as endocrine hormone while that produced by the retina and GI tract acts as paracrine hormone. It is important in the regulation of the circadian rhythms of many

biological functions (Altun A, Ugur-Altun, 2007). Oral administration of melatonin has been found to increase total sleep time, reduce night awakening and may synchronize sleep-wake cycles (Arendt, Aldhous, Wright,1988; Folkard, Arendt, Aldhous,et al, 1990).

The biological functions of melatonin are due to activation of melatonin receptors (Boutin, Audinot, Ferry, et al, 2005).

Disorders of the sleep-wake cycle are related to the timing of sleep within the 24 hour day. The day is for work while the night is for sleep that restores what is lost in the day. These disorders are a common clinical problem encountered in medicine. Some are under the control of the individual such as shift work while the others are disorders of neurological mechanisms.

Some studies have demonstrated that visual loss may be associated with disorders of the sleep-wake cycle (Adeoti (2010), Miles, Wilson, 1077; Leger, Guilleminault, Defrance, et al, 1996; Sasaki,Nakata, Murakami, et al, 1992).

Also, reports of graded inhibition of melatonin levels by light of different intensity (McIntyre, Norman, Burrows, et al, 1989) suggest a reduction in the input of signals to the SCN and the pineal gland by any degree of visual loss. Therefore, subjects with severe loss of vision are expected to have a higher prevalence or greater severity of sleep disorders than others.

The recognition of sleep-wake disturbances in the visually handicapped is very important since a disturbed sleep cycle may aggravate the problem. Also, chronic insomnia is associated with an increased risk of depression (Neckelmann, Mykletun, Dahi, 2007), anxiety (Neckelmann, Mykletun, Dahi, 2007), excess disability (Simon, Vonkorff, 1997), increased use of health care resources (Simon, Vonkorff, 1997) and reduced quality of life (Silber, 2005).

Furthermore, insufficient sleep impairs cognition and has been linked to a group of illnesses.

For example, if you sleep less than 6 hours in the night, epidemiologic studies have shown the following:

• Stroke is increased 4 times.

• Obesity is increased.

• Diabetes is increased because sleep deprivation increases insulin resistance.

• Memory loss is accelerated. Epidemiologic studies show that there is not only permanent cognitive loss but also evidence of early brain deterioration.

• Cardiac disease is increased. There is a 48% increase in early cardiac death, as well as increased cardiac-related mortality.

• A 4-fold overall increase in mortality.

Also, sleep deprivation, or fragmentation, has profound implications for cancer biology. From a gastroenterology standpoint, it may be related to colon cancer and gastric cancer and is certainly in the pathway to chronic bowel disease and its progression to cancer genesis.

Obstructive sleep apnea

This is a common sleep disorder that has been associated with many eye disorders. It is the most common form of sleep apnea, affecting over 12 million people in the US. It is associated with several conditions including hypertension, floppy eyelid syndrome, glaucoma and non-arteritic ischaemic optic neuropathy.

Hypertension

Obstructive sleep apnea (OSA) is a risk factor for developing hypertension or high blood pressure. High blood pressure can cause heart disease and the vascular changes caused by hypertension can also affect the eye's *vascular system and eventually cause blindness.*

Floppy eyelid syndrome in which the eyelid everts and turns inside out can lead to excessive watering and discomfort and can be a signal to OSA.

Glaucoma

This has been discussed earlier. OSA is associated with both open and closed angle glaucoma and the more frequent the episodes of apnea, the more severe the glaucoma.

Non-arteritic ischemic optic neuropathy

This can cause painless, irreversible loss of vision in one or both eyes.

Therefore, physicians who diagnose OSA should look for these eye abnormalities. Infact, regular eye examination by an ophthalmologist should form part of the treatment plan of these patients, even in the absence of obvious eye disease at presentation.

Likewise, eye care workers who find any of these visual abnormalities should do a sleep work up and ask about sleep and snoring.

Scientists have tried to examine mechanisms that can explain why sleep is very critical to healthy living and for many years they had no answer to the question of how the sensitive neural tissue of the central nervous system (CNS) functions in the absence of the lymphatic circulation. The lymphatic circulation is responsible for the transportation of waste products from peripheral tissues back into the blood.

Recently, they have come up with the theory that sleep allows our brains to clean themselves up ready for another day’s constructive activity. This is the glymphatic system. In other

words, the glymphatic system is a functional waste clearance system for the central nervous system (CNS). Studies have shown that this system is mostly active in sleep thus helping the brain to eliminate unwanted byproducts.

It is obvious from the aforementioned facts that there is a well known relationship between the eyes, sleep and health. All efforts must be taken to prevent blindness by caring for the eyes in order to sleep well and have good health.

Caring for the eyes:

- Prevention is better than cure- prevent trauma, prevent blindness from glaucoma
- Good personal and environmental hygiene.
- Balanced diet + antioxidants in adults.
- Avoid things that are toxic to the eye such as cola, alcohol and smoking
- Regular eye checks especially for people at risk of glaucoma.
- Early diagnosis and prompt treatment of systemic diseases such as hypertension, hypotension, diabetes mellitus and other vascular diseases.
- Early diagnosis and prompt treatment of eye diseases.
- Cataract is treatable so don't refuse surgery.
- Take glasses when it is necessary.
- Protect your eyes from injury.
- Stay away from dangerous things like bangers.

Remedies for sleep-wake disorder:

1. See your Doctor
2. Take a warm bath before bed.
3. Get a physical exercise during the day.

4. Get a gentle massage in bed.
5. Listen to soft soothing music or other audio
6. Drink warm milk or herb tea
7. Avoid caffeine, alcohol and tobacco
8. Sleep in a well ventilated room
9. Sleep on a good firm bed
10. Sleep like a child.
11. Keep regular bedtime hours. Best time is 10pm to 4am/6am.
12. Sleep in a dark room.
13. Use sleep masks if you do nocturnal jobs like shifts and you need to sleep in the day.
14. Avoid day naps so that you can sleep well at night
15. Drugs should be a last resort.

Finally:

What does the future in LAUTECH foretell?

Future:

The future is bright on the elimination of blindness.

A. We have trained many eye care workers including nurses and doctors in order to reduce blindness.
B. We have commenced outreaches to eliminate avoidable blindness. The outreaches in future will continue to engage in:

1. Health education activities to enlighten the public on how to prevent blindness.
2. Cataract surgeries to eliminate cataract blindness.
3. Glaucoma screening at every outreach to pick cases early for prompt treatment

B. Family glaucoma screening.

C. Research on the prevention and treatment of glaucoma and the blindness it causes.

Conclusion:

Giving sight to all by the year 2020 in order to sleep normally at the right time all the time and have good health is a task every eye care worker world-wide must engage in.

Acknowledgement

I am grateful to the Almighty God, the maker of heaven and earth who made today a reality.

My gratitude goes to my employers, the Governments of both Oyo and Osun states. All governors of Osun state government have supported me one way or the other. I sincerely register my appreciation to Colonel Bamgboye, the then Military Governor of Osun State who bought Mercyland Specialist hospital for Ophthalmology use when I came to Osun State having been moved along side others from Old Oyo State with the creation of Osun State.

The Council members (past and present), I appreciate you all.

All Kabiyesis here present, I thank you for finding the time to attend this Inaugural lecture.

I have worked closely with many Vice-Chancellors. I appreciate Prof. A. M. Salau and Prof. B.B Adeleke for their administrative styles, thoughtfulness and roles played in my career.

My Vice-Chancellor today, Prof. Adeniyi Sulaiman Gbadegesin whose style I admire and like to emulate. He came at a time when LAUTECH needed a lot of rebranding.

I stated my policy at the beginning of this lecture which is 'doing the right thing at the right time all the time'. This amongst other things, I have seen in him and I whole heartedly decided to emulate him all the way.

I thank you Sir for making me what I am today. You were the one that lifted the victimization I inherited from the ownership crisis. Your wife remains my sister ever since I knew you.

The road to becoming a Professor started from Primary school. I attended Saint John's primary schoolB Iloro Ilesha from where I later went to Saint Margaret's Girls grammar school Oke-oye Ilesha. I remember my friends, teachers and our principal then, the late Mrs Alalade who instilled into us the discipline which has been guiding me up till now. May her gentle soul rest in perfect peace. My chemistry teachers in the secondary school and University were very interesting and efficient. Maybe, because I like chemistry but they both

contributed to my success in that subject. I appreciate both of them- Mr Alalade and Father Foley respectively.

I thank the entire LAUTECH community and the public for the honor given me today.

The members of committee of Provost and Deans, I enjoyed your company throughout my 5 years as Dean, Faculty of Clinical sciences. I thank you most sincerely.

I say a special thank you to all members of the College of health Sciences, Faculty of Clinical Sciences, Lautech Teaching Hospital and the department of Ophthalmology for their support and prayers.

My mentor and teacher, Prof. Mrs A. O Ashaye who mentored me in my postgraduate days and is still there for me even now, I thank you ma for the role played in making today a reality. I used to wonder where she gets her energy from. I admire you ma. I appreciate your effort at proofreading this paper.

Prof. Ronke Baiyeroju, my sister and teacher, I thank you very much for your role in my life.

My husband, the crown of my head for your love at all times, I am very grateful Sir.

My parents who worked so hard to give all of us the education they so much wanted for themselves, I thank you both so sincerely. How I wish you were alive today. My father was the head master of his school. He loved children so much that he was nicknamed ‘Baba ewe’- father of children. He was the cook when we were yet to come back home from school in those days. My father could cook everything, soup, name it but especially pounded yam.

My mother was a trader who had little education as a child but determined to learn how to read her bible. She therefore, went for adult education. She was a neat person and will only be satisfied when everything is done neatly and to her taste.

My parents were great disciplinarians. My mother especially did not tolerate any nonsense, I remember she will tell her grandchildren; ‘ki tu yee’ meaning what is this? When the girls wear trousers and ‘ke te re tu se se yoyo bi yee’ meaning why are your lips colored like this?

I have been told many times that I take after her. However, I think I am gentle and if not for the state ownership crisis, I would not have been known by many people. I thank them both for what I am today.

I thank my mother's sister (Mrs. B. A. Osundiya) and her husband who I lived with in my primary school days. Mummy, you are a mother in a million. I appreciate you Ma.

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- Mr. & Mrs Oluwole Kuteyi
- Engr. Dupe Okuo
- Mr & Mrs Diti Adeoti
- Mr & Mrs Lekan Adeoti
- Mr & Mrs Williams
- Mr & Mrs Yomi Ariyo
- Engr & Mrs Tunde Adeoti
- Mr & Mrs Tunji Ajibola

All members of the Kuteyi, Adefokun, Adeoti family, you have been wonderful.

I thank you all for your support and prayers.

My fathers, mothers, brothers and sisters in the Lord: I like to mention everyone but they are too numerous to list in this book. My Arch Bishop (Ibadan Province) who is also the Bishop (Ibadan North Anglican Diocese) and his wife – Most Revd. and Mrs Segun Okubadejo. I thank you Sir and Ma for your fatherly and motherly role in my spiritual life.

Past venerables of Bishop Akinyele Memorial Anglican church (BAMAC), I appreciate you all. The current venerable of BAMAC, Iwo road Ibadan, the 'Olori ebi' as we popularly call him and his wife, I thank you very much for my spiritual upliftment and prayers.

Past assistant priests and the present ones, Revd Sowale, Revd Tolu-Kehinde, Revd Femi Ojeniyi, Revd D.E. Olayioye and all others. You are wonderful people. I appreciate you Sirs.

To all members of BAMAC family, I say a big thank you for your love at all times. I cherish going to that church. Mr. Vice Chancellor sir, please permit me to use this medium to invite everybody here to that church where love radiates all the time.

My children who are many and space will not allow me to name them but I will mention a few;

- The Enis
- The Kuteyis
- The Okuos
- The Adeotis
- The Akintoyes
- All my children in Ophthalmology
- All my staff in Osogbo

I thank you all. You are all wonderful people.

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Mr. Vice Chancellor Sir, permit me to rest my case. Thank you all for your attention.

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ABIOYE omo edu lukoro

Esisan wopo si

Edu ule, edu oko, edu ona meji

Omo Olukoro korodo lona oriya

Omo a magbeje kan dile po

Omo a riyeromo bo na rugba

Omo ekure eleo simi

Omo eleo iwo turu tara

Omo osun megbewa tido

Eloni moni are seibo lodoun lola

Omo elero, korodi su mogun

Omo ayinkasin eo keregbekeregbe

Omo ama'ka aja ro

Omo alapoporo meta

nse Ologbe oyin

Okan a in tidi tidi

Okan a in jagi jagi

Okan a in dede a me o ra

Omo e o oni ni mo e e e

Omo alaja dana

Omo eka imi e o

Igbi eo igbi mo

Eleka ni eme ye

Omo eye elede bu jura

O bu Kunwin Kunwin kunwin

Suponni agbode

O nakaja ro, kemi yaa ki un

Labo oke esu

Omo elekun kei nao oja gboro nir'apa

Omo alayese, alumoju pere.

Okinka mewa na a mu mwa aya

Okan soso naa mu le isode

Omo ita pete a rin ya ofin

Omo oni agbebo adie nmo kiki

a in kekereke ko o.