DISSERTATION

PATTERN OF OCULAR FINDINGS AMONG PATIENTS AGED 40 YEARS AND ABOVE ATTENDING EYE CLINIC AT JUBA TEACHING HOSPITAL

IN

SOUTHERN SUDAN

A dissertation submitted in part fulfillment for the Degree of Master of Medicine in Ophthalmology

University of Nairobi

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DECLARATION

I declare that this thesis is my original work and has not been presented for the award of a degree in any other university

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APPROVAL

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DEDICATION

This work is dedicated to my beloved wife Rose and my mother Alice for the prayers, moral support and understanding during the entire period of this study.

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LIST OF ABBREVIATIONS

AREDs	Age-Related Eye Diseases
ARMD	Age Related Macular Degeneration
CBM	Christian Blind Mission
DCCT	Diabetes Control and Complications Trial
DR	Diabetic retinopathy
ED	Emergency Department
IOP	Intraocular Pressure
SSHHS	South Sudan household health survey
JTH	Juba Teaching Hospital
MOH	Ministry of Health
RSS	Republic of South Sudan
HIV	Human Imunodifiency Virus
AIDS	Acquired Imunodifiency Syndrome
UON	University of Nairobi
TB	Tuberculosis
POHx	Past Ocular History
PMHx	Past medical history
BCVA	Best Corrected Visual Acuity
RAPD	Relative Afferent Pupilary Defect
TF	Trachoma Follicles

TI	Trachoma Intense
TS	Trachoma Scars
TT	Trachomatous Trichiasis
CO	Corneal Opacity
PH	Pinhole
COECSA	Colleges of Ophthalmology in Eastern, Central and South Africa
V.A	Visual acuity
TPR	Tarsal plate rotation
DR	Diabetic retinopathy
HR	Hypertensive retinopathy
WHO	World health organization
TBUT	Tear break up time
SAFE	Surgical Antibiotics Facial cleanliness and Environmental improve
CSR	Cataract surgical rate

ABSTRACT

Aim

To determine the pattern of ocular findings among patients aged 40 years and above attending to eye clinic at Juba Teaching Hospital in South Sudan.

Design

A descriptive cross-sectional hospital based study.

Method

All patients aged 40 years and above attended an eye clinic in Juba Teaching Hospital in the month of October to September 2013, who met the inclusion criteria for the study, underwent a thorough ophthalmological examination. Data collected analyzed using the SPSS statistics version 17.0 software.

Results

A total of 539 eyes of 270 patients were examined in this study, The range of age varied from 40 years to 84 years, with the majority of patients 204(75.5%) being between the age group of 40-60years. Male 140(51%) to female 130(49.1%) ratio was 1.1:1. The commonest ocular disease was dry eye syndrome with a prevalence of 199(36.9%), It was most prevalence in patients above 50 years of age (72%). Cataract was the second commonest ocular disease encountered with a prevalence of 116(21.5%), followed by refractive error/presbyopia 108 (20.0%), glaucoma 731(13.5%) and conjunctival degenerative conditions 47(8.7%).

Conclusion

The preventable causes of visual impairment and blindness were common among the patients. We recommend community education to reduce the prevalence of these diseases in general population and skilled human resource to offer optimal management for various ocular morbidity

INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

As people advance in age, normal functions of the eye tissues decreases and blinding disorders increase in frequency. The 2010 report on visual impairment worldwide revealed that 65% of the 285 million people with visual impairment are over the age of 50 years. This age group also makes up 63% of the 246 million with low vision and 82% of the 39 million blind.[1] Visual impairment is unequally distributed across age groups, as more than 82% of all blind people are 50 years of age or older. People in this age group represent 19% of the world's population; the prevalence of blindness among children is about 10 times lower than that among adults. [2] This age related visual impairment occurs globally with a higher prevalence in less developed regions.[3]

Another study stipulates that advancing age is susceptible to numerous diseases especially age related cataract and degenerative disorders.[4] The frequency of eye diseases has been suggested to start increasing around 40 years of age, with an even steeper increase beginning around 60 years of age. [5] Population based cross-sectional studies depicting the magnitude and prevalence of ocular diseases among the elderly population in South Sudan is non-existent. Data on the prevalence and causes of blindness and severe visual impairment in adults are need for planning and evaluating preventive and curative services for adults, including planning special education and low vision services. The available data suggest that there may be a tenfold difference in prevalence between the wealthiest countries of the world and the poorest.[6] For instance, based on demographics from the 2000 U.S. Census, an estimated 937,000 Americans aged 40 years and older are blind and another 2.4 million suffer from low vision. [7] Regardless of the cause, the number of people who are blind or who have low vision is expecting to nearly double by the year 2020, because of the ageing of the world's population.[8]

1.2 Literature Review

1.2.1 Overview

The elderly people were susceptible to numerous degenerative disorders. [9] The frequency of eye diseases start to increase around 40 years of age with a steeper increase noted around the age of 60 years.[10] Thus a proper understanding of the magnitude of ocular diseases and the factors associated with their occurrence greatly will help in planning for geriatric eye care services.

1.2.2 Pattern of Ocular Finding among Patients aged 40 Years and above

The pattern of ocular diseases varies in different parts of the world and is influence by racial, geographic, socioeconomic and cultural factors. [10] The common ocular diseases in the elderly population worldwide are cataract, glaucoma, refractive error/Presbyopia, conjunctival degenerative diseases, age related macular degeneration (ARMD). Other eye diseases include trachoma, onchocerciasis, trauma and diabetic retinopathy. The principal causes and prevailing epidemiology of visual disability distinct in developed as compared to developing countries. The commonest eye diseases seen among patients attending ophthalmic outreach services in a rural area in Ethiopia were conjunctivitis, cataract, presbyopia, refractive errors and blepharitis.[11]

1.2.3 Prevalence of Ocular Morbidity among Population aged 40 years and above

The prevalence of ocular diseases among the elderly population was high. Each person above fifty years of age is susceptible to suffer from one or more ocular diseases. Age is a factor found to have a profound influence on the occurrence of ocular morbidity.[10] In the United States of America; AREDs are commonly associated with the elderly. [12] A rapidly ageing population is likely to result in a considerable increase in the prevalence of AREDs. Furthermore, there seems to be a corresponding increase in the frequency of these diseases with increasing age. In Singapore AREDs form, a substantial proportion of the public health disease burden due to the high morbidity and rehabilitation costs associated with visual loss.[13]

1.2.4 Causes of Ocular Morbidity in Population aged 40 years and above

The leading causes of ocular morbidity among the elderly are cataract, ARMD, glaucoma and diabetic retinopathy. Cataract though easily correctable, is the most common cause of blindness in the developing countries.[14] In India alone 3.8 million people become blind from cataract each year.[15] In many parts of the world refractive errors are the second largest cause of treatable blindness after cataract.[16] Especially where blindness is define based on presenting distance visual acuity. A study on ocular morbidity among patients attending satellite clinic in Bhaktapur, Nepal found refractive errors, cataract, and anterior segment diseases are the main cause of ocular morbidity.[17]The consequences of morbidity such as macular degeneration, glaucoma, and cataract may contribute significantly to visual impairment among the elderly.[18]

1.2.4.1 Cataract

For cataract, ageing is the most well known risk factor for its development.[14] It is define as the clouding of the normally clear crystalline lens and is currently the leading cause of blindness in the world. As the global population of the elderly people increases, cataract-induced visual dysfunction and blindness is on increase possessing a significant global challenge. Though cataract has an easy availability of cure, it appears that many elderly patients with cataracts are undiagnosed; A study by Ho et al found that for every 3 person known to have cataract, two were previously undiagnosed. [19] In a study by Aga et al in a slum area of Ethiopia, on RAAB among the elderly population, cataract was the commonest prevalent disease accounting for 43.1%, followed by glaucoma (10.0%) and extra ocular diseases (8.8%) respectively.[20]

1.2.4.2 Age-Related Macular Degeneration (ARMD)

Ho states that for every elderly person with known ARMD, 154 were unknown.[12] In Singapore ARMD is the second leading cause of ocular morbidity among the older population. In the United Kingdom, it accounts for nearly 40% of registered blind people. ARMD is the leading cause of blindness in developed countries. It affects a person's central vision and was broadly classify into two categories: non-neovascular/ non-exudative and wet neovascular/exudative ARMD. Dry ARMD progresses more slowly than wet ARMD, is more common and less visually debilitating and considered less severe. Wet ARMD is characterised by the development of choroidal

neovascularisation, which can result in severe loss of vision due to bleeding and scarring. [14]

1.2.4.3 Glaucoma

Glaucoma is the third leading cause of blindness among the elderly, age is among the array of risks factors associated with primary angle-closure glaucoma.[12] Blindness due to glaucoma is irreversible and there is no preventive measure for glaucoma. Visual loss due to glaucoma is preventable if treatment is start before the optic nerve is damage. This therefore means that detecting glaucoma early is crucial in preventing sight loss. The silent presentation of most of the cases of glaucoma and the lack of a single effective diagnostic tool, population screening has proved difficult. The measurement of intraocular pressure (IOP) is not sufficient for detecting glaucoma. This is because patients with low-tension glaucoma have an IOP within the so-called normal range. Even though the clinical diagnoses of glaucoma rely mainly on the appearance of the optic disc, screening based on the evaluation of the optic disc was note to be unreliable due to significant inter-observer variability. In another study done by Ralf Buhrmann in rural villages in Tanzania among $\geq$ 40 years found the prevalence of glaucoma is, 4.16% with the majority had primary open angle glaucoma about 3.1%.[17]

1.2.4.4 Refractive Error/presbyopia

Refractive error is the state in which non-accommodating eye, fails to bring parallel rays of light to focus on the retina. [21] In myopia the optical system of the eye brings parallel rays of light into focus anterior to the retina while in hyperopia the optical system of the eye brings parallel rays of light into focus posterior to the retina, both resulting in blurred vision. [22] The prevalence of the refractive error differs with age with hypermetropia prevailing especially after the age of 70.[23] Several cross-sectional studies indicated that older persons tend to have lower rates of myopia and higher rates of hyperopia, than younger persons.[15] After 60 or 70 years of age, the hyperopic shift seems less prominent. However, some studies have shown a reverse trend where there is an increasing prevalence of myopia and a decreasing prevalence of hyperopia with advancement in age.[24]

1.2.4.5 Diabetic Retinopathy

Even though diabetic retinopathy is not a direct result of ageing, it is consider the fourth most common cause of visual loss among elderly population. This is because greatest risk factor for diabetic retinopathy is the duration of diabetes mellitus. [25] Diabetic retinopathy known to progress from mild non-proliferative diabetic retinopathy to advanced proliferative diabetic retinopathy. Leakage from blood vessels causes macular oedema that may result in visual loss. The progression of diabetic retinopathy is multi-factorial with the greatest risk factor being the duration of the disease.[16]

1.2.5 Other Causes of Ocular Morbidity in Population aged 40 years and above

1.2.5.1 Trachoma

Trachoma is the commonest infectious cause of blindness, cause by Chlamydia trachomatis. It is estimate to be responsible for at least 3.6% of all blindness worldwide. Trachoma is hyperendemic in many of the poorest and most remote rural areas in 57 countries of Africa, Asia, Central and South America, Australia and the Middle East. Roughly half of the global burden of active trachoma is concentrated in five African countries (Ethiopia, India, Nigeria, Uganda and Sudan), and trachomatous trichiasis in four countries (China, Ethiopia, Nigeria and Uganda). Overall, Africa is the most affected continent: 27.8 million cases of active trachoma (68.5% of all cases globally) and 3.8 million cases of trichiasis (46.6% of all) occur in 28/46 countries in the African Region. The highest prevalences of active trachoma reported from Ethiopia and Sudan, where the infection often occurs in more than 50% of children younger than 10 years; trichiasis in upto 19% of adults. [24] After the age of 15 years almost half of the persons examined (43.0%) had evidence of TS. [19]

1.2.5.2 Onchocerciasis

Onchocerciasis recognized as a major disease of public health importance in endemic parts of the world, with sub-Saharan Africa. Onchocerciasis, commonly known as river blindness, is endemic in many tropical countries but mainly in the equatorial regions of Africa. Out of the estimated 18 million infected people worldwide, more than 80% live in Africa. [26] West Africa, being the most hyperendemic foci in the world; Onchocerciasis affects communities leaving along fast-flowing rivers, which

enable the breeding of the vector, Simulium. The symptoms of the disease are particularly irritating and disabling; it leads to posterior segment damage causing irreversible blindness.

1.2.5.3 Trauma

Ocular trauma continues to be a significant cause of morbidity in terms of visual loss or impairment and diminished quality of life. According to the data compiled by WHO's Blindness Data Bank, it is estimated that globally approximately 55 million eye injuries restricting activity for more than one day occur each year and 750, 000 cases require hospitalization each year, including approximately 200,000 with open-globe injuries. There are approximately 1.6 million blind from injuries, additionally some 2.3 million people with bilateral low vision resulting from ocular trauma and almost 19 million people with unilateral blindness or low vision. In the United States alone, over 2.4 million eye injuries occur yearly, with ocular trauma being the third most common ophthalmic indication for hospitalization. However, most ocular injuries and their complications is preventable by appropriate safety precautions and early detection. The two commonest affected age groups were from 18 to 29 years (31%) and 30 to 45 years (24%).[27]

1.2.6 Overview of Ocular Morbidity in South Sudan

An acute shortage of health workers in developing countries is a setback to the achievement of the health Millennium Development Goals and reductions of poverty. Over a billion people worldwide have little or no access to health services and the help and advice of health workers. This huge shortage of health personnel is perhaps the greatest problem facing good eye care. Only 14 of the 45 countries in Africa for which data is available reach the VISION 2020 target of one ophthalmologist per 400,000 populations, and in several countries, the ratio is more than one ophthalmologist per million. [28] Apparently, South Sudan has some of the highest blindness rates in the world. Despite this, the country by March 2012 had only one ophthalmologist serving the whole country with a population of over 9 nine million people. [29] Juba Teaching Hospital is the only eye unit in the whole of South Sudan equipped with one ophthalmologist. This eye unit attends patients from the 10 states, which are not only poor funded but also are under-staffed. The study estimated that over a quarter a million of South Sudan population suffers from blindness. This puts it

as the country with the highest prevalence in East Africa. On average, each family in South Sudan has a blind person.[29]

STATEMENT OF THE RESEARCH PROBLEM AND RATIONALE

2.1 Statement of the Problem

The Republic of South Sudan got its independent on July 9th2011. Its population is about 8.26 million and 51% of which is below the age of 30 Years as per 2008 census. 83% of the population is rural, only 27% of the adult are literate and 51% live below poverty line which earns only less than 1$ per day.[29]

There are about 5eye care centres in the whole Country run by the government but only one centre which is located in the capital city Juba is equipped with Ophthalmologist, it is the only referral eye hospital in the Country offering only basic eye care services while the major cases are referred to the neighboring countries. At JTH eye clinic consultation fees plus the medication all cost about 3$ per patient, cataract surgery cost about 20$ per eye and other minor surgery cost about 5$.

. Currently the young nation faces enormous challenges due to its long history of war, with limited infrastructure and major gaps in the availability of eye care services due to the lack of trained eye care staffs and resources, major investment is necessary to enable this sector to serve the citizens. [28] South Sudan has the greatest number of people suffering from eye related diseases. The nation currently has over 150,000 people suffering from eye related diseases and estimate that the number will approach half a million in the near future, if no urgent measures are taken.[29]There is no study done in South Sudan in regard to ocular diseases among the patients 40 years and above. The purpose of this study is to determine the pattern of ocular diseases among the elderly patients in South Sudan. This study may help to generate baseline information, which will be beneficial for program formulation and planning of activities on ocular services in South Sudan. The study can also be an impetus for a more extensive research in the future.

2.2 Study Rationale

- The burden of eye diseases in South Sudan is significantly high.[30]
- Little information is known on prevalence and pattern of ocular morbidity among patients aged 40 years and above in Southern Sudan

- The outcome of this study will help in formulating policy for the eye services in the Country.

2.3 Broad and Specific Objectives of the Study

2.3.1 Broad Objective

The overall aim of the study was to determined pattern of ocular findings and types of interventions done in management of various ocular conditions among patients aged 40 years and above attending to the eye unit in Juba teaching hospital

2.3.2 Specific Objectives

1. To determine the pattern of ocular findings among patients aged 40 years and above attending the eye unit in Juba teaching hospital
2. To determine the intervention done in management of various ocular conditions among patients aged 40 years and above in Southern Sudan

MATERIAL AND METHODS

3.1 Study Design

A Hospital based descriptive cross-sectional study.

3.2 Study Area

This study conducted at Juba teaching hospital eye unit in Southern Sudan (Appendix II).The hospital established in 1920s and became a teaching hospital in 1977. It is located in the capital of Southern Sudan Juba with a catchment area of about 150 kms and of population of 350,000. The eye unit operates from Monday to Friday with frequency of patient ranging between 80 -100 per day, seeing 14,000 to 18,000 per year in all age groups. The frequency of patients aged 40 years and above ranged from 7000 to 11,000 per year. Juba teaching hospital selected for this study because it is the only referral eye hospital in the Country. It is equipped with basic ophthalmic equipments which was utilized in data collection.

3.3 Study Population

The study targeted patients aged 40 years and above attended eye unit in Juba Teaching Hospital from 7thSeptember to 10thOctober 2013.

3.4 Inclusion Criteria

1. All patients aged 40 years and above attending the Juba teaching hospital eye unit
2. Patient who signed a written consent form.

3.5 Exclusion Criteria

1. Very sick and mentally challenged patients.

3.6 Study Period

Study period was from June 2013 to February 2014. Data was collected from 7th Sept to 10thOct 2013, it was a period where rain was at its peak and weather was bad, so patients flow to the clinic was at the low peak, because is Juba located in the equatorial region where rain season is 10 months a year.

3.7 Sample Size Determination

The sample size was determined by adopting the standard formula, that is, $N=Z^2pq/d^2$ as used by Cochran.[31]

n= the minimum sample size (if the target population is greater than 10,000)

Z= the standard normal deviate at the required confidence level 1.96 which corresponds to 95% confidence interval

p= the proportion of the target population estimated to have characteristics being measured [32]

q= the proportion of the remaining population calculated by subtracting p from 1 (1-p)

d= the level of statistical significance or degree of freedom which is 0.05

Using a confidence of 95% that corresponds to the normal standard deviate of 1.96 and the minimum error set at 0.05, the calculated required sample size was:

Sample size desired = 1.96^2x 0.2x 0.8/ 0.05^2

n= 245, Add 10%=25, minimum sample size became 270

Sample size of 270 patients was used from both sex.

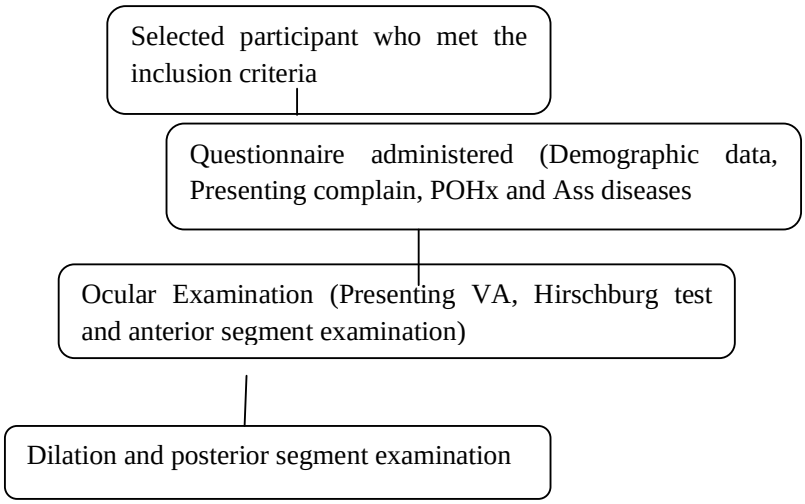
3.7.1 Sampling Method

Each patient aged 40 years and above attended to eye clinic during the study period was included. Two ophthalmic clinical officers and one ophthalmic nurse assisted in data collection after been trained for one-week followed by 2 days of pilot study prior to the data collection process. Those who met the inclusion criteria were recruited the trained ophthalmic nurse recorded demographic data and took visual acuity. The ophthalmic clinical officers was consulting the principle investigator from time to time on various ocular findings particularly, the posterior segments examination and final diagnosis.

3.7.2 Recruitment and Consenting Method

After the selection of each patient, the objectives and procedure of the study explained and they signed a written consent, which was available in both English and Arabic. There was recruitment of respondents after meeting the inclusion criteria.

3.8 Data Collection Procedure



3.8.1 Data Collection Instruments

- A designed questionnaire comprised of two sections(A and B) was used to collect information on demographic data, past ocular history ,associated diseases and ocular examination form was used.(Appendix I)
- Snellen's illiterate E chart at 6 meters
- Near vision reading chart at 40 cm
- Torch and batteries
- Retinoscopy
- Refraction set and trial frame
- Direct and indirect ophthalmoscope
- Slit lamp
- Loupes 20 and 90 Diotres
- Dilating drops (Tropicamide with phenylpherine and mydriacyl)
- Fluorescein
- Topical anaesthetic (Amethocaine)

3.9 Ethical Considerations

3.9.1 Confidentiality

Maximum confidentiality was maintained for all information and data presented by the participant. All information collected from the patients was confidential and treated as such. The instruments used for the research were void of the patient's names to ensure confidentiality.

3.9.2 Ethical Approval

The ethical approval for the study sought from KNH/UON ethics and research committee. In South Sudan, ethical approval sought from the Directorate of Research, Planning and Health System Development, Ministry of Health, Government of South Sudan.

4.0 Data Management and Statistical Analysis

After collection of data from the field, coding of data was conducted and entered in a pre-designed Microsoft access database, and then analyzed using SPSS version 17 software. Presentation of results was in tables and graphs.

5.0 Case Definitions

The following case definitions were used to identify some of the ocular morbidities.

Refractive error: Vision acuity □6/18 improving to □ 6/18 with pinhole.

Cataract: Presence of visible opacity on the lens.

Glaucoma: Presence of significant pallor or Cup: Disc (C: D) ratio □ 0.6, intraocular pressure (IOP) more than 21mmhg and other signs of glaucoma including evidence of iredectomy/bleb or C: D ratio asymmetry □0.2 between the two eyes

RESULT

Figure 1: **Patients Flow Diagram**

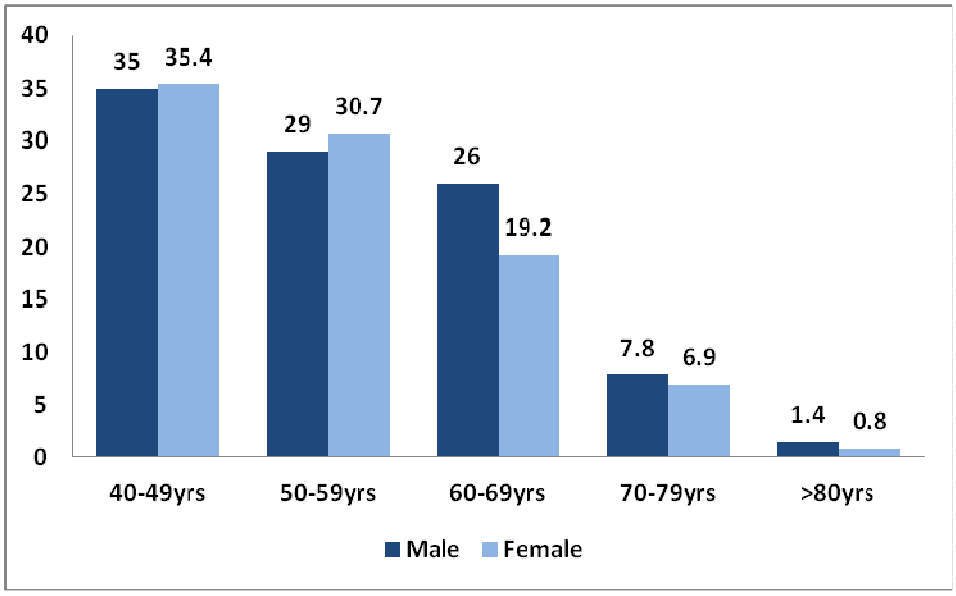


Figure 2: Distribution of sample by age and sex, N=270 patients

Mean age for male was 54years (SD +/-9.5), Median was 52 years

Mean age for female was 51years (SD +/-9.5), Mean was 50 years

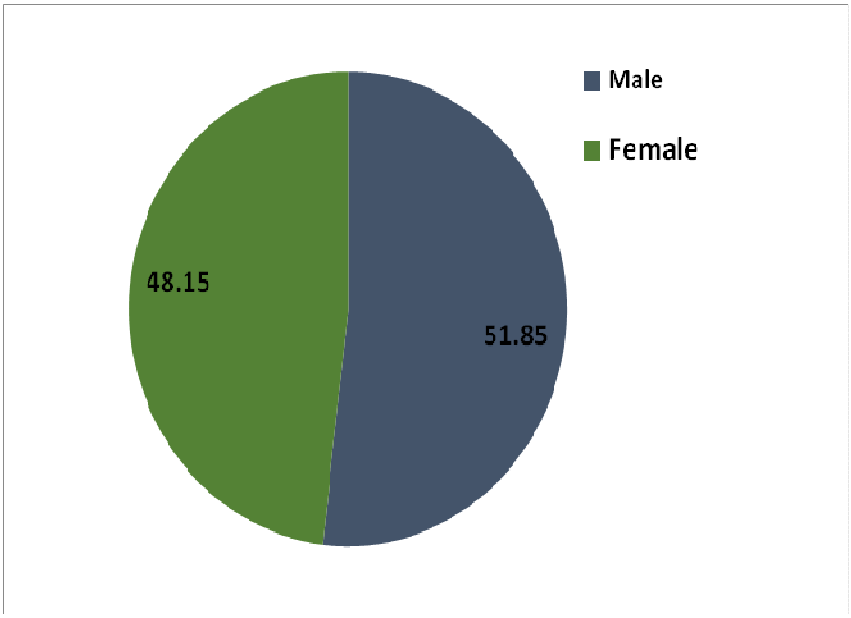


Figure 3: Distribution of sample by sex, N=270 patients

There were 140 (51.85%) female and 130 (48.15%) male, with male to female ratio of 1.1:1

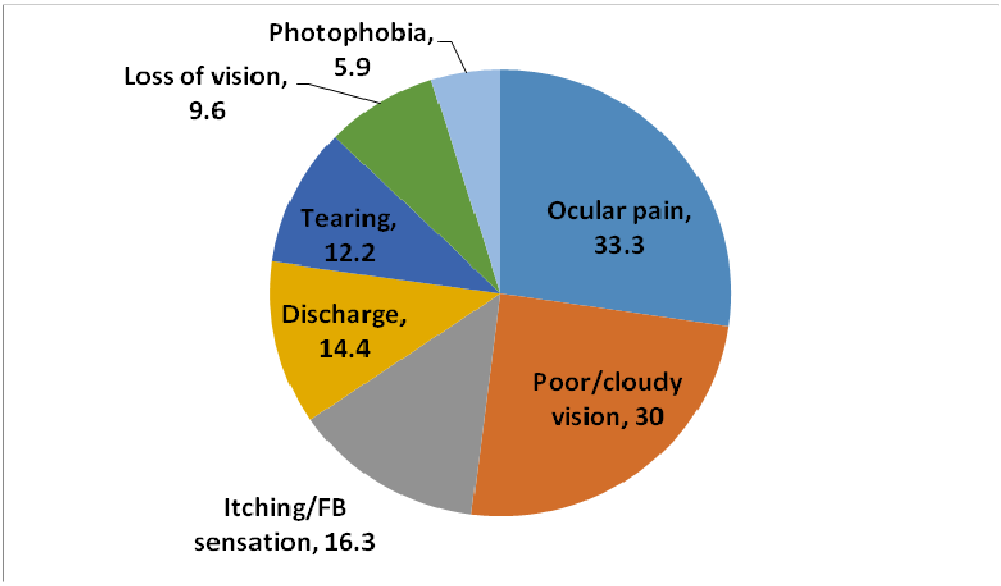


Figure 4: Distribution by ocular complaint, N=270 patients

*Total n is □ N because some patients had more than one complaint

The commonest presenting complaint was ocular pain (33.3%).

Table 1: Distribution by past ocular history and systemic diseases

Variable	Number (%)
History of ocular injuries, n=270	
Traffic accident	11 (47.8)
Physical attack/assault	6 (26.1)
Flying insect	3 (13)
Bullet/Landmine fragments	3 (13)
No ocular injury	247(91.5)
History of ocular surgery, n=270	
Cataract surgery	42 (66.7)
TPR	17(27)
Laser(PRP)	1(1.6)
No ocular surgery	209(77.4)
Types of spectacle, n=270	
Reading	14 (53.8)
Distant	7 (26.9)
Protective/Photochromatic	5 (19.2)
No spectacle	244(90.4)
Ocular medication, n=270	
Steroids	57 (53.8)
Anti-allergy	38(35.8)
Antiglaucoma medication	3(2.8)
Unknown	4 (3.8)
Not on ocular medication	168(62.2)
Associated systemic disease, n=270	
Diabetes mellitus	18 (45)
Hypertension	16 (40)
HIV / AIDS	4 (10)
TB	2 (5)
No associated systemic disease	230(85.2)

N* patients

Traffic accident was the commonest cause of ocular injuries (47.8%). cataract surgery (66.7%) was the commonest ocular surgery patients' underwent. 53.8% of patients had reading spectacle. Majority of patients (53.8%) were on topical steroid and diabetes and hypertension were the commonest associated systemic diseases.

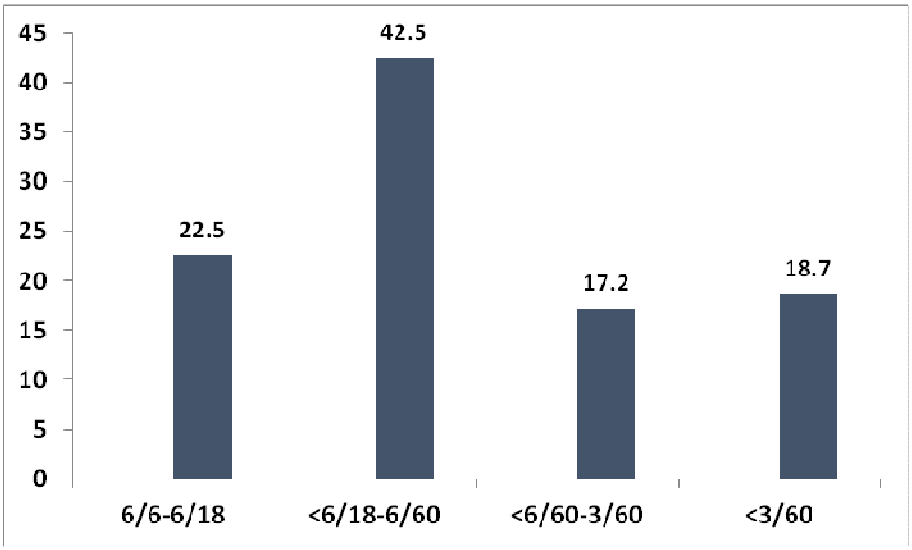


Figure 5: Distribution by presenting V.A-per eye, N=539 eyes

Majority of eyes 42.5% had V.A between< 6/18-6/60 while 18.7%had V.A worse than 3/60.

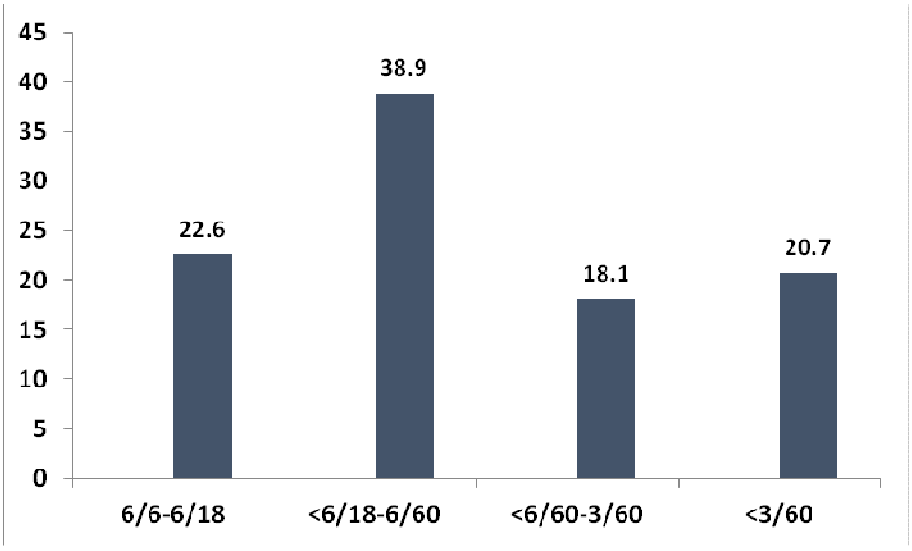


Figure 6: Distribution by presenting V.A in the better eye, N=270 patients

Majority of patients (38.9%) had visual impairment and 20.4% were blind, according to WHO category of vision loss

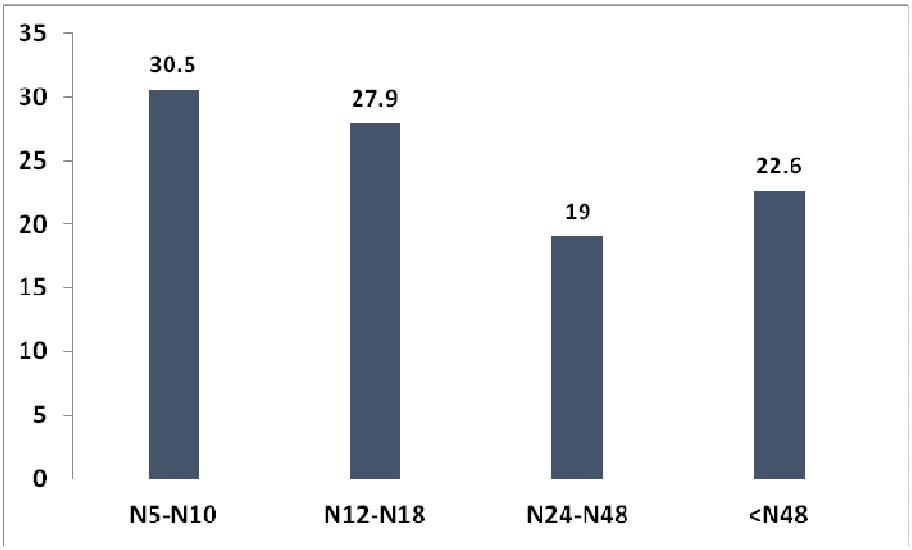


Figure 7: Distribution by near vision, N=270 patients

30.5% of patients had nears vision of N5-N10 and 22.6% could not read

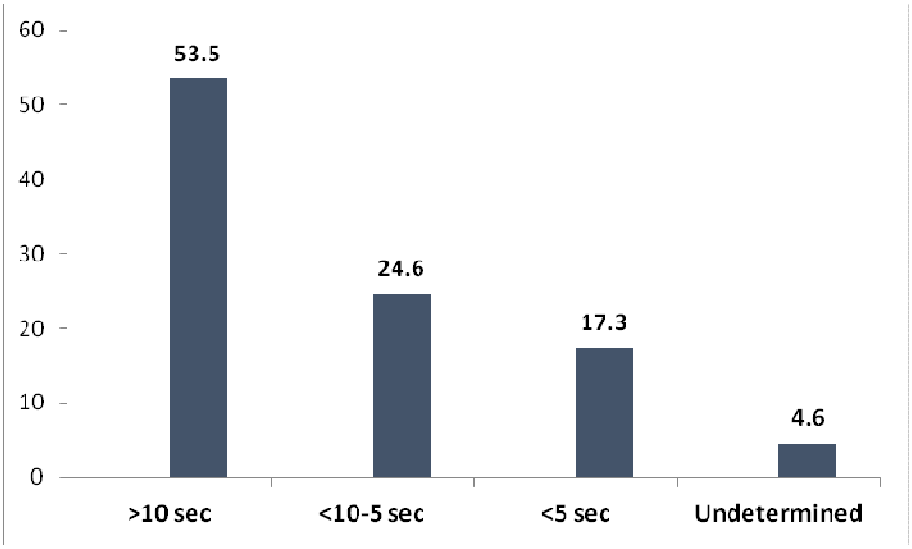


Figure 8: Distribution by TBUT, N=539 eyes

40.9% of eyes had TBUT of less than 10seconds

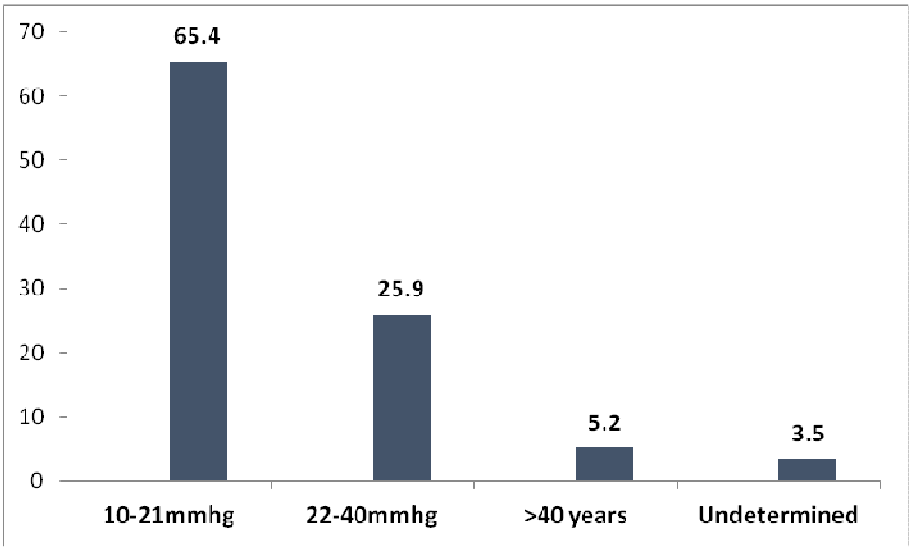


Figure 9: Distribution by IOP, N=539 eyes

31.1% of eyes had IOP of more than 22mmhg

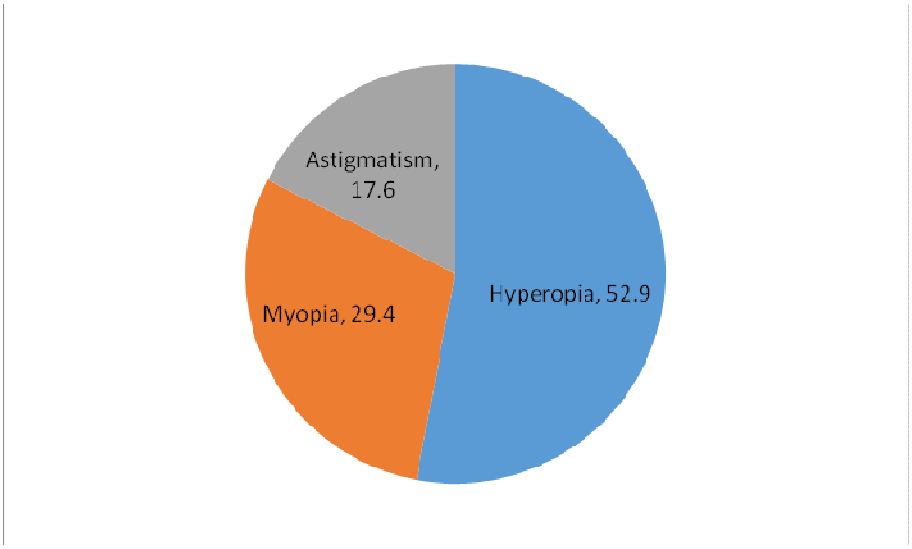


Figure 10: Distribution by retinoscopic findings after VA improvement on PH

Hyperopia 52.9% was the commonest refractive error encountered in this study

Table 2: Distribution by adnexial findings, N=540 eyes

Variable	Number (%)
Extraocular muscle motility	
Free(normal)	536 (99.2)
Esotropia	3 (0.5)
Exotropia	1 (0.2)
Whole globe(grossly)	
Normal	538 (99.6)
Phthisis	1 (0.2)
Socket	1 (0.2)
Nature of eye discharge,	
Whitish discharge	24 (4.4)
Mucopurulent discharge	13(2.4)
Watery discharge	11(2.0)
No discharge	492(91.1)
Eyelid findings	
Normal	494(91.5)
Scar	18(3.3)
Entropion/Trichiasis	13(2.4)
Ectropion	12(2.2)
Others	3(0.5)
Conjunctival findings	
Normal	432 (80.0)
Pingacuela/Pterygium	69(12.8)
Papillae	24(4.4)
Follicles	9 (1.7)
Symblepharon	2 (0.4)
Others	4 (0.7)

2.4% of eyelid had entropion/trichiasis and 69(12.8%) had pterygium/pengacuelum.

Table 3: Distribution by anterior segment findings, N=540 eyes

Variable	Number (%)
Corneal findings, n=539	
Clear	478(88.7)
Scarring/ulcer	45(8.3)
Dystrophy	9(1.7)
Others	8(1.5)
Anterior chamber findings, n=539	
Deep/Quiet	498(92.4)
Shallow	9(1.7)
Deep with activity(cells and flares)	1(0.2)
Others	32(5.9)
Pupil findings, n=539	
RRTL	409(75.9)
Irregular	44(8.1)
RAPD	37(6.8)
Fixed NRTL	19(3.5)
Inaccessible	31(5.7)
Lens findings, n=539	
Clear	360 (66.8)
Cataract	116 (21.5)
Pseudophakia	31 (5.7)
Aphakia	10 (1.8)
Others	23 (4.3)

21.5% of the eyes had cataract, 8.5% had corneal scar/ulcer and 6.8 of the pupil had RAPD

Table 4: Distribution by posterior segment findings, N=539 eyes

Variable	Number (%)
Vitreous findings, n=539	
Clear	492(91.2)
Posterior Vitreous Detachment	6(1.1)
Vitreous Hemorrhage	2(0.3)
Inaccessible	40(7.4)
Retina findings, n=539	
Normal	461(85.5)
Diabetic/Hypertensive retinopathy	7(1.3)
ARMD	16(2.9)
Tigroid/Scar	12(2.2)
Inaccessible	44(8.1)
Optic nerve findings, n=539	
Normal Disc	442(82.0)
CDR □ 0.6	47(8.7)
Optic Atrophy	10(1.8)
Inaccessible	41(7.6)

47(8.7%) of the eyes had CDR of more than 0.6 and 7(1.3%) had DR/HR changes based on ETDRS and Keith NM, Wegener HP classification

Table 5: Distribution by causes of visual impairment, N=540 eyes

Causes	Visual-impairment (□6/18-6/60) n (%)	Severe visual impairment (□6/60-3/60), n (%)	Blind □3/60 n (%)
Cataract	32(5.9)	21(3.9)	35(7.2)
Refractive error	27(5)	15(2.8)	17(3.9)
Glaucoma	14(2.6)	13(2.4)	15(3.5)
Uncorrected aphakia	2(0.4)	2(0.4)	6(1.1)
ARMD	2(0.4)	1(0.2)	6(1.1)
Corneal scar	5(0.9)	5(0.9)	7(1.3)
Diabetic retinopathy	1(0.2)	1(0.2)	3(0.5)
Trachoma	2(0.4)	4(0.7)	1(0.2)
Phthisis bulbi	--		1(0.2)
Optic atrophy	--	1(0.2)	3(0.5)
Strabismic amblyopia	--	1(0.1)	2(0.4)

Majority of blindness was due to cataract (33.6%), refractive error (17.7%) and glaucoma (15.6%)

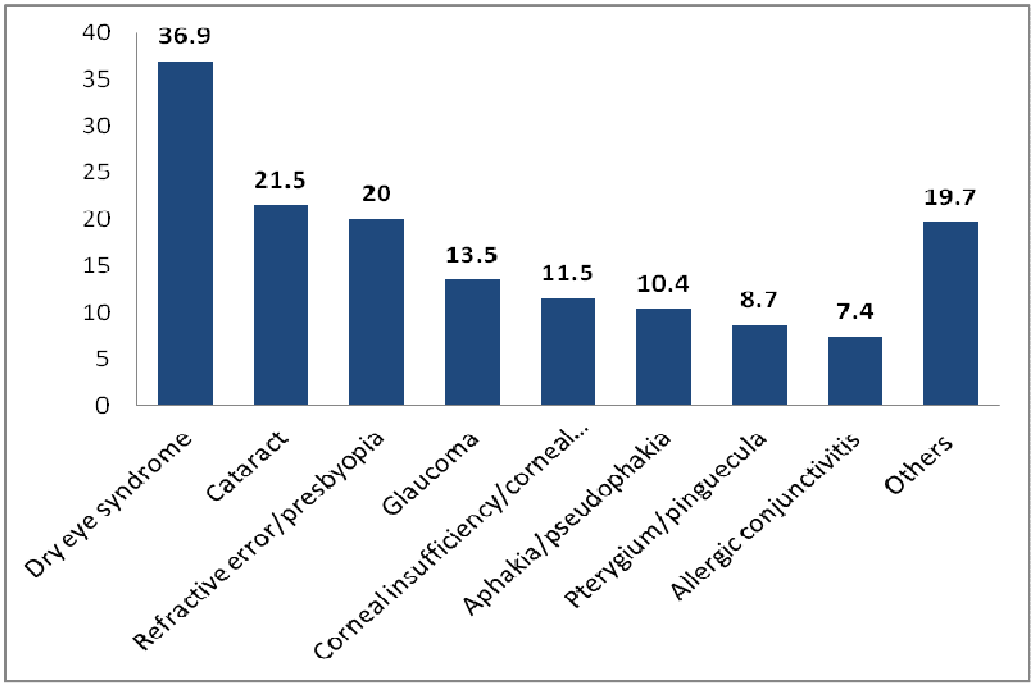


Figure 11: pattern of ocular disease, N=540 eyes

*Some patients had multiple ocular diseases.

Cataracts, refractive errors and glaucoma were at 21.5%, 20.0% and 13.5% of the eyes respectively. Others include ocular hypertension, ARMD, Bacterial conjunctivitis/blepharitis, Trachoma trichiasis, Diabetic/hypertensive retinopathy, Keratitis, Uveitis, Strabismus, Phthisis, and Anophthalmic socket.

Table 6: Distribution by anatomical site of ocular morbidity, N=540 eyes

Site of ocular morbidity	Types of ocular morbidity /n	n/%
Orbit/globe grossly	Phthisis(1) Socket (1)	2(0.4%)
Eyelid	Scar (18) Trachoma (13) Dermatochalisis (12)	43(8.0%)
Conjunctiva	Pingaquela/pterygium (69) Allergic conjunctivitis (24) Bacterial conjunctivitis/blepharitis(15) Trachoma (9) Chemical burn(2)	119(22.0%)
Cornea	Scar/ulcer (45) Corneal insufiency/dystrophy(9) *Others (8)	62(11.5%)
Pupil	Irregular RTL (44) RAPD (37) Fixed NRTL (19)	100(18.5%)
Lens	Cataract (116) Pseudophakia (31) Aphakia (10)	157(29.1%)
Optic nerve	Glaucoma (73) Optic atrophy (10)	83(15.4%)
Retina	DR/HR (9) ARMD (16) Tigroid/Scar (12)	37(6.8%)

*Others: Arcus senilis, spks, kps

The commonest site of ocular morbidity was lens and conjunctiva at 157(29.1%) and 119(22.0%) respectively

Table 7: Distribution by types of intervention done prior to the study

Ocular morbidity(n =eyes)	Type of intervention
Cataract(116)	Small incision cataract surgery
Pseudophakia(31)	Spectacle correction
Aphakia(10)	Spectacle correction
Refractive error(51)	Spectacle correction
Presbyopia(57)	Reading spectacle
Glaucoma(73)	Antiglaucoma medication
Symptomatic pterygia/pingacuela(47)	Topical steroid
Allergic conjunctivitis(47)	Topical steroid and other antiallergy
Ocular injury(2)	Repair/Evisceration
Trachoma(17)	Azithromycin tablet/epilation/TPR
Diabetic retinopathy(7)	Referred abroad for VR review
Uveitis(3)	Topical steroids
Keratitis(3)	Topical antibiotics

No surgical management for glaucoma and pterygium grade 3 encountered

DISCUSSION

The result of this study showed that the primary ocular disease was dry eye syndrome followed by refractive error/presbyopia, cataract, Glaucoma, conjunctival degenerative conditions, corneal opacity, allergic conjunctivitis, ocular hypertension and ARMD.

The high prevalence of dry eye syndrome199 (39.9%) in our study is likely because we investigated predominantly elderly population with co-existing undiagnosed age related systemic inflammatory conditions, worsen by sub-saharan dry, dusty, sunny environment in this part of South Sudan.

This is similar to findings by Sang Beom Han et al where the prevalence of dry eye was 30.3% based on schirmer test and TBUT of less than 10 sec among elderly population in Korea. In rural areas of Nepal Pastole et al, found the prevalence of dry eyes was (14%) based on TBUT, this low prevalence could be because of geographical difference.

Age related cataract prevalence was at 116 (21.5%) and 30.2% of the eyes were blind, majority of the cases were referred for cataract operation because Juba teaching hospital is the only referral hospital equipped with Ophthalmologist. In Ethiopia Aga et al found the prevalence of age related cataract was 43.1% among elderly population in slum areas. [20] It is high than our study because their studied population predominantly aged above 70 years compared to our study where 75.4% of our studied population was between 40-59 years.

We found prevalence of refractive error/presbyopia was 80 (20.0%) and only 21 (26.2%) of all patients had spectacle corrections this is most probably due to unaffordable spectacle prices. Study in Singapore by Malay among patients aged $\geq$ 40 years; reported prevalence of 20.4%.In another study in India by Singh MM et al found a prevalence of 40.8% but 80% of patients had spectacle corrections due to affordability and availability of spectacle. [33]

The high prevalence of glaucoma 73 (13.5%) in our study with majority of eyes had advanced glaucoma, is most probably due to the lack of consistent glaucoma screening program and unavailability of antiglaucoma medication. Prevalence of glaucoma was 10% in study done by Aga among Ethiopian elderly population; it is

low compare to our study because ours was a hospital based. [20]Mathenge et al in her study in Kenya among population-aged 50 years, 19% of visual impairment was due to glaucoma while in our study it was 7.8%. Ralf Buhrmann reported glaucoma prevalence of 4.16% among Tanzanian population of ≥ 40 years.[17] It was low in comparison to our finding, since it is a population based study.

The high prevalence of pterygium/pingaquelum 47 (8.7%) in our study is probably because our studied population were mainly elderly person who were residing in sub-saharan dry and sunny environment of South Sudan. Singh MM et al found a prevalence of 5.2 % in his study among elderly population of India.[33] Another study in Nigeria done by S.N.N.Nwosu and L.O.Onyekwe among elderly patients had a similar findings to our study with a prevalence of 10.5%

Aphakia/pseudophakia eye prevalence was 41 (7.6 %,) and the uncorrected aphakia 10(1.9%) do not have spectacle corrections most likely due to unavailability of spectacles. Dr.Sonia and Mathenge in their study in India and Kenya found prevalence of uncorrected aphakia at 2.9% and 3.2% respectively but majority of their aphakic patients had spectacle corrections due to easy accessibility. [34]

Prevalence of trachomatous trichiasis is 3.1% and almost all the patients with trachoma came from trachoma endemic region of South Sudan. Ngondi et al found prevalence of 9.6% in their study done in endemic region of South Sudan. [19] Aga et al had similar findings in their study in Ethiopia with the prevalence of 14.9%.[20] It was high compared to our study because it was conducted in trachoma endemic rural areas while ours was conducted in urban town with clean water and good hygiene

The prevalence of diabetic/hypertensive retinopathy and ARMD was low at 3.0%% and 1.7% respectively, it is likely due to lack of specialized program for screening of diabetic retinopathy among diabetic patients and majority of patients had dense cataract which obscure access to posterior segment. S.N.N.Nwosu and L.O.Onyekwe in their study among elderly patients in Nigeria found the prevalence of diabetic/hypertensive retinopathy and ARMD at 11.9% and 6.0% respectively .Aga et al reported prevalence of ARMD at 5.8% among Ethiopian elderly population.[20]

CONCLUSION

1. The commonest ocular diseases encountered among patients attending the eye clinic in JTH was dry eye syndrome, cataract, un-corrective refractive error and glaucoma, at 36.9%, 21.5%, 20% and 13.5% respectively
2. The interventions done in regards in management of various ocular conditions was good but inadequate due to lack of skill human resource
3. Prevalence of blindness and visual impairment was high at 17.8% and 27.6% respectively
4. Majority of blindness was due to cataract (36.4%), refractive error (3.1%) and glaucoma (2.8%) respectively
5. The prevalence of diabetic/hypertensive retinopathy was low at (3.0%)

LIMITATIONS

- Lack of equipments like optical coherence tomography and fluorescein angiography for assessment of retinal vascular diseases
- Study carried out during a season where patient peak was low due to bad weather condition
- Very elderly patients were not able to access hospital
- Lack of human resources
- The result of this study will not represent population of 40 years and above because it was hospital-based study.

RECOMMENDATIONS

- Health education programs should target older age groups specifically and the population in general.
- Training of more eye care workers
- Juba teaching hospital should be equipped better
- The availability and accessibility of eye care services, particularly cataract surgery and refraction services should be increased
- A more extensive survey would help in generating the updated information about the status of ocular morbidity and blindness in the community in general and in elderly population in particular.

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APPENDICES

Appendix A : Questionnaire

SECTION A

I) Personal Detail:

1) Hospital Number ☐ 2) Age ☐ 3) Sex ☐ 4) Marital status _____

5) Nature of employment _____

II) Ocular complain:_____

III) Past ocular History:

1) History of ocular injury: Yes ☐ No ☐ If Yes, Indicate by what_____

Both Eye ☐ One eye ☐

2) History of ocular surgery: Yes ☐ No ☐ If Yes, Specify_____

3) History of wearing spectacle: Yes ☐ No ☐ If Yes: For Distant ☐ Reading ☐

Other specify _____

6) History ocular medication (<3months): Yes ☐ No ☐ If Yes, Specify: _____

IV) Other diseases associated:

1) Diabetes mellitus ☐ 2) Hypertension ☐ 3) HIV/AIDS ☐ 4) Epilepsy ☐

5) TB ☐ 6) Other, specify _____

SECTION B

I) Visual assessment:

	RE	**LE**
a) Visual acuity:		
Presenting VA	☐	☐
BCVA	☐	☐
Near Vision	☐	☐
b) Extraocular muscle motility & Hirschburge test:		
EOMM	☐	☐
Hirschburge Test	☐	☐
c) If VA improves with pinhole Retinoscopy finding:		
Hyperopia	☐	☐
Myopia	☐	☐
Astigmatism	☐	☐

II) Ocular Examination:

a) Whole globe:	**RE**	**LE**
1) Normal	☐	☐
2) Not normal, specify	_____	_____
3) Discharge: Yes ☐	No ☐	If Yes, Nature of the

discharge: _____

b) Eyelid:	**RE**	**LE**
1) Normal	☐	☐
2) Not normal, specify	_____	_____
c) Conjunctiva:	**RE**	**LE**
1) Normal	☐	☐
2) Not normal, specify	_____	_____
d) Cornea:	**RE**	**LE**
1) Clear	☐	☐
2) Not clear, specify	_____	_____
e) Anterior Chamber:	**RE**	**LE**
1) Deep/quiet	☐	☐
2) Not deep/quiet, specify	_____	_____
f) Pupil:	**RE**	**LE**
1) Round and reacting to light	☐	☐
2) RAPD	☐	☐
3) Fixed dilated	☐	☐
4) Other, specify	_____	_____
g) Tear break-up time:	**RE** ☐	**LE** ☐
h) Intraocular pressure	**RE** ☐	**LE** ☐
i) Lens	**RE**	**LE**
1) Clear	☐	☐
2) Aphakia	☐	☐
3) Pseudophakia	☐	☐
4) Cataract	☐	☐
5) Other, specify	_____	_____
j) Vitreous:	**RE**	**LE**
1) Clear	☐	☐
2) Not clear, specify	_____	_____
3) Other, specify	_____	_____
k) Retina	**RE**	**LE**
1) Normal	☐	☐
2) Hypertensive retinopathy change	☐	☐
3) Diabetic Retinopathy changes	☐	☐
4) Macula ARMD	☐	☐
5) Scar	☐	☐
6) Other, specify	_____	_____
l) Optic Nerve	**RE**	**LE**
1) Normal Disc	☐	☐
2) CDR >0.6	☐	☐
3) Optic atrophy	☐	☐
4) Other, specify	_____	_____

Diagnosis:

RE_____

LE_____

Appendix B: Consent Form In English

Title: Pattern of ocular finding among patients aged 40 years and above attending an eye unit in Juba Teaching Hospital, South Sudan

Investigator: Dr Joseph Monday

Supervisors: Dr Sheila Marco, Dr.Nyamori J Maina and Dr.Wani Mena

Address: (University of Nairobi, P.O. BOX 30197, 00100, Nairobi)

(Kenyatta National Hospital, P.O.BOX 20723 code 00202: Tel:+254-726300

Fax: 725272: Telegram: MEDSUP, Nairobi)

I am a postgraduate student at the University of Nairobi, Kenya. I am conducting a study on **pattern of ocular finding among patients aged 40 years and above attending an eye unit in JTH**. The main objectives of this study is to assess pattern of ocular findings and interventions carried in managing it .Participation in this study is voluntary and the information gathered will be kept confidential and used solely for academic and improvement of health services. Your name or identity is not required in this questionnaire.

Thank you for your co-operation.

Declaration.

I accept that I have read and understood the above explanation and I am willing to participate in the study voluntarily.

Participants signature_____ Date_____

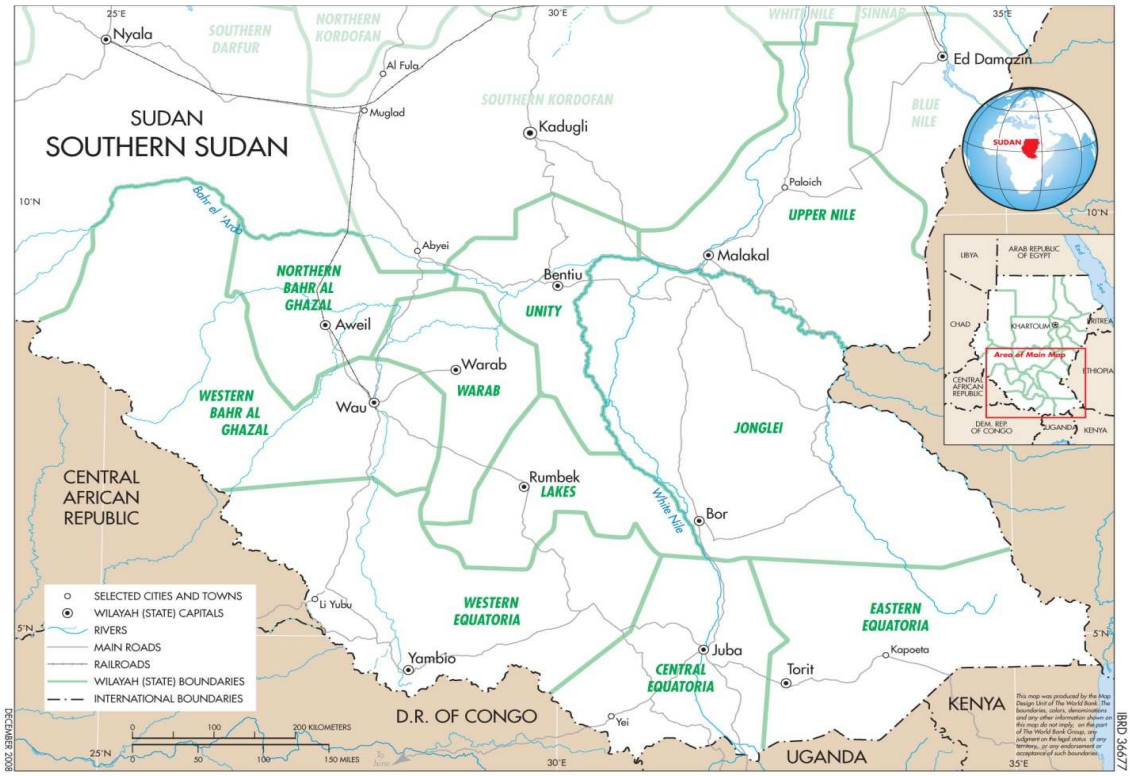
Investigator's signature_____ Date_____

Appendix C : Consent Form in Arabic

العنوان: خطة العين الحقائق بين المرضى ≤ 40 سنة الذين حضروا وحدة العيون في مستشفى جوبا التعليمي، جنوب السودان.
المحقق: الدكتور Joseph Monday
المشرفون: الدكتور Wani Mena,Nyamori J and ,Shiela Marco
العنوان: (جامعة نيروبي، 30197PO BOX، 00100، نيروبي)
أنا طالب دراسات عليا في جامعة نيروبي، كينيا. أقوم حاليا بإجراء دراسة عن نمط بصري العثور بين المريض ≤ 40 سنة وحضور وحدة العيون في مستشفى جوبا التعليمي. المشاركة في هذه الدراسة هو طوعي وسيتم الاحتفاظ المعلومات التي تم جمعها سرية وتستخدم فقط للأكاديمي وتحسين الخدمات الصحية. غير مطلوب اسم أو هويتك في هذا الاستبيان.
شكرا لتعاونكم.
إعلان.
أنا أقبل أن أكون قد قرأت وفهمت الشرح أعلاه وأنا على استعداد للمشاركة في الدراسة طوعا.

signature_____ المشارك Date_____
signature_____ المحقق Date_____

Appendix D: Map of South Sudan



Appendix E: Location of Juba Teaching Hospital in Juba

Appendix F: Ethical Approval

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
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KNH/UON-ERC
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Link:www.uonbi.ac.ke/activities/KNHUoN

KENYATTA NATIONAL HOSPITAL
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Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/299

26th September, 2013

KENYATTA NATIONAL HOSPITAL
APPROVED
26 SEP 2013
ETHICS & RESEARCH COMMITTEE

Dr. Joseph Monday Lawrence
Dept.of Ophthalmology
School of Medicine
University of Nairobi

Dear Dr. Monday

RESEARCH PROPOSAL: PATTERN OF OCULAR FINDINGS AMONG PATIENTS AGED 40 YEARS AND ABOVE ATTENDING AN EYE CLINIC IN JUBA TEACHIING HOSPITAL SOUTHERN SUDAN (P363/07/2013)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 26th September, 2013 to 25th September 2014.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN.**

Yours sincerely

PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

c.c. Prof. A.N.Guantai, Chairperson, KNH/UoN-ERC
The Deputy Director CS, KNH
The Principal, College of Health Sciences, UoN
The Dean, School of Medicine, UoN
The Chairman, Dept.of Ophthalmology, UoN
AD/Health Information, KNH
Supervisors: Dr. Sheila Marco, Dr. Nyamori J. Maina, Dr. Wani Mena

REPUBLIC OF SOUTH SUDAN

MINISTRY OF HEALTH
Juba Teaching Hospital
Eye Department

11 October 2013

Head of Department
Department of Ophthalmology
University of Nairobi
Faculty of Medicine.

Dear Prof. Ilako,

REF. DR. JOSEPH MONDAY LAWRENCE (MMED STUDENT)

The above named is an MMed (Ophth) student at your department who was at Juba Teaching Hospital collecting Data for his dissertation. He has now completed his data collection exercise and may return to the university.

He has not yet received his letter of approval from the ethical committee of the ministry of Health, but this will be forwarded to him when we receive it. I authorized him to begin data collection while we wait for the approval.

Yours sincerely

MINISTRY OF HEALTH JTH 11 OCT 2013 OPHTHALMIC DEPARTMENT

Dr Wani Mena
Ophthalmologist and Head
Juba Teaching Hospital Eye Dept