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**PREVALENCE AND ASSOCIATED FACTORS OF VISUAL IMPAIRMENT
AND BLINDNESS AT UNIVERSITY OF GONDAR TEACHING HOSPITAL,
GONDAR, NORTHWEST ETHIOPIA**

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Abstract

The aim of the study was to assess the prevalence and associated factors of visual impairment and blindness. Institutional based chart review was conducted from July to October, 2013. Systematic random sampling technique was used. A total of 784 client charts age greater than 14 years old from January 2012 to December, 2012 were included. Pre tested data extraction format used and it was checked for completeness, entered and analyzed using SPSS version 16.0. Both bi-variable and multivariable logistic regressions model were used. The degree of association between independent and dependent variables was assessed using odds ratio with 95% confidence interval and p value of less than 0.05 was considered significant. The prevalence of visual impairment and blindness was 15.3% and 14.4% respectively. Being male [AOR=1.715; 95%CI :1.064-2.765], cataract [AOR=6.972; 95% CI:3.417-14.228], refractive error [AOR= 11.023; 95% CI:5.632-21.575], glaucoma [AOR= 4.846; 95% CI:1.992-11.7840], age related macular degeneration [AOR=35.584; 95% CI:7.776-162.842] and pseudophakia [AOR=12.998; 95% CI:3.905-43.265] were significantly associated with visual impairment. Factors associated with blindness were cataract [AOR= 10.504; 95% CI: 5.372-20.5420], glaucoma [AOR=13.774; 95%CI: 6.145-30.876] and old patients [AOR=4.545; 95%CI: 1.812-11.401]. The prevalence of visual impairment and blindness were high. Priority and attention has to given for patients with cataract, glaucoma, refractive error, macular degeneration, pseudophakia and old age group.

Keywords: Blindness, Visual Impairment, Prevalence, Gondar, Ethiopia.

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Introduction

Visual perception is the ability of interpreting surrounding environment glow by visible light spectrum resulting vision measured by clinical parameters like visual acuity, visual field contrast sensitivity, colour vision, binocularity and stereopsis.^{1,2}

Qualitatively blindness is defined as inability to see, absence or sever loss of vision so as to be unable to perform any work for which eye sight is

essential.³ World health organization (WHO) consultation recommends definition of visual impairment and blindness from best corrected distance visual acuity to presenting distance visual acuity.⁴

Definitions of blindness and low vision vary from country to country and there are outdated means of classifications.⁵⁻⁷ Hence different organizations use revised definition to prepare strategies.^{4,8,9}

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Therefore; this paper will use this newly revised definition and category.

Globally, blindness and low vision are the major public health problems. In 2012 worldwide 285 million people are visually impaired among this 39 million are blind and 246 million have low vision.⁶

Despite considerable efforts in many developing countries through national blindness prevention programs, the global number of blind and visually disabled seems to be growing, mainly as an effect of increase population and aging. Most people with visual impairment are older, and females.^{8, 10} Globally, about 85% of all low vision and 75% of blindness could be prevented or cured worldwide and about 90% of the worlds visually impaired live in developing countries.^{6, 10}

Africa accounts around 18% of the world's blind population in which nearly 1% of the population and 7.1% of the world's 38 million blind people live in sub-Saharan Africa, from this women account 60% of blindness. Generally Prevalence of low vision and blindness in Africa is 9.2 % and 1.0% respectively.¹⁰ Review of population based studies in sub Saharan Africa using presenting visual acuity show the prevalence of blindness range from 1.1% in urban district of Cameroon to 7.9% in rural district of Ethiopia.¹¹

In Ethiopia visual impairment and blindness are still major public health problems. According to 2005/6 national survey, the national prevalence of blindness is 1.6% and low vision 3.7%. Blindness and low vision are more prevalent among females and rural residents, thus 91.2% of low vision and 87.4% of blindness are caused due to avoidable causes.¹²

Blindness is not only a personal tragedy, but also an economic nightmare. People who are poor are more likely to become blind and blind people are poor. Impact is also for care givers like children unable to reach school and adults stop working.^{6,8,13}

A lack of quality information upon which to base planning is significant problem in the study area and similar setups Ethiopia. Therefore conducting this research will provide epidemiological evidence based on newly endorsed WHO guideline to set strategies and implement effectively.

Globally as WHO⁹ reported, the major causes of blindness include cataract (39 %,) uncorrected refractive errors (18%), glaucoma (10%), age-related macular degeneration (7%), corneal opacities (4%), diabetic retinopathy (4%), trachoma (3%) and onchocerciasis (0.3%).⁹

Rauf A *et al*¹⁴ reported prevalence of 4.2% and 0.7 % for low vision and blindness respectively. While P Herse *et al*¹⁵ pointed the prevalence of low vision and blindness is 10.8% and 2.6% respectively.^{15, 16} Another hospital based study done by Saleh A *et al* among adults in Yemen showed prevalence of 11.2% of blindness.¹⁷

Al-Shaaln FF *et al*¹⁸ shows prevalence of low vision and blindness 11.4% and 16.9% respectively.¹⁸ while Ramezani A *et al*¹⁹ pointed prevalence of 46.4% and 24.8% for sever visual impairment and blindness respectively.¹⁹ Pathanapitoon K *et al*²⁰ state prevalence of low vision and or blindness at the tertiary eye hospital in Thailand is 12.5%.²⁰ and to Bamashmus MA *et al*²¹ Prevalence of blindness in Yemen is 11.2% in all age group.

In India leading causes of blindness are glaucoma (16.3%), diabetic retinopathy (13.2%), corneal opacity and retinitis pigmentosa (11.6%) each; however in Nigeria cataract (63%) is taking the lead followed by glaucoma (22%), maculopathy (4.3%) and retinitis pigmentosa (3.4%).^{17, 22}

In countries like Nigeria and Yemen, cataract, glaucoma, refractive error, corneal opacity and trauma, are among the top leading causes of low vision. Glaucoma is among the top leading cause of low vision in countries like India, Nigeria, Yemen but it is one of the lists in countries like Saudi Arabia and Iran.^{22-23, 24-28}

In Ethiopia, according Brhan Y *et al*¹² the prevalence of low vision based on presenting visual acuity is 3.7% (2.6% for urban and 3.8% for rural populations) and blindness is 1.6%(1.1% for urban and 1.6 for rural population).¹² Another study shows prevalence of low is 12.1%.²⁹ Major causes of blindness are cataract, trachomatous corneal opacity and glaucoma while for low vision cataract and refractive error.¹²

Objectives

General Objective

To assess the prevalence and associated factors of visual impairment and blindness

Specific objectives

- To determine the prevalence of visual impairment
- To determine the prevalence of blindness
- To identify factors associated with visual impairment
- To identify factors associated with blindness

Methods

Institution based cross-sectional study design was employed. The study was conducted in University of Gondar teaching hospital Gondar, Northwest Ethiopia, from July – October 2013. The source population was all patients attending University of Gondar hospital tertiary eye care and training centre and study populations were patients' age greater than 14 years old who came from January 2012 to December 2012.

Single population proportion formula was used to calculate the sample size with proportion of 50% end up sample size $n = 734$ patients. Systematic random sampling technique was employed for this study to select samples. Data were collected using data extraction format from secondary data using English language. Ocular findings approved by an optometrist or ophthalmic officers or cataract surgeon or ophthalmologist signatures were taken in to consideration. Data were entered and analyzed using SPSS version 16 statistical packages.

The results were presented using texts and tables. Both bi-variable and multivariable logistic regression models were used to identify associated factors. Variables having p-value less than or equal to 0.2 in the bi-variable analysis were fitted to multivariable model. Ninety five percent confidence intervals with crude odds ratio was computed and variable having p value less than 0.05 in the multivariable logistic regression models was considered as significant and associated with the dependent variable.

Ethical clearance was obtained from school of medicine ethical review board, University of Gondar. Confidentiality was maintained by using anonymous checklist and the collected data were secured in locked box by investigator and were available during data entry. The result of the study was submitted to optometry department, College of Medicine and Health Sciences, University of Gondar.

Results

A total of 734 patient charts were reviewed. The mean (\pm standard deviation) age of the study participants was 43.95 years old (± 19.83) with age range from 15-93 years. More than half of patients 417 (56.8%) were male giving female to male ratio of 1: 1.31. Majority of patients 731 (99.6%) were from Amhara regional state and of them 362 (49.3%) were from Gondar town. Nearly two third of patients, 493 (67.2%) were urban dweller.

Table No. 01: Socio-demographic characteristics of the patients at University of Gondar teaching hospital, Gondar, Northwest Ethiopia from January 2012 to December, 2012

Variable	Number	Percent (%)
Sex		
Male	417	56.8
Female	317	43.2
Address		
Urban	493	67.2
Rural	241	32.8
Age (years)		
15-29	237	32.3
30-44	139	18.9
45-59	155	21.1
≥ 60	203	27.7

The prevalence of visual impairment was 112 (15.3%). Two third of them were male 76 (67.9%) and urban dwellers were 60 (53.6%). More than half of visually impaired patients were older than 60 years old. The prevalence of blindness was 106

(14.4%), of these 58 (54.7%) were male and 48 (45.3%) were rural dwellers. About 75 (70.8%) blindness were in age group greater than or equal to 60 years old.

Table No. 02: Magnitude of visual impairment and blindness among patients at University of Gondar teaching hospital, Gondar, Northwest Ethiopia, from January, 2012 to December, 2012.

Variables	Visual impairment		Blindness	
	Number	Percent (%)	Number	Percent (%)
Sex				
Male	76	67.9	58	54.7
Female	36	32.1	48	45.3
Address				
Urban	60	53.6	48	45.3
Rural	52	46.4	58	54.7
Age (years)				
15-29	14	12.5	7	6.6
30-44	9	8.0	4	3.8
45-59	19	17.0	20	18.9
≥ 60	70	62.5	75	70.8

From the point of independent variable which contributes for prevalence of visual impairment were cataract, refractive error, glaucoma, AMD and pseudophakia, while for that of blindness were cataract, glaucoma, pseudophakia and uveitis.

According to multivariable analysis men, age group greater than or equal to 60 years old, cataract, refractive error, glaucoma, age related macular degeneration and pseudophakia were significantly associated.

This study showed that men were 1.6 times more likely visually impaired compared to women [AOR=1.648, 95% CI: (1.004-2.703)]. Patients with cataract were 7 times more likely to be visually impaired than those who did not have cataract [AOR=7.518; 95% CI: (3.559-15.881)]. Patients with refractive error were 11 times more likely to be visually impaired than those who did not have refractive error [AOR= 11.256; 95% CI: (5.560-22.787)]. Additionally patients with glaucoma were 5 times more likely to be visually impaired than those who did not have glaucoma [AOR= 5.057; 95% CI (2.035-12.565)]. patients with age related macular degeneration were about 37 times more likely visually impaired than those who did not have age related macular degeneration [AOR=37.673; 95% CI: (8.129-174.586)] and finally patients with pseudophakia were nearly 14 times more likely visually impaired than those who did not have pseudophakia [AOR=13.791; 95% CI: 4.809-46.514]. Age greater than or equal to 60 years old are two point five times (2.5x) risky for visual impairment than age group 15-29 years old patients [AOR=2.520;95%CI:1.160-5.476].

However there is no statically significance among other age groups.

Regarding blindness according to multiple-variable analysis, age greater than or equal to 60 years old, cataract, glaucoma and pseudophakia were significant.

Concerning blindness this study showed that patients with cataract were nearly 12 times more likely to be blind than those who did not have cataract [AOR= 11.525 ;95%CI 5.733-23.170]; Whereas patients with glaucoma were approximately 15 times more likely to be blind than those who did not have glaucoma [AOR=14.890; 95%CI:6.582-33.684]. Patients who had pseudophakia were approximately 8 times more likely to be blind than those who did not have pseudophakia [AOR=7.965; 95%CI: 2.275-27.887]. Age greater than or equal to 60 years old are four pint five times (4.5x) risky for visual impairment than age group 15-29 years old patients [AOR=4.545;95%CI:1.812-11.401].

Discussion

The prevalence of visual impairment among age group greater than 14 years old patients was 15.3% at university of Gondar hospital tertiary eye care and training centre, which is higher than national prevalence which was 3.7%.¹² The prevalence in this study is nearly 5 times higher than the national prevalence. In this study the prevalence of Blindness was 14.4% which was higher than the national prevalence where the national prevalence was 1.6%.¹² The prevalence in this study is nearly 9 times higher than the national prevalence.

The prevalence of visual impairment in this study was still higher compared to studies done in Gurage zone, Ethiopia which was 12.1%²⁸ and study done in central Ethiopia with prevalence of visual impairment 10.9% and blindness 3.5%.²⁹ The reason might be those studies were done at the community, where chance to screen normal sighted people and eye problematic people existed while this study was hospital based where patients already came with recognised eye problem which may lead to increase prevalence of visual impairment and blindness.

The prevalence of visual impairment and blindness in this study was still higher compared to population based study across Africa which was 9.2%¹⁰ for visual impairment and 1.0%¹⁰ for blindness. The reason could be the African study was based on population based and used across different countries. While this study was based on patients came to hospital for seeking treatments for recognised eye problem which ends higher prevalence.

The prevalence of blindness in this study is still higher than the study conducted in sub Saharan Africa which was in range from 1.1% -7.9%.¹¹ This was possibly the sub Saharan study was at community level while this study was conducted at hospital where targeting patients with recognized eye problem which end up higher prevalence.

According to this study, the prevalence of visual impairment and blindness were still higher compared to study done in India which was 10.8% and 2.6%¹⁵ respectively. The reason may be the Indian study was done after best corrected visual acuity. However this study was done based on presenting visual acuity rather than best corrected visual status which will lead for over estimation of prevalence.

From this study, it was found that the prevalence of visual impairment and blindness is still higher than study done among British Asian population based on secondary data (prevalence of VI 4.2% and blindness 0.7%).¹⁴ The reason might be the better awareness on eye problems and better facility for eye care at England. However, the prevalence of visual impairment and blindness were less compare to study done in Iran where it was 28.8% and 24.8% respectively.¹⁹ The reason might be because

of chronic posterior segment diseases and longer life expectancy and also different genetic background among Ethiopian and Iranian people. The other solid evidence was that, the study done at Iran was among referred patients to visual rehabilitation clinic where chronic and complicated ocular conditions already existed.

It is found to be lower prevalence compared to the prevalence of visual impairment study done in Brazil (68%).²² The reason might be the Brazil study was among age greater than 60 years old people who will have more age related ocular problems.

Compared to the prevalence of visual impairment done in India (prevalence 49.3%).¹⁵ This study found the prevalence is 3 times lower. The reason might be this study included non referral patients which include good sighted patients of different cases than from Indian referral rehabilitation hospital where patients with highly deteriorated vision.

The prevalence of visual impairment in this study found higher than from the prevalence in Saudi Arabia 11.4%¹⁸ but the prevalence of blindness [16.9] is found lower. The reason might be that they used best corrected vision as criteria for under estimation of visual impairment and older people will have more chance of blinding than youngest.

In this study age group greater than or equal to 60 years old were risky for visual impairment and blindness than compared from young age 15-29 years old. It was 2.5 times for visual impairment and 4.5 times for blindness. But there was no statistically significant difference among other age categories. It is in line with other studies conducted globally (6, 8) for age group greater than 60 years old. The most convincing reason was most visually impairing and blinding factors found to be due to age related factors.

According to this study males were 1.7 times risky for visual impairment compared to females. However, in the study conducted at central Ethiopia, females were more risky for both visual impairment and blindness²⁹ and also in African studies.¹⁰ Some of the reasons for this result might be, the access of females to hospital is limited to get examined as it was hospital based study, males

outdoor activity increase risk and male get access to eye examination.

The ocular conditions which contribute for visual impairment were cataract, refractive error, glaucoma, AMD and pseudophakia. These factors were mentioned similarly as significant in different literatures in Ethiopia,¹² India,¹⁶ Nigeria.²³ Pseudophakia was significant associated factors with very large confidence interval because of small sample size. Compared to other studies it associated with visual impairment. The reason might be the surgical procedure, degree of maturity of operated cataract, incorrect biometry parameters and intra ocular lenses, poor patient compliance after surgery and lack of post operative refractive correction.

Concerning blindness the major associated factors were cataract, glaucoma and pseudophakia. This was similar in studies conducted in Ethiopia¹² and globally.⁹ Because most cases were found in tropical areas and sub Saharan Africa where eye care infrastructures are limited. However factors like AMD were not found unlike other worldwide studies which were included people of developed world with long life expectancy.

The limitations were inadequate sample size for rare case variables, incompleteness of the records, and systematic error during data collection and compromised secondary data.

Conclusion and recommendation

The prevalence of visual impairment and blindness was high from national prevalence. Sex, age, Cataract, refractive error, glaucoma, AMD and pseudophakia were significantly associated with visual impairment while age, cataract, glaucoma and pseudophakia were significantly associated with blindness. Older people were risky for visual impairment and blindness than youngest.

Vision rehabilitation centres should be strengthened and screening should be done at older age group patients. Early screening and treatment of glaucoma is recommended to reduce visual morbidity. Pseudophakia patient's should refracted and get spectacle correction to improve their vision. Further study recommended using large sample size to address rare cases.

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