

TYPES OF GLAUCOMA AND BLINDNESS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY

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ABSTRACT

Aim-To describe the various types of glaucoma and glaucoma blindness in the Eye Clinic of the University of Benin Teaching Hospital, Benin City, Edo state, Nigeria.

Methods: This was a prospective study which was carried out among glaucoma patients in the Eye Clinic of the University of Benin Teaching Hospital with the aim of describing the various types of glaucoma. All glaucoma patients presenting for the first time in the hospital eye clinic over a one year period were enrolled in the study. Data was obtained using interviewer administered questionnaires and ocular examination included visual acuity, gonioscopy, slit lamp examination, funduscopy, tonometry and visual fields. Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 17.

Results: Two thousand and twenty three (2,023) new patients were seen in the eye clinic within the study period and two hundred and sixty five (265) of these making 13.1% had various types of glaucoma. Primary Open Angle Glaucoma (POAG) was the most common type seen among 63.4%, 22.3% patients had secondary glaucoma, 5.3% had juvenile glaucoma, 6.4% had Primary Angle Closure Glaucoma(PACG) while 2.6% had congenital glaucoma. Out of these patients one hundred and thirty three (50.2%) were blind either in one or both eyes at presentation. Educational status, age group and place of first presentation were significantly associated with blindness.

Conclusion: The percentage of new patients presenting in the Eye Clinic of the University of Benin Teaching Hospital with glaucoma is 13.1 %. POAG is the most common type of glaucoma followed by secondary glaucomas. Blindness was seen in over half, 50.2% of these new patients and was significantly associated with increasing age, lower educational status and first presentation with traditional healers.

Keywords: glaucoma types, blindness, open angle, angle closure, congenital, juvenile

INTRODUCTION

The term glaucoma is derived from a Greek word "glaukos" which describes a clouded bluish green or grey hue, like the sea.¹ The presence of glaucoma is defined by a characteristic optic

neuropathy consistent with excavation and undermining of the neural and connective tissues of the optic disc and by eventual development of characteristic visual field defects.² Elevated intra ocular pressure (IOP) is a primary and significant risk factor.²

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The feature that differentiates glaucoma from other causes of visual morbidity is a characteristic pattern of damage to the optic nerve head and associated visual dysfunction that may be caused

by various pathological processes.² This is most easily recognised at the superior and inferior poles of the optic disc. The vertical cup:disc ratio (VCDR) has proved to be a simple and good index of glaucomatous loss of the neuroretinal rim. As with intraocular pressure, VCDR is a continuous variable within the population.³

A study which looked at the optic discs of Asians and Africans reported that the 97.5th percentile which was used for the diagnosis of glaucoma was 0.7 and above.² It was detected during the Baltimore eye survey that blacks have a 4 times greater risk of developing glaucoma⁴ and glaucoma blindness⁵ than whites. Glaucoma onset was also about 10 years earlier on average estimation in the blacks in a study population than the whites.⁶

There are several views on classification of glaucoma. It can be classified as primary and secondary. Primary glaucomas are not associated with any known ocular or systemic factors which cause increased resistance to aqueous outflow.⁷ They tend to affect both eyes. Secondary glaucomas are associated with ocular or systemic disorders responsible for decreased aqueous outflow and are often asymmetric or unilateral.⁷ Another method of classification is anatomical / gonioscopic in which glaucoma is classified into open angle or angle closure glaucoma. Other methods include the use of age of onset into congenital, juvenile or adult glaucoma. Aetiological classification is mainly used for secondary glaucomas for example lens induced glaucoma, uveitic glaucoma, neovascular glaucoma amongst others.

POAG which several studies have identified as the most common type of glaucoma both worldwide as well as in our environment^{3,8-11} is an insidious disease which has been referred to as the “sneak thief of sight”. It has been observed in Nigeria that there is a poor awareness of health problems in general and of ocular diseases in particular.¹² Some reports in Africa indicate that most people with glaucoma are not aware of having it and at least half of eyes are already blind at presentation.¹³⁻¹⁵ People rarely present in hospital for routine check-

up and even when they have health concerns, they present late.

This study examines the prevalence and distribution of all the types of glaucoma among new patients presenting in the University of Benin Teaching Hospital (UBTH), Benin City. Although a cure for the primary types of glaucoma does not exist, an awareness of the problem and early detection and treatment minimize the impact of the disease.

Methods

This is a prospective study done in the Eye clinic of the University of Benin Teaching Hospital in which all the patients diagnosed with glaucoma over a one year period were selected. Ethical approval for the study was obtained from the Ethical Review Board of the University of Benin Teaching Hospital. A written individual informed consent was also obtained from every patient and control enrolled in the study.

All new patients presenting in the eye clinic over a one year period who had a diagnosis of glaucoma were recruited into the study. A detailed history and examination of all these patients was done. They were two hundred and sixty five (265) in number.

A detailed history was obtained including relevant demographic data, educational and socioeconomic status, presenting complaints and duration of symptoms, type of care obtained initially and other relevant history. Visual acuity was measured using the Snellen’s chart and illiterate E chart and where vision was too poor by hand movement and light perception. This was carried out by the optometrist. It was done separately for each eye at a distance of 6 meters first unaided and then with pinhole. The patients that had refractive errors were then refracted and issued spectacles. Visual acuity was converted to Logmar acuity for easy analysis. Refraction was carried out manually with a Welch–Allyn retinoscope and subjective refractions were carried out and refined to get the best corrected vision. Spectacles were prescribed. A pen torch was used to examine eyelids and assess pupillary responses. This was followed by

anterior segment examination with Haag-Streit slit lamp biomicroscope which was done to identify ocular abnormalities and estimate anterior chamber depth by Van Herrick method. Tonometry was done with a Goldman applanation tonometer mounted on Haag-Streit slit lamp biomicroscope. Gonioscopy was done with a Goldman 2 mirror gonioscopes. Disc assessment was by binocular ophthalmoscopy using a +78D lens and Haag-Streit slit lamp biomicroscope after dilatation with combination of tropicamide and phenylephrine. Central visual fields were assessed using a Dicon Automated perimeter. Contrast sensitivity was assessed using Pelli Robinson chart. It usually took at least two clinic visits to complete all investigations.

Infants were examined under anaesthesia. For the infants, intraocular pressure was done with a Keeler air puff tonometer. Corneal diameter was measured with callipers. Gonioscopy was done with Koepe gonioscopes. Fundoscopy was done with Welch Allyn direct and indirect ophthalmoscopes after dilatation with cyclopentolate.

Data analysis was done with the Statistical Package for Social Sciences (SPSS) version 17. Frequencies, means, standard deviations and rates were determined and displayed in tables and charts. Tests of significance were carried out between blindness, socioeconomic variables and types of glaucoma using the student's t test and chi square where applicable.

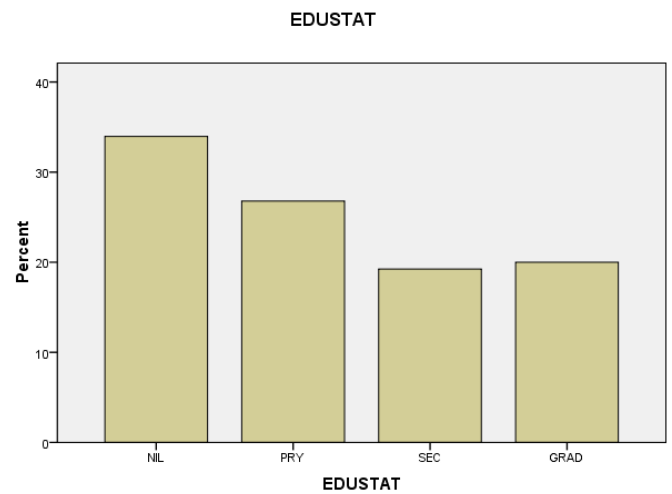
RESULTS

Of a total of two thousand and eighteen new patients (2,018), two hundred and sixty five (265) patients had glaucoma making up 13.1% of new patients presenting in the Eye Clinic. Ages of glaucoma patients ranged from 4 months to 93 years. Mean age was 55.8 years with a standard deviation of 22. Median age was 63 years. One hundred and fifty one (57%) were male while one hundred and fourteen (43%) were female giving a male: female ratio of 1.3:1.

TABLE 1: AGE AND SEX DISTRIBUTION OF GLAUCOMA PATIENTS

AGE (YEARS)	SEX		TOTAL
	MALE	FEMALE	
0-30	24(9.0%)	22(8.3%)	46(17.4%)
31-40	11(4.2%)	4(1.5%)	15(5.7%)
41-50	19(7.2%)	8(3.0%)	27(10.2%)
51-60	18(6.8%)	19(7.2%)	37(14%)
61-70	28(10.2%)	35(13.2%)	73(27%)
71-80	27(10.2%)	19(7.2%)	46(17.4%)
81-90	12(4.5%)	7(2.6%)	19(7.2%)
91-100	2(0.8%)	0	2(0.8%)
TOTAL	151(57%)	114(43%)	265(100%)

FIGURE 1: EDUCATIONAL STATUS OF PATIENTS WITH GLAUCOMA

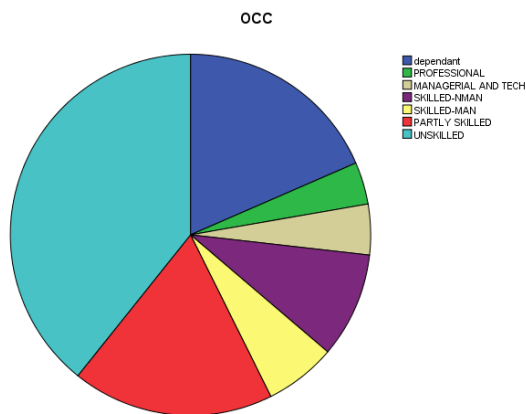


Ninety patients (34%) had no formal education, seventy one (26.8%) completed primary school education, fifty one (19.2%) completed secondary school education while fifty three (20%) had tertiary, postgraduate and other forms of education above secondary school (Figure 1).

The occupations of the patients were varied (Figure 2). Ten (3.8%) were higher professional like doctors, lawyers and lecturers, twelve (4.5%) were in managerial positions as company executives, large employers of labour, businessmen; seventeen(6.4%) were skilled non manual workers like teachers, twenty five(9.5%) were skilled manual workers like carpenters, barbers, tailors; forty eight(18.1%) were partly skilled , one

hundred and four(39.2%) were unskilled, twenty five were unemployed, while twenty four were students making up 18.5% who are dependent on others for their livelihood .

Figure 2: DISTRIBUTION OF OCCUPATIONS OF GLAUCOMA PATIENTS.



One hundred and sixty eight (63.4%) of the patients in this study had POAG, 17(6.4%) had PACG, 14(5.3%) had juvenile glaucoma, while 7 (2.6%) had congenital glaucoma. 59 (22.3%) patients had different kinds of secondary glaucoma (Table 2).

TABLE 2: TYPES OF GLAUCOMA

DIAGNOSIS	FREQUENCY	PERCENTAGE
POAG	168	63.4
PACG	17	6.4
JUVENILE GLAUCOMA	14	5.3
CONGENITAL GLAUCOMA	7	2.6
SECONDARY GLAUCOMA	59	22.3
TOTAL	265	100

The male:female ratio of patients with POAG was 1.3:1. Thirty one (18.4%) of the patient with POAG had Normal Tension glaucoma. Out of the 17 patients with PACG, 10 were female while 7 were male. Only 3 (all female) presented with acute episodes. The others presented like OAG but had closed angles on gonioscopy with some demonstrating peripheral anterior synechiae.

Three male and four female patients had congenital glaucoma. Their ages ranged from 4 months to 2 years at initial presentation. 3 of the cases were unilateral while 4 were bilateral. One bilateral case was associated with cataracts while one patient had cleft palate and iris anomalies. They all had varying degrees of buphthalmous and corneal opacities at presentation.

TABLE 3: DISTRIBUTION OF SECONDARY GLAUCOMA

GLAUCOMA DIAGNOSIS	FREQUEN CY	PERCENTA GE
UVEITIC	14	23.7
LENS INDUCED	13	22
PSEUDOPHAKIC/APH AKIC	12	20.3
TRAUMATIC	9	15.3
NEOVASCULAR	6	10.2
STEROID INDUCED	2	3.4
ANIRIDIA	2	3.4
PIGMENTARY	1	1.7
TOTAL	59	100

The most common type of secondary glaucoma was uveitic (23.7%) due to couching, toxopasmosis, herpes zoster ophthalmicus and unexplained causes (Table 3). This was followed by lens related causes (22%) commonly intumescent and/ or subluxated lenses causing pupil block; phacoanaphylaxis causing both glaucoma and uveitis, 20.3% were due to aphakia or pseudophakia, 14.2% occurred following traumatic hyphaema, angle recession and trabeculitis following trauma. Neovascular glaucoma was seen in 10.2% some had proliferative diabetic retinopathy, central retinal vein occlusion and ?chronic uveitis. Steroid induced glaucoma was seen in 2 patients who continued steroid use for a long period following pterygium surgery and aniridia was seen in two siblings making up 3.4% while pigmentary glaucoma was least common, seen in one patient making up 1.7%. See table 3. Only forty nine patients (18.5%) had been previously diagnosed as having glaucoma and only 7 of these were using medication when they presented.

TABLE 4: COMORBIDITIES

DIAGNOSIS	FREQUENCY	PERCENTAGE
HYPERTENSION	60	22.7
DIABETES	9	3.4
HYPERTENSION AND DIABETES	16	6.0
ASTHMA	4	1.6
HIV INFECTION	1	0.3
NIL	175	66

Systemic co-morbidities include hypertension in 22.7%, diabetes in 3.4%, hypertension and diabetes in 6%, asthma in 1.6%, and Human Immunodeficiency virus HIV infection in 0.3%. Sixty six percent (66%) had no associated illnesses (Table 4).

Five hundred and ten fundi were assessed as two patients had glaucoma in their only eyes. Eighteen fundi could not be assessed due to media opacities especially in patients with secondary glaucoma.

TABLE 5: CUP:DISC RATIO OF GLAUCOMA PATIENTS

CUP:DISC RATIO	RIGHT EYE	LEFT EYE	TOTAL FREQUENCY
0.9-1.0	143	164	307(60.2%)
0.7-0.8	66	57	123(24.1%)
<0.7	47	33	80(15.7%)

One hundred and thirty three (50.2%) of these patients were blind according to the WHO definition in one or both eyes at presentation. Monocular blindness was seen in 30.6% of these patients while bilateral blindness was seen in 19.6% (Table 6).

TABLE 6: FREQUENCY OF BLINDNESS AMONG GLAUCOMA PATIENTS

BLINDNESS	FREQUENCY	PERCENTAGE
NOT BLIND	132	49.8
UNILATERALBLINDNESS	81	30.6
BILATERAL BLINDNESS	52	19.6

When they discovered they had visual problems 29% of the glaucoma patients first presented to a chemist shop, 25% presented to an optometrist,16.6% presented at a general practitioner or other medical specialist, 20% presented to a traditional healer and only 9.4% presented to an ophthalmologist.

Age group, sex, educational status, occupation, place of first presentation were tested for significance against blindness using chi square. Educational status, age group and place of first presentation were significantly associated with blindness with level of significance less than 0.05%. Older people, less educated people were more likely to be blind (p value< 0.001% and 0.04% respectively) while people who presented to ophthalmologist were less likely to be blind (p value <0.001%) than people who presented to a herbalist (Tables 7).

TABLE 7a: BLINDNESS COMPARED WITH AGE GROUP

AGE GROUP(YEARS)	NOT BLIND	BLIND	TOTAL
<30	35 (76%)	11 (24%)	46
31-40	9 (60%)	6 (40%)	15
41-50	20 (74%)	7 (26%)	27
51-60	16 (43%)	21 (57%)	37
61-70	32 (44%)	41 (56%)	73
71-80	16 (34%)	30 (66%)	46
>80	4 (19%)	17 (80%)	21

$\chi^2 =$ df=6. P value= 0.000 (<0.05%)

TABLE 7b: BLINDNESS COMPARED WITH SEX

SEX	NOT BLIND	BLIND	TOTAL
MALE	71 (47%)	80 (53%)	151
FEMALE	61 (54%)	53 (56%)	114

$\chi^2 =$ 1.094 df=1 p value= 0.296 (>0.05%)

TABLE 7c: BLINDNESS COMPARED WITH EDUCATIONAL STATUS

EDUCATION	NOT BLIND	BLIND	TOTAL
NIL	32 (35%)	58 (65%)	90
PRIMARY	42 (59%)	29 (41%)	71
SECONDARY	25 (49%)	26 (51%)	51
GRADUATE AND POST SECONDARY	33 (62%)	20 (38%)	53

$\chi^2 = 13.1$.df=3. P value= 0.004 (<0.05%)

TABLE 7d: BLINDNESS COMPARED WITH PLACE OF INITIAL PRESENTATION

PLACE OF PRESENTATION	NOT BLIND	BLIND	TOTAL
CHEMIST	33 (43%)	44 (57%)	77
HERBALIST	12 (23%)	42 (77%)	53
OPTOMETRIST	41 (62%)	25 (38%)	66
MEDICAL DOCTOR	27 (61%)	17 (39%)	44
OPHTHALMOLOGIST	19 (76%)	6 (24%)	25

$\chi^2 = 30.384$ df = 4 p value = 0.001 (<0.05%)

DISCUSSION

Out of the two hundred and sixty five (265) patients with glaucoma, one hundred and fifty one were male while one hundred and fourteen were female giving a male female ratio of 1.3. This is similar to many studies on glaucoma in Nigeria.^{11,12,16} The males are more in number than the females, however it is not statistically significant. Even though the peak age of glaucoma in this study was in the 7th decade (27%), an appreciable number of people under 40 years of age (23%) had glaucoma. This is not unusual with studies in Africa^{11,12,17} in keeping with the fact that onset of glaucoma is earlier in blacks.

It was found in this study that 13.1% of new patients presenting in UBTH eye clinic was This is similar to a value obtained of 11.5% in a hospital

based study in India.¹⁸ Other hospital based study values are 4.4%,¹⁹ 17.7%,²⁰ 6.5%.²¹ It is higher than the prevalence of 7.8% obtained earlier in the same institution by Omoti.¹¹ This is probably due to more frequent outreach programmes into both local and distant communities within Edo state and increased advocacy for prevention of blindness which attracts people with visual impairment from all causes although it is mainly directed towards cataract.

The proportion of patients with secondary glaucomas was second highest 22.3% after primary open angle glaucoma. This seems to be the pattern in most hospital based studies in Africa.^{10,17,22,23} Of the primary glaucomas, POAG was highest followed by PACG 6.4%, then juvenile glaucoma 5.3%, before congenital glaucoma 2.6%.

The prevalence of juvenile glaucoma is higher than in the study done by Omoti¹¹ probably because this study used the more recent definition as primary open angle glaucoma in people less than 30 years of age.

Primary angle closure glaucoma was also increased 6.4% compared to 2.7% in a former study done in Benin¹¹ but less than 15% reported in Ibadan.¹⁶ More of these patients (61.1%) with PACG had the chronic type with peripheral anterior synechiae occluding the angles in keeping with the study done in Lagos and Cameroon.^{22,24} This is can be mistaken for open angle glaucoma due to a lack of gonioscopic evaluation, as pain which is believed to characterise PACG is absent. The normal-tension glaucoma was low in this study (6.3% of primary open-angle glaucoma). The proportion of patients presenting with congenital glaucoma was higher probably because the centre now has a paediatric ophthalmologist and the number of children attending the clinic has increased dramatically.

The most common type of secondary glaucoma was uveitic (23.7%) due to couching, toxoplasmosis, herpes zoster ophthalmicus and unexplained causes. This was followed by lens related (22%) intumescent and subluxated lenses causing pupil block. This is quite different from a study in South Africa where secondary glaucoma occurred with an adjusted prevalence of 1.7%, of which the principal contributors were exfoliative

and aphakic glaucoma.²⁵ The prevalence of primary angle-closure glaucoma was low.²⁵

In this study, 50.2% of patients were blind either in one or both eyes at presentation. This is a common problem in Africa where late presentation is the norm. This has not changed over the last 40 years.^{9,26} About 81.5% of the patients in this study had not been previously diagnosed as having glaucoma this is in keeping with studies in other parts of Africa.^{25,27} Among those that had been diagnosed only 7 (14.2%) were still taking their drugs while 2 had a functioning trabeculectomy bleb. This contributes to the high level of glaucoma blindness in Africa.²⁸ At presentation 23.5% of the glaucoma patients were blind in both eyes while 28.7% were blind in one eye. A study by Nwosu²⁹ also showed that 22% of new patients were blind bilaterally from glaucoma.²⁹ Some factors were tested for significance against blindness using chi square and student's t test. Blindness was found to be significantly associated with older age groups and male sex. This is in keeping with studies done earlier.^{30,31}

Concerning place of first presentation, one hundred and thirty (130) patients (49%) first presented at a chemist shop or traditional healer, while the least number twenty five (9.5%) presented first to an ophthalmologist. This attests to the poor health seeking behaviour and the need for more health education. It was found however that about 77.8% of those who were initially treated with traditional medicine were blind, while 21.5% of patients who presented at ophthalmologist were blind. This was statistically significant showing that blindness was much more likely in those who used traditional healers or medicine.

Blindness was not much reduced in those who presented first to an optometrist. This is different from a study done in the U.K in which patients referred by an optometrist were less likely to present with advanced field loss and subsequent blindness.³² The situation seen in the UK should be the norm because they are part of the eye health care team. It different in our environment. A smaller percentage of those who had higher levels of education were blind (40% compared to 55.6%).

However this was not statistically significant, p value 0.061%. This is probably due to the fact that POAG is asymptomatic and the culture of seeing a doctor for routine medical examination when one feels well is practically non-existent in our culture even among well educated people including doctors. When they do have symptoms they are more likely to present at the appropriate place to get treatment.

In conclusion, the percentage of new patients presenting in the Eye Clinic of the University of Benin Teaching Hospital with glaucoma is 13.1 %. In keeping with most studies in Africa POAG is the most common type of glaucoma followed by secondary glaucomas. Blindness was seen in over half 50.2% of these new patients and was significantly associated with increasing age, lower educational status and first presentation with traditional healers.

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