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GLAUCOMA

Variation of Intraocular Pressure and Cup-to-Disc Ratio With Age: A Baseline Assessment of Ahmadu Bello University Community, Zaria, Nigeria

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Introduction: Data from population-based surveys indicate that glaucoma is the second leading cause of blindness, accounting for 8% of blindness among the 39 million people who are blind worldwide.^[1] The Nigeria National Blindness survey reported proportion of blindness due to glaucoma was 16.7% among those aged ≥ 40 years, second only to cataract-induced blindness. Glaucoma progresses slowly with few, if any, noticeable symptoms in the early stage.^[2-4] Intraocular pressure (IOP) and VCDR are the most commonly used clinical measurement for the diagnosis of glaucoma.^[5]

Materials and Methods: The 421 participants recruited completed informed consent form and a questionnaire to extract relevant information. Visual acuity assessments, anterior and posterior segment examination, including fundoscopy were conducted. The IOP was measured with Perkins applanation tonometer. The VCDR was estimated as the percentage of surface area of the optic disc occupied by cupping in the vertical axis. The data were collated and analyzed using Analyze-it V2.22 (2010) statistical software.

Results: Four hundred and twenty-one participants between the age range of 10 and 79 were examined, with M: F of 1.0:0.9. The mean age was $37.0 \pm$ standard deviation (SD) 6.0 years. The mean IOP (mmHg) and VCDR vary from 13.2–16.0 to 0.32–0.40 respectively for different age brackets. Fifteen participants (3.6%) had a binocular VCDR difference of 0.2 and above and were considered Glaucoma Suspects, whereas 18 (4.3%) had a VCDR of 0.5 and above in one eye and in both eyes 41 (9.7%). Ten of these (2.4%) had IOP > 21 mmHg in one eye and 8 (1.9%) had it in both eyes. Hence, 14.0% were presumed to have glaucoma. There was a positive correlation between IOP on one side and vertical CD ratio on the other with age (linear regression Analysis of Variance (ANOVA) (Enter Model), Beta = 0.957 and 0.910 for IOP and CD ratio respectively, $P = 0.001$).

Discussion: Mark.^[6] stated that normal IOP is usually defined from 10 to 21 mmHg and that in nonglaucomatous people average IOP is 16 mmHg \pm SD 2.5 mmHg. In Egypt, Hossam *et al.*^[7] also reported that the mean IOP varied from 11.8 to 16.8 within the age bracket of 18–40. The average IOP in the Zaria community studied was $14.4 \pm$ SD 3.8, which falls right within these previously estimated values. In Israel, David *et al.*^[8] found mean IOP to increase incrementally by age from 14 to 35 mmHg among subjects < 50 years old to 15–49 mmHg among those over 70 years. This difference in means was statistically significant as determined by a one-way ANOVA. Using linear regression ANOVA we also found the β value relating IOP and Age to be $0.91 \approx 1.0$, which implies that a change of 1 standard deviation in age results in a 1% change in the IOP. This is further supported by the findings of Carel *et al.*^[9] who noted a positive correlation between IOP and age. Hossam *et al.* also fortified this finding when he observed that the mean IOP showed increase in older age group (33–40 years) by an average of about 1 mmHg.^[7] Hossam *et al.*^[7] in his study found the mean VCDR to be 0.1–0.5 within the age bracket of 18–40 years. The mean VCDR in this study was found to be between 0.3 and 0.4 and there was a positive correlation with age (ANOVA, $\beta = 0.957$). Hence, both IOP and VCDR increase progressively with age [Figure 1].

Conclusion: The baseline IOP in Zaria is $14.4 \pm$ SD 3.8 and the mean VCDR is $0.35 \pm$ SD 0.59. Both IOP and VCDR increase progressively with age.

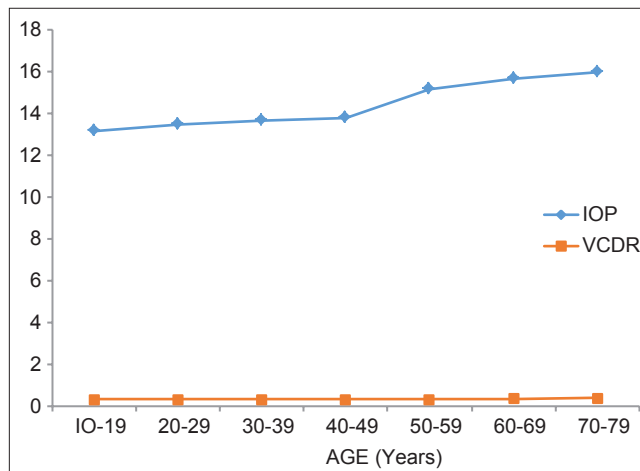


Figure 1: Variation of intraocular pressure and VCDR with age

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Relationship between Anterior Chamber Depth, Lens Thickness and Intraocular Pressure in Primary Open Angle Glaucoma Patients in Ile-Ife, Nigeria

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Introduction: Primary open-angle glaucoma (POAG) is commoner

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and more aggressive in blacks. Tomlinson *et al.*,^[1] found that glaucoma subjects had shallower anterior chamber depths (ACDs) and thicker lenses than normal subjects. Berdahl,^[2] proposed that the reduction in intraocular pressure (IOP) following cataract surgery could be as a result of the removal of the aging crystalline lens. The relationship between shallow ACD and increased lens thickness (LT) causing elevated IOP in PACG has been well-documented.^[3] There are only few studies on these parameters in POAG patients. This study investigated the relationship between ACD, LT and IOP in POAG patients and compared with non-glaucoma controls.

Methods: A cross-sectional analytical study of 62 newly diagnosed POAG patients, age and sex-matched with 62 controls in OAUTHC, Ile-Ife. Sociodemographic data and ocular examinations were documented. IOP was measured using the Goldmann applanation tonometer. LT and ACD were measured using A-scan ultrasonography and the IOL Master, respectively. Data of the right eyes were analyzed using SPSS, at the level of significance set at $P < 0.05$.

Results: There were 26 males (41.9%) and 36 females (58.1%) in each group. In the glaucoma group and control groups respectively, mean age was 60.3 ± 8.9 years and 58.5 ± 8.1 years ($P = 0.234$), mean ACD was 3.12 ± 0.27 mm and 3.15 ± 0.24 mm ($P = 0.514$), mean LT was 4.24 ± 0.46 mm and 4.23 ± 0.45 mm ($P = 0.903$) and mean IOP was 28.27 ± 7.88 mmHg and 14.47 ± 2.60 mmHg ($P < 0.001$). In the glaucoma group, IOP was positively correlated with ACD ($r = 0.022$, $P = 0.864$) but negatively correlated with LT ($r = -0.04$, $P = 0.758$) and ACD was negatively correlated with LT ($r = -0.058$, $P = 0.657$).

Discussion: The positive correlation between IOP and ACD in the glaucoma group suggests that the elevation in IOP seen in POAG is not the result of a shallow ACD as opposed to what is found in PACG. Furthermore, the negative correlation between IOP and LT in the glaucoma group could suggest a pressure effect on the crystalline lens, which could retard its growth. Furthermore, that the lens may not be responsible for the reduction in IOP following cataract surgery in POAG subjects. A positive correlation was found between IOP and LT in the control group. This may be because IOPs are not elevated in normal subjects. This study revealed no significant relationship between ACD, LT and IOP in POAG subjects. Thus, the changes in ACD and LT, which have been reported to predispose to PACG, may not have a similar effect in POAG.

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Awareness of Glaucoma in an Elite Community; A Study of Ahmadu Bello University, Zaria

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Introduction: A 2010 estimate by the World Health Organization reported that glaucoma is the second leading cause of blindness worldwide, accounting for 8% of global blindness.^[1] The Nigeria National Blindness survey reported the prevalence of glaucoma-related blindness at 0.7% second only to cataract-induced blindness. Glaucoma is also the most common cause of functional low vision in Nigeria.^[2] Studies from Africa have reported low levels of awareness of glaucoma among Nigerians and Ghanaians. Level of awareness among Caucasians is higher and ranged between 22.9% and 93%.^[3] This study aims to assess the level of awareness of glaucoma among members

of a tertiary academic institution community in Northern Nigeria.

Materials and Methods: The study was conducted in a university community and it involved interview and descriptive cross-sectional analysis. Consenting participants who presented at the sick bay of the university health service were serially recruited in March, 2014. Semi-structured questionnaire was directly administered to obtain sociodemographic data and information about glaucoma awareness. Data were analyzed using SPSS version 18.

Results: The number of participants was 483, mean age 21.0 years (standard deviation = ± 20.0 years). There were 262 males (54.2%). Those who had heard of glaucoma were 226 (46.8%) with no statistically significant difference between males 124 (47.3%) and females 102 (46.2%) ($P = 0.966$). Predictors of glaucoma awareness with statistically significant values were level of education, family history of glaucoma and family history of blindness ($P = 0.000$ in all three) [Table 1].

Discussion: In our study, we observed that the level of education significantly influenced the awareness of glaucoma; highest in people

Table 1: Socio-demographic variables by awareness of respondents

Variable	Awareness (freq. (%))			χ^2	df	P value
	No response	No	Yes			
Age group (years)						
1-9	20 (8.5)	111 (47.0)	105 (44.5)			
10-19	4 (22.2)	7 (38.9)	7 (38.9)			
20-29	2 (2.7)	36 (48.6)	36 (48.6)			
30-39	2 (5.0)	22 (55.0)	16 (40.0)			
40-49	3 (5.5)	18 (32.7)	34 (61.8)			
50-59	3 (7.5)	15 (37.5)	22 (55.0)			
60-69	2 (13.3)	7 (46.7)	6 (40.0)			
70-79	1 (20.0)	4 (80.0)	0 (0.0)	22.500	14	0.069
Sex						
Male	20 (7.6)	118 (45.0)	124 (47.3)			
Female	17 (7.7)	102 (46.2)	102 (46.2)	0.069	2	0.966
Educational status						
None	12 (40.0)	15 (50.0)	3 (10.0)			
Primary	8 (11.1)	40 (55.6)	24 (33.3)			
Secondary	11 (11.2)	53 (54.1)	34 (34.7)			
Tertiary	6 (2.1)	112 (39.6)	165 (58.3)	83.085	6	0.000
Occupation						
Student	11 (5.0)	103 (47.2)	104 (47.7)			
Civil servant	13 (7.8)	77 (46.4)	76 (45.8)			
House wife	6 (20.0)	12 (40.0)	12 (40.0)			
Teacher	1 (4.0)	5 (20.0)	19 (76.0)			
Business	2 (10.0)	8 (40.0)	10 (50.0)			
Driver	1 (25.0)	2 (50.0)	1 (25.0)			
Farmer	1 (25.0)	2 (50.0)	1 (25.0)			
Pensioner	0 (0.0)	4 (100.0)	0 (0.0)			
Artisan	0 (0.0)	2 (100.0)	0 (0.0)			
Child	1 (100.0)	0 (0.0)	0 (0.0)			
Mechanic	0 (0.0)	1 (100.0)	0 (0.0)			
None	1 (12.5)	4 (50.0)	3 (37.5)	35.823	22	0.032
Family history of blindness						
No idea	10 (37.0)	7 (25.9)	10 (37.0)			
No	27 (6.5)	197 (47.2)	193 (46.3)			
Yes	0 (0.0)	16 (41.0)	23 (59.0)	27.341	4	0.000
Family history of glaucoma						
No idea	14 (23.0)	25 (41.0)	22 (36.1)			
No	22 (5.8)	187 (49.2)	171 (45.0)			
Yes	1 (2.4)	8 (19.0)	33 (78.6)	40.581	4	0.000

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with tertiary education, 58.3%. This was consistent with studies done elsewhere.^[3-5] This is not surprising because the study was conducted in an academic community with access to and interest in educational materials and internet. Unlike other studies^[5,6] where awareness increased with age and more in females, these factors had no influence in our study ($P = 0.069$ and $P = 0.966$). Family history of glaucoma and blindness were other factors that have a positive correlation with a higher level of awareness in the study ($P = 0.000$). This is probably due to the proximity of the teaching hospital to the university and presence of functional eye clinic in a university health center where relatives of glaucoma patients can readily access information when they accompany them. This was similar to reports in other studies.^[3,5]

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Efficacy and Safety of Transscleral Cyclophotocoagulation in Management of Patients with Uncontrolled Intraocular Pressure
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Introduction: Cyclodestructive procedures for intractable glaucoma have evolved over the years.^[1] Recently, it has gained attention as a modality for the treatment of glaucoma cases with good vision.^[2] The aim of this study was to evaluate the efficacy and safety of TSCP in the reduction of intraocular pressure (IOP) for a range of conditions, with emphasis on post procedure visual acuity (VA) in seeing eyes.

Methods: Retrospective study of eighty eyes with uncontrolled IOP comprising 26 seeing and 54 non-seeing eyes treated with TSCP using diode laser (810 nm) over a period of 4–16 months at Eye Foundation Hospital, Lagos. Visual acuity and IOP measurements were taken with Snellen chart and Goldmann applanation tonometry respectively preprocedure, 1 day, 1 week, 1, 2, 3 months post procedure. Successful treatment was defined as a 30% reduction in IOP with or without medications. Safety was defined as preservation of VA in seeing eyes post procedure. Data obtained was analyzed with SPSS statistical software v 16.

Results: Mean ages of all patients were 60.5 years. Mean laser power and shots used was 1535.4 mW and 47.9 (seeing eyes) and 1616.7 mW and 81.1 (nonseeing eyes) respectively. 53% of seeing and 62% of nonseeing patients had successful treatment at final visit [Figure 1]. In the seeing group, 65.4% of patients maintained stable VA, 15.4% had improved VA, 19.3% had reduced VA. Lines gained or lost was at least 1 Snellen's line [Figure 2].

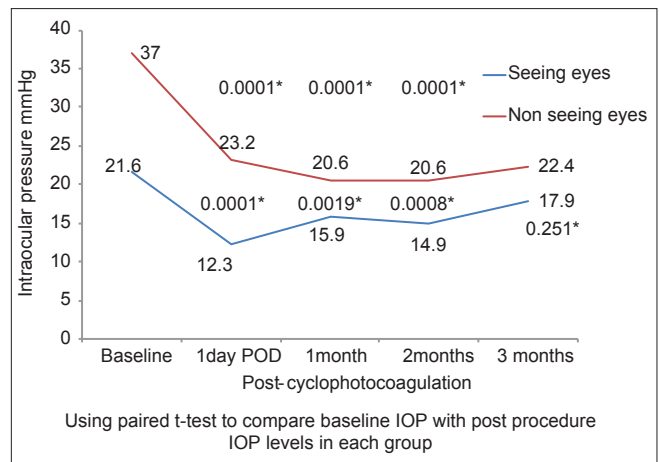


Figure 1: Pattern of mean IOP changes following cyclophotocoagulation in study eyes

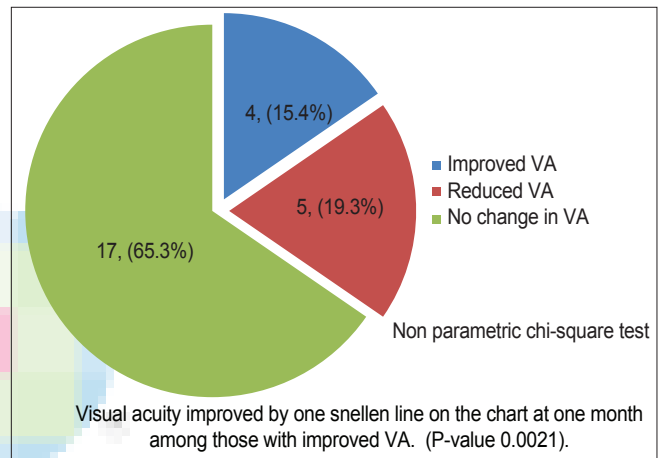


Figure 2: Changes in VA following cyclophotocoagulation in seeing eyes only

Discussion: TSCP has been proven in many studies to be effective in eyes with complex and refractory glaucoma.^[3] More recent studies demonstrate the safety of the procedure in seeing eyes. Overall Success rate of the procedure in this study is 60%. 52.5% had IOP at 18 or less at final visit. About 19.3% of patients had reduced vision. Comparable to 2 similar studies with 13%^[2] and 23%.^[3] Number of medications did not change significantly, but oral acetazolamide was discontinued. In eyes with reduced VA, 2 eyes were due chronic anterior uveitis, 2 to progression of glaucomatous optic neuropathy, 1 to cataract. No major complications arose. None of the patients had vitreous hemorrhage, phthisis bulbi or prolonged hypotony. Limitations included the retrospective study type and short period of follow up.

Conclusion: Cyclophotocoagulation has been shown to reduce IOP and preserve vision in seeing eyes. The results of this study are encouraging and agrees with the view that TSCP can be used safely and effectively in seeing eyes.

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Comparison of Patient Comfort with the Use of Icare Tonometer Versus Goldmann Applanation Tonometer for Measurement of Intraocular Pressure among Healthy Adults – A Pilot Study

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Introduction: Tonometry is the measurement of the intraocular pressure (IOP). It is a very important procedure in ophthalmic clinical practice. There are different techniques and instruments used in measuring IOP. Goldmann applanation tonometry (GAT) is the most commonly used and trusted technique in clinical practice.^[1] Newer techniques such as rebound tonometry (Icare) are now being used. There is no need for anesthetic agent and fluorescein, measurement of IOP is easy and quick.^[2] High level of agreement in IOP measurements between Icare and applanation tonometer was obtained in some studies.^[2-5]

Aim of the Study: To compare patient comfort and preference between the use of Icare tonometer and GAT for the measurement of IOP in an out-patient eye clinic of a teaching hospital.

Methodology: Study design: Cross-sectional prospective study. Study site: Eye clinic of the University College Hospital, Ibadan. Study participants: Consecutive new patients aged 18 years and above were recruited; patients with corneal eye diseases and those that declined consent were excluded. All RBT measurements were obtained by the same examiner without the use of topical anesthesia, and all GAT measurements were obtained by another examiner. Participants were then asked about the level of comfort experienced with RBT and GAT, their preferred choice and the reasons for the preference. Data collected were recorded in a proforma, Statistical analysis was performed with SPSS version 22.

Results: A total of 100 participants were studied, 45 males and 55 females. Age range was 18–81 years and the mean age of 47.1 ± 17.4 years.

Table: Distribution of participants by level of comfort

Level of comfort	Frequency	Percent
Icare much more comfortable	18	18.0
Icare more comfortable	25	25.0
No difference between the 2 tonometers	26	26.0
Goldmann tonometer more comfortable	22	22.0
Goldmann tonometer much more comfortable	9	9.0
Total	100	100.0

Fifty-three participants preferred GAT, though 6 of them were more comfortable with Icare but still preferred GAT because they felt it was more sophisticated, required eye drop and also due to fear of Icare probe whereas 47 participants preferred Icare, however one of them was more comfortable with GAT but preferred Icare because it was faster.

Discussion: About 43% of the participants felt Icare tonometry was more comfortable compared to GAT in this study. Higher value was reported by Pakrou *et al.*^[2] in Australia where 73.7% of the 38 participants assessed found Icare more comfortable than GAT. Munkwitz *et al.*^[6] in Germany also reported that 100% of their studied participants felt no discomfort with Icare. In this study, 53% of the participants preferred GAT to Icare, contrary to findings of Dahlmann-Noor *et al.*^[7] in Morefield eye clinic where 70% of the participants though aged 8–19 years preferred Icare tonometry to GAT.

Conclusion: Although this study has shown that more participants were more comfortable with Icare tonometer, more than half of the participants still preferred GAT. This may indicate that patient preference may not always be based on consideration for comfort.

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Intraocular Pressure Fluctuation and Glaucoma

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Introduction: Raised intraocular pressure (IOP) is a known risk factor for development and progression of glaucoma.^[1] New evidence is also suggestive of IOP fluctuation as a possible risk factor for progression.^[2] Preventing pressure swings could be even more important than achieving a target pressure.

Methods: This is a web-based review of available literature on IOP fluctuation using pub med and med line search with keywords fluctuation, IOP.

Discussion: For many years, the aim was to lower the mean pressure but lately, IOP fluctuations have drawn greater attention from researchers, including daily fluctuation of the diurnal curve and long-term fluctuations from visit to visit.^[3]

There are categories of IOP fluctuation: Ultra-short-term fluctuation, short-term fluctuation (that can further be subdivided into diurnal (day time), nocturnal (night time) of circadian (24-h) and long-term fluctuation.^[3] The importance of fluctuation in glaucoma progression is however still controversial. Asrani *et al.*^[3] Collaborative Initial Glaucoma treatment study,^[4] Advanced Glaucoma Intervention study^[5] all support the importance of variation in the progression of glaucoma, while the Early Manifest Glaucoma trial^[6] does not. The management of glaucoma patients should involve the use of pressure curves, change in medication to include drugs with long duration of action and stabilization of fluctuations, e.g. PG analogs, topical CAI.^[7] Continuous IOP monitoring is still being developed. The WGA consensus-4 on IOP however states that there is currently insufficient evidence to support 24-h or more than 24-h IOP fluctuation as a risk factor for glaucoma development or progression.^[8]

Conclusion: There is conflicting evidence of importance of IOP fluctuation. IOP Fluctuation can however be reduced by use of drugs such as PG analogues, Topical Carbonic Anhydrase Inhibitors or surgical procedures like Selective Laser Trabeculoplasty and Trabeculectomy.

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