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Subjective Optic Disc Assessment and Single Measurement Intra-ocular Pressure to Screen a Cohort of Pensioners in Port Harcourt

CN Pedro-Egbe, BMedSc, MBBS, FMCOph; IO Chukwuka, MBBS, FMCOph
Department of Ophthalmology, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

SUMMARY

Background: There is good evidence that screening can detect primary open-angle glaucoma (POAG) in adults and that early treatment of adults reduces the number of persons who develop visual field defects or those whose visual field defects progress.[1]

Aim: To screen and identify persons with glaucoma among pensioners in Port Harcourt.

Materials and Method: The study was carried out among retirees in Rivers State. Verbal consent was obtained from the Treasury Department of the Rivers State Ministry of Finance and also from all individuals who participated in the study. Demographic data including age and sex were recorded in the WHO/PBL eye examination form. Ocular examination consisted of uncorrected VA measured with Snellen's chart and then pin-hole presented when VA < 6/18. Intraocular pressure was measured with Perkin's applanation tonometer. The external eye was examined with a pen torch and funduscopy with the direct ophthalmoscope. Glaucoma was diagnosed based on an IOP>21mmHg and VCDR >0.5 or VCDR = 0.8 with normal intraocular pressure.

Results: A total of 176 subjects (351 eyes) were examined; 135(76.7%) male and 41(23.3%) female patients. The mean age of respondents was 62.33 (±±8.58) years. Of the 176 subjects examined, 14 had glaucoma (based on the defined criteria of VCDR > 0.5 and IOP above 21mmHg or VCDR = 0.8 with normal IOP) giving a relative frequency of 7.95%. Ten subjects had ocular hypertension.

Conclusion: There is a need to screen at-risk people for glaucoma especially the aged. In doing this, sufferers will be identified early and appropriate treatment instituted to prevent visual loss.

Key words: glaucoma screening, cohort, pensioners, Port Harcourt

INTRODUCTION

Glaucoma is a major cause of visual impairment and blindness in the world. Available data shows that 5.2 million individuals are blind from glaucoma and this represents 15% of global blindness.[1] Of this number, 3 million have primary open angle glaucoma (POAG), 2 million, angle closure glaucoma and 200,000 have congenital glaucoma.[1] POAG is the commonest type and has a devastating effect in black populations. POAG is more likely to result in irreversible blindness; it appears approximately 10 years earlier and progresses more rapidly in blacks than in whites.[2] Primary open-angle glaucoma is also said to be four to five times more common in black populations compared to Caucasians.[3] However, there is no difference in rates of primary open-angle glaucoma between men and women for either blacks or whites.[3] Based on available data, sub-Saharan Africa accounts for 19.4% of all cases of POAG, second only to China with 20.1%. About 13.5 million people over the age of 40 years are currently being treated for POAG – this constitutes 60% of global eye patients.[1]

For both social and economic reasons, glaucoma screening is useful and necessary, with possible benefits for individuals and the health care system arising from the early diagnosis and early therapy of patients with glaucoma. Early treatment of patients with glaucoma decreases the probability that those patients will become blind and lowers the direct and indirect costs for patients with glaucoma. Widespread screening is fundamental in limiting the incidence of glaucoma-associated blindness.

Both cupping of the optic disc and increased intraocular pressure have been used to assess indicators of glaucoma in a number of screening campaigns in developed countries, but visual field loss is diagnostically the most specific since both cupping and intraocular pressure exhibit physiological variations in any given population.[1]

The US Preventive Services Task Force (USPSTF) found good evidence that screening can detect increased intraocular pressure (IOP) and early primary open-angle

Correspondence: Chinyere Nnenne Pedro-Egbe, Department of Ophthalmology, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria • e-mail: cpegbe@welteknig.com

glaucoma (POAG) in adults.[4] The USPSTF also found good evidence that early treatment of adults with increased IOP detected by screening reduces the number of persons who develop small, visual field defects, and that the timely treatment of those with early, asymptomatic POAG decreases the number of those whose visual field defects progress.[4] Similarly, the American Academy of Ophthalmology (AAO) recommends screening for glaucoma as part of a comprehensive adult medical eye evaluation, starting at the age of 20, and with a frequency depending on individual age and other risk factors for glaucoma.[4] The prevalence of primary open-angle glaucoma increases with increasing age in many populations studied.[5]

MATERIALS AND METHOD

Study Setting: The study was carried out among pensioners in the pension office of the Rivers State Secretariat in Port Harcourt. Port Harcourt is the capital of Rivers State in the Niger Delta region of Nigeria. It is the centre of the oil industry in the country and as such, home to people from different parts of the country including expatriate workers.
Method: The study was carried out among retirees in Rivers State who had been invited to the state secretariat to regularize their banking documents for easy payment of their monthly allowances. The exercise lasted for about two weeks, but we were there for three days; and during this time, almost all who presented for the exercise were examined. Verbal consent was obtained from the Treasury Department of the Rivers State Ministry of Finance and also from all individuals who participated in the study. Participation was based on oral approval to take part in the study. Nobody declined inclusion. Demographic data including age and sex were obtained and recorded in the WHO/PBL eye examination form.

Ocular examination started with assessment of both uncorrected and corrected visual acuity (VA) at 6 metres using Snellen's chart. Each eye was tested separately; and with pin-hole when VA was < 6/18. Intra-ocular pressure was measured with Perkin's applanation tonometer (MK-2) following the instillation of topical tetracaine and flourescein dye. The external eye was examined with a pen torch and funduscopy with the direct ophthalmoscope (Welch Allyn USA REF 11720). Small pupils were dilated with Mydriacyl 0.5% to allow for good funduscopy. All data were recorded in the WHO/PBL eye examination form. The visual acuities were done by the medical assistants (ophthalmic nurse and resident doctor) while all funduscopy and intra-ocular pressure measurements were carried out by the first and second author, respectively.

Since the diagnosis of glaucoma is closely associated with a morphologic change in the optic nerve head, our screening parameter included assessment of the optic disc in addition to intraocular pressure measurement. Glaucoma was diagnosed based on IOP>21mmHg and VCDR >0.5 or VCDR = 0.8 with normal intraocular pressure. Data was analyzed using Epinfo version 6.04. Any case of glaucoma picked up by this process will be referred to the University of Port Harcourt Teaching Hospital for confirmatory tests (Slit-lamp examination in conjunction with superfield lenses and central visual field analysis).

RESULTS

A total of 176 subjects were examined; 135(76.7%) males and 41(23.3%) females giving a male to female ratio of 3.3:1. All the subjects were aged between 40 and 89 years with a mean of 62.33 (±8.58) years. Most subjects (72.7%) were aged between 50-69 years old while those above 79 years made up only 3.4% (n=6). The age and sex distribution is shown in table 1.

Table 1. Age and sex distribution of the study subjects

Age group (years)	Male (%)	Female (%)	Total (%)
40-49	6	3	9 (5.1%)
50-59	31	15	46 (26.1%)
60-69	66	16	82 (46.6%)
70-79	26	7	33 (18.8%)
80-89	6	-	6 (3.4%)
Total	135 (76.6%)	41 (23.3%)	76 (100%)

A total of 351 eyes of 176 subjects were tested for visual acuity (one subject had a prosthesis). Of this number, 219 (62.4%) eyes had uncorrected visual acuities (VA) of 6/6-6/18, and 93 eyes (26.5%); visual acuities of 6/24-6/60. Only two eyes had visual acuities of no perception of light (NPL). See table 2.

Intraocular pressure (IOP) was measured in 351 eyes and the mean was 17.97 (±4.61) mmHg. The mean IOP for the right eye was 17.45 (±4.15) mmHg and 18.50 (±4.98) mmHg for the left eye. Most subjects (91.2%) had IOPs of between 10-21mmHg. Only 8.6% of the subjects had IOPs 22 mmHg or higher (table 3). There was no statistically significant difference between the mean IOP in the right and left eyes (X^2= 0.032, Student t-test=2.147).

Table 2. Presenting uncorrected visual acuity (VA) in both eyes

VA	Right Eye (%)	Left Eye (%)	Total (%)
6/6-6/9	64 (36.4%)	61(34.9%)	125 (35.6%)
6/12-6/18	44 (25%)	50 (28.6%)	94 (26.8%)
6/24-6/60	52 (29.5%)	41(23.4%)	93 (26.5%)
CF-LP	16 (9.1%)	21 (12%)	37 (10.5%)
NPL	Nil	2(1.1%)	2 (0.6%)
Total	176	175	351 (100%)

CF = counting fingers ; LP= light perception
NPL = no perception of light

Table 3. Intra-ocular pressures in both eyes

Intraocular pressure (mmHg)	Right eye (%)	Left eye (%)	Total (%)
< 10	1 (0.5%)	Nil (%)	1 (0.2%)
40830	69 (39.3%)	53 (%)	122 (34.8%)
16-21	95 (54%)	103 (%)	198 (56.4%)
22-27	7 (4%)	10 (%)	17 (4.8%)
28-39	2 (1.1%)	7 (%)	9 (2.6%)
40 and above	2 (1.1%)	2 (%)	4 (1.2%)
Total	176	175	351(100%)

Mean IOP RE = 17.448 ±4.150 mmHg
Mean IOP LE = 18.498 ±4.984 mmHg
Mean IOP Both eyes = 17.973 ±4.609

Funduscopy was done in 304 (86.6%) eyes (151 RE; 153 LE). The remaining eyes (n = 47) had cataracts so the fundus could not be assessed. The mean VCDR for both eyes was 0.417 (±0.181). In over 80% of the eyes, the vertical cup/disc ratio (VCDR) was between 0.1- 0.5. The rest (18.7%) had VCDRs of 0.6-0.9. There was no eye with a VCDR of 1.0. The mean VCDR for the right eye was 0.42 (±±0.181) and 0.414 (±0.182) for the left eye. There was no statistically significant difference between the VCDR of the right and left eyes (P-value = 0.773).

Table 4. Vertical cup/disc ratio (VCDR) for both eyes

Vertical cup/ disc ratio	Right eye (%)	Left eye (%)	Total (%)
0.1-0.5	123 (81.5%)	124 (81.1%)	247 (81.3%)
0.6-0.9	28 (18.5%)	29 (18.9%)	57 (18.7%)
>0.9	Nil	Nil	
Total	151	153	304 (100%)

Mean VCDR RE= 0.42 ±0.181; Mean VCDR LE =0.414 ±0.182;
Mean VCDR Both Eyes =0.417 ±0.181

Of the 176 subjects screened, 14 had glaucoma (based on the defined criteria of VCDR > 0.5 and IOP > 21mmHg; or VCDR = 0.8 with normal IOP). The 14 glaucoma cases included five subjects with normal IOP and nine with elevated IOP. This gives a relative frequency of 7.95%. There were 12 males and two females and almost all were aged between 60 and 75 years old. Ten subjects had ocular hypertension (IOP above 22mmHg in both eyes with no cupping of the optic disc).

DISCUSSION

Intraocular pressure > 22 mmHg and the optic disc assessment as screening parameters have been found to have good specificity (> 95%) in some studies though there was relatively poor sensitivity (< 75%).[6] Screening could be used as a filter to identify eyes that have higher risk of glaucoma, and in one study the prevalence of glaucoma was found to be 4.75%.[6] Definite cases of glaucoma have also been identified by some screening studies and in a study involving those 30 years and older, the prevalence of glaucoma was 2.10%.[7] This study has a much higher relative frequency of glaucoma (7.95%) compared to the other studies probably because our study targetted a specific group of people (pensioners) and older age is a known risk factor to glaucoma. Also, the first study involved a younger population (30 years and above) while the second was population-based, cross-sectional and involved a larger number of people which could explain the lower prevalence obtained in those studies. Some studies have also noted that treatment of patients with increased IOP reduces the development of visual field defects by more than 40%[8] and that screening sometimes extends life and/or improves the quality of life.[9]

Though primary open glaucoma is known to be commoner in blacks and to have a more devastating effect in them,[10] as half of those with POAG may not be aware that they have the disease,[3,11] hence the importance of this study. Glaucoma screening is part of the recommendation of the American Academy of Ophthalmology as part of a comprehensive adult medical eye evaluation, starting at the age of 20, and that the frequency should depend on an individual's age and other risk factors for glaucoma.[4] Even though the utility of tonometry as a screening tool for POAG is limited (because IOP fluctuates over time and diurnally, and therefore more than one reading may be needed to detect elevated IOP), some studies have found it to have a specificity of between 92-95%.[6,15,16]

The findings from our study corresponds with other studies where it was found that men are more affected than women.[12] In our study, however, the males tested were six times as affected as females tested, but this may be because of a larger male representation in the survey. About 36% of

our glaucoma cases had normal intraocular pressure and this is similar to findings in other studies.[11,13,14]

Despite this high relative frequency of glaucoma in our study, some cases of glaucoma may have been missed because the central visual fields were not analyzed and also, the variability in the time IOP was measured may not give the correct picture of the subject's intra-ocular pressure.

CONCLUSION

Screening is important in the detection of glaucoma but should be done in two phases. In the first phase, simple and portable tools can be used to identify cases of suspected glaucoma and in the second phase, glaucoma suspects can then be reviewed in detail in a referral centre with facilities for at least central visual field analysis and fundus photography, before commencement of glaucoma treatment. The cases we identified as glaucoma were all referred to the University of Port Harcourt Teaching Hospital for slit-lamp examination and central visual field analysis.

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