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Research Article

Visual Acuity, Vertical Cup Disc Ratio and Demographic Correlates of Respondents of Patients Attending a Private Eye Facility in Rivers State, Nigeria

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Abstract

Background: Visual acuity (VA) is a measure of the resolving power of the eye. The visual pathway extends from the retina through the optic nerve to the occipital cortex. The effect of gender on optic nerve morphology is varied with reports of males generally having larger optic discs and consequently larger Vertical Cup Disc Ratio (VCDR). Males have also been found to outperform females in visual perception but no studies have been performed in our region comparing these parameters.

Methodology: A total of one hundred eye clinic attendees at a Private Health Facility were purposively sampled in the study. Data was entered in Microsoft Excel and exported to IBM Statistical Package of Social Sciences (SPSS) version 20 for statistical analysis.

Results: The age range of respondents was 8-100 years while the mean age was 45.83 ± 20.43 SD. Mean VCDR in the right and left eye of respondents was 0.42 ± 0.22 and 0.42 ± 0.20 respectively. There was no statistically significant difference between means of VCDR across gender but when compared across age groups the difference was significant, as older age group had higher VCDR. More females had normal visual acuity (51%) as compared to males but this was not statistically significant, however comparison of visual acuity across age was statistically significant. The comparison of mean VCDR across the categories of visual acuity in better eye was also statistically significant.

Conclusion: There was no statistically significant difference in VCDR and VA across gender in our study. There was however a significant difference in VCDR and VA with age.

Keywords: *Visual Acuity; Vertical Cup Disc Ratio; Age; Gender*

Introduction

Visual acuity is a measure of the resolving power of the eye. It is the ability to accurately distinguish objects at specified distance and measures the central vision [1]. The visual pathway extends from the retina through the optic nerve to the occipital cortex. The optic nerve comprises about one million nerve fibers which are continuation of the axons of the ganglion cells in the retina. They bend out of the eye via the lamina cribrosa to enter the anterior part of the nerve and this area is referred to as the optic nerve head [2].

The optic nerve head is made up of a central depression called the cup, the neuroretinal rim and the disc margin [3].

The effect of gender on optic nerve morphology is varied. Studies have suggested large discs in males in European and African American ethnic groups [4,5]. Males have also been found to do better with visual perceptual tests [6].

Aim of the Study

The aim of this study is to identify age and gender differences in visual acuity and optic disc characteristics in a cohort of patients attending an eye care facility.

Methodology

Sampling methodology

A total of one hundred eye clinic attendees at a Private Health Facility were purposively sampled in the study. They all had their unaided and Pin Hole visual acuity accessed using the Literate Snellen's chart. For those who were not literate the E-Chart was used. They all underwent a slit lamp bio microscopy with dilated +78Diopter lens examination using the 78D Volk lens.

Statistical analysis

Data was entered in Microsoft Excel and exported to IBM Statistical Package of Social Sciences (SPSS) version 20 for statistical analysis. Data were tested for normality using Kolmogorov-Smirnov Statistics prior to selection of statistical tests. Normally distributed variables were summarized using means and standard deviation and differences compared using student's t test and Analysis of Variance (ANOVA) as appropriate while non-normally distributed variables were summarized as medians and ranges and differences compared using Kruskal-Wallis H statistics. Nominal variables were expressed as absolute and relative frequencies and significant differences compared using Pearson's Chi square test or a Fisher's exact test when the expected cell count was less than five in at least twenty percent of the cells. $P < 0.05$ was considered statistically significant.

Results

VCDR	Mean ± S.D
Right eye	0.42 ± 0.22
Left eye	0.42 ± 0.20

Table 1*: Mean VCDR in right and left eye of respondents.*

S.D: Standard Deviation.

	Gender			
VCDR	**Male Mean ± S.D**	**Female Mean ± S.D**	**t**	**P-value**
Right eye	0.45 ± 0.23	0.39 ± 0.22	1.107	0.272
Left eye	0.44 ± 0.22	0.38 ± 0.18	1.352	0.180

Table 2: *Comparison of mean VCDR across males and females.*

S.D: Standard Deviation.

		VCDR	
Age category	**N**	**Right eye Mean ± S.D**	**Left eye Mean ± S.D**
< 20 years	12	0.32 ± 0.14	0.36 ± 0.12
20 - 29 years	6	0.46 ± 0.29	0.44 ± 0.27
30 - 39 years	18	0.30 ± 0.10	0.34 ± 0.09
40 - 49 years	22	0.46 ± 0.23	0.44 ± 0.22
50 - 59 years	15	0.45 ± 0.23	0.35 ± 0.14
≥60 years	27	0.53 ± 0.28	0.56 ± 0.28
		ANOVA = 2.518; P-value = 0.037*	ANOVA = 2.774; P-value = 0.024*

Table 3: *Comparison of mean VCDR across age categories.*

**Statistically significant; S.D: Standard Deviation.*

	Gender		
VA Better eye	**Female n (%)**	**Male n (%)**	**Total n (%)**
Normal (better than 6/18)	21 (51.2)	23 (39.0)	44 (44.0)
Mild (6/18)	6 (14.6)	13 (22.0)	19 (19.0)
Moderate (6/24, 6/36, 6/60)	12 (29.3)	19 (32.2)	31 (31.0)
Severe (3/60 and worse)	2 (4.9)	4 (6.8)	6 (6.0)
Total	41 (100.0)	59 (100.0)	100 (100.0)
Fisher's exact = 1.713; p value = 0.678			

Table 4: *Comparison of VA better eye by gender.*

	Age in years
Categories of VA better eye	**Median (Range)**
Normal (better than 6/18)	37 (10 - 61)
Mild (6/18)	50 (8 - 74)
Moderate (6/24, 6/36, 6/60)	56 (9 - 91)
Severe (3/60 and worse)	80.50 (51 - 100)

Table 5: *Comparison of median ages of respondents by VA better eye categories.*

Kruskal-Wallis H = 16.602; p-value = 0.0001 *Statistically significant.*

Discussion

Visual function has been found to be affected by various factors including age and gender but this is not a universal fact as opinions are varied [6,7]. Visual acuity reaches its best at 10years and gradually begins to decline by age 45years [8]. It has been suggested that males may see better because of thalamic neurons in the visual cortex which as controlled by testosterone during fetal development [6,9]. This was not the case in our study as females had better (normal) vision as compared to males (51.7%).

Visual acuity also seemed to be better in both sexes in their dominant eye though this was not statistically significant; it however corresponds with a study done by Cederlund J [10] while studying eye preference and its association with visual acuity and handedness. The study showed that eye dominance correlates with brain dominance.

It has been also been reported that there is a wide variety of disc sizes as a result of the physiological relationship between disc size and cup size. Garway-Heath DF., *et al.* did not find any relationship between the optic cup diameter, gender, intra ocular pressure or age [11].

A few studies have found an unequivocal relationship [4,12]. A study in our environ however documented significant correlation between optic disc findings and age and gender [13].

The vertical cup disc ratio is affected by ocular and systemic factors e.g. race, genetic factors, age, sex, and intra ocular pressure. Male subjects tend to have larger disc sizes as compared with females [14-18].

It also tends to increase with age and correlates with an annual loss of nerve fiber [19,20]. This is similar to findings from our study as VCDR was higher in older age groups. This is important as increase in VCDR is clinically useful in optic-disc assessment in glaucoma's and suspects.

Ocular parameters tend to vary with age and gender and should be considered while evaluating for ophthalmic diseases.

Conclusion

Females had better visual acuity in our study than males but no correlation existed between VCDR and gender. VCDR however tended to increase with increasing age.

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