

Evaluate Contrast Sensitivity in Glaucoma Patients from 16 - 80 Years

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Abstract

Purpose: To measure the contrast sensitivity in different types of glaucoma patients.

Material and Method: An observational and non-probability convenient sampling study from February to August 2020, using lea contrast sensitivity, Snellen visual acuity charts, trial box and occlude.

Result: Out of 60 patients 37 were males and 23 were females. Mean onset age was 38.4 years between 16-80 years. 33 (55%) patients were diagnosed with Primary Open Angle Glaucoma, 17 (28.3%) patients with Primary Close Angle Glaucoma, 7 (11.7%) patients with Acute Closure Glaucoma and 3 (5%) patients with Secondary Glaucoma. Similar with Glasses 46 (76.7%) patients had visual acuity 6/6 to 6/12, 11 (81.3%) patients had 6/18 to 6/36 and 3 (5%) patients had 6/60. According to contrast sensitivity 30 (50%) patients had 1.25% (80%), 21 had 2.50% (40%) and 9 had 5% (20%). 15 subjects had 1.25% (80%), 13 subjects had 2.5% (40%) and 5 subjects had 5% contrast sensitivity in POAG. 11 subjects had 1.25% (80%), 4 subjects had 2.5% (40%) and 2 subjects had 5% contrast sensitivity in PCAG. 3 subjects had 1.25% (80%). 3 subjects had 2.5% (40) and 2 subjects had 5% contrast sensitivity in ACG.

Conclusion: There is reduction in contrast visual acuity with and without refraction most of patients had variation at level of Contrast Visual Acuity in Primary Open Angle Glaucoma.

Keywords: Contrast Sensitivity; Open Angle; Close Angle; Acute Closure; Glaucoma; Optic Nerve; Intraocular Pressure; Periphery Vision

Introduction

It is a progressive optic neuropathy with visual field defects (Figure 1 Difference between normal eye and glaucomatous eye). Raised intraocular pressure is one of the major risk factors [1].

Types of glaucoma

Open angle

Open-angle, or chronic, glaucoma has no signs or symptoms except gradual vision loss [2,3].

Figure 1: Difference between normal eye and glaucomatous eye.

Angle closure

The flow of aqueous humour fluid is suddenly blocked [4].

Congenital

Children born with congenital glaucoma have a defect in the angle of their eye, which slows or prevents normal fluid drainage [5].

Secondary

A side effect of injury or another eye condition, such as cataracts or eye tumours [6,7].

Normal tension

Without increased eye pressure develop damage to their optic nerve [8].

Objective

To measure the contrast sensitivity in different types of glaucoma patients who attending the glaucoma clinic.

Rationale

To find out the contrast sensitivity in various types of glaucoma's patients usually measures visual acuity, visual field. There is no any significant data found who describe the relationship between glaucoma and contrast sensitivity.

Subjects and Methods

Study design

Observational study.

Study setting

Glaucoma clinic at Al- Ibrahim Eye Hospital Malir, Karachi.

Study duration

February - August in 2020.

Sample size

Sample size was 60.

Sample technique

Non probability sampling.

Sample selection

Inclusion criteria

- Age range will be 16 years to 80 years.
- Patient who has glaucoma only.
- Patients who are consenting.

Exclusion criteria

- Patient having other ocular diseases.
- Mentally Disabled patients.
- Patients who are not consenting.

Data analysis procedure

- Data analysis was done on Statistical package for social sciences (SPSS) version 20.0.
- All continuous variables were present as Mean± Standard Deviation.
- The entire categorical variables shown as frequency and percentages.
- Statistical charts are present in the form of Bar chart, Frequency curve and Pie chart etc.

Data collection instrument

After obtaining written consent. All patients in the age group of 16to 80 years. Uncorrected and corrected visual acuity will assess in standardized room illumination with Snellen and contrast sensitivity was assessed with lea symbols (low contrast flip Chart).

The following instruments were used:

- Lea symbol contrast sensitivity chart.
- Occluder
- Trial Box
- Snellen chart Visual Acuity Chart.

Visual Acuity with Glasses	Frequency	Percent
6/6-6/12	46	76.7
6/18-6/60	11	18.3
6/60	3	5
Total	60	100

Table 1: Visual Acuity with Glasses.

Contrast Sensitivity with Glasses	Frequency	Percent
5%	9	15.0
2.5%	21	35.0
1.25%	30	50.0
Total	60	100.0

Table 2: Contrast Sensitivity with glasses.

Results

Visual acuity with Glasses 46 (76.7%) patients had visual acuity 6/6 to 6/12, 11 (81.3%) patients had visual acuity 6/18 to 6/36 and 3 (5%) patients had visual acuity 6/60 (Table 1).

There are 30 (50%) patients had 1.25% (80%) Contrast Sensitivity with glasses, 21 patients had 2.50% (40%) Contrast Sensitivity with glasses and 9 patients had 5% (20%) Contrast Sensitivity with glasses (Table 2).

A total 60 patients 37 were males and 23 were females. Mean onset age was 38.4 years, from between 16-80 year (Figure 2 Distribution of Gender).

Out of 60 patients, 33 (55%) patients were diagnosed with Primary Open Angle Glaucoma and 17 (28.3%) patients were diagnosed with Primary Close Angle Glaucoma, 7 (11.7%) patients were diagnosed with Acute Closure Glaucoma and 3 (5%) patients were diagnosed with Secondary Glaucoma (Figure 3 Different types of Glaucoma).

Total 15 subjects contrast sensitivity had 1.25% (80%), 13 subjects contrast sensitivity had 2.5% (40) and 5 subjects contrast sensitivity had 5% in POAG. 11 subjects contrast sensitivity had 1.25% (80%), 4 subjects contrast sensitivity had 2.5% (40) and 2 subjects contrast sensitivity had 5% in PCAG. 3 subjects contrast sensitivity had 1.25% (80%), 3 subjects contrast sensitivity had 2.5% (40) and 2 subjects contrast sensitivity had 5% in ACG. 1 subject contrast sensitivity had 1.25% (80%), 1 subject contrast sensitivity had 2.5% (40) and 1 subject contrast sensitivity had 5% in SG (Figure 4 Contrast Sensitivity with glasses in different types of Glaucoma).

Discussion

In this current study total about sixty patients attended the glaucoma clinic during the data collection to check visual acuity as well as contrast sensitivity test of each patient with and without glasses.

Similarly, the visual field measurement and optic disc evaluation are the principal methods for confirming the presence and progression of glaucoma and psychophysical tests to examine the function of specific parts of the visual pathway are also useful for monitoring glaucomatous changes. The decline in spatial contrast sensitivity in patients with glaucoma has been documented in different tests.

Figure 2: Distribution of Gender.

Figure 3: Different types of Glaucoma.

Figure 4: Contrast Sensitivity with glasses in different types of Glaucoma.

A test Lea contrast for quickly measuring low contrast visual acuity at 25%, 10%, 5%, 2.5% and 1.25% contrast by measuring the distance at which the symbols are seen. 10M symbols correspond to visual acuity 0.10 at 1 meter; 0.05 at 0.5 meters and 0.3 at 0.3 meters. Visual acuity values are thus easy to calculate and this test includes a table for conversion to snellen equaling VA values. There are 6 pages and response key available, lea contrast compare to Peli-Robson chart test produces reliable and reproducible results. The Peli-Robson chart tests the spatial frequency of 1 cpd at a distance of 1 meter. Patients with ocular hypertension and glaucoma demonstrate contrast sensitivity losses at spatial frequencies between 0.25 and 8 cpd.

Although, in current study decrease the contrast sensitivity with glasses in glaucomatous patients had maximum 1.25% contrast sensitivity of high percentage of patients compare to Maria, *et al.* 2016 study's report that contrast sensitivity more affected than high-contrast visual acuity in glaucoma patients and previous studies did not provide enough evidence to support the use of contrast sensitivity for the early detection of glaucoma, contrast sensitivity correlates with the perimeter deviation and we believe that contrast sensitivity in conjunction with visual field testing would be a promising method of detecting functional changes in glaucoma patients, even those with good visual acuity.

Onal, *et al.* 2008, to investigate spatial-contrast sensitivity (CS) assessment as a tool for diagnosis of early glaucoma in patients with good visual acuity. The result was shown that the Contrast sensitivity scores were significantly lower at all spatial frequencies for the glaucoma patients than for the control subjects to compare with current study Visual Acuity with Glasses 46 (76.7WQ%) patients had 6/6 to 6/12, 11 (81.3%) patients had 6/18 to 6/36 and 3 (5%) patients had 6/60. And if we compare contrast sensitivity between both studies, the sensitivity of CS measurements was generally around 50%. Specificity ranged between 68 and 100%. FACT CS scores of less than 22 at 12 cpd spatial frequency provided sensitivity and specificity values concomitantly exceeding 60% to Contrast Sensitivity with glasses 30 (50%) patients had 1.25% (80%). 21 patients had 2.50% (40%), 9 patients had 5% (20).

Contrast Sensitivity is high percentage in POAG approximately 33 patients with decrease contrast sensitivity about 15 subjects had 1.25% (80%), 13 subjects had 2.5% (40) and 5 subjects had

5%, than PCAG approximately 11 subjects had 1.25% (80%), 4 subjects had 2.5% (40), and 2 subjects had 5% in PCAG after than in ACG approximately 3 subjects had 1.25% (80%), 3 subjects had 2.5% (40) and 2 subjects had 5% in ACG and low percentage in SG approximately 1 subject had 1.25% (80%), 1 subject had 2.5% (40), and 1 subject had 5% but there was no any evidence of current previous studies about the types of glaucoma effect the contrast sensitivity.

Conclusion

There is reduction in contrast visual acuity with and without refraction most of patients had variation at level of contrast visual acuity in primary open angle glaucoma.

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