

Screening for glaucoma suspects in a sample of Egyptian population coming for general checkup

Purpose and background

To detect the percentage of glaucoma suspects in a sample of Egyptians attending the general check up unit at a private hospital based on the presence of certain clinical criteria and imaging risk factors.

Introduction

Screening for undiagnosed and potentially treatable glaucoma is important, to overcome the personal, social and economic burden of blindness.¹ With primary open angle glaucoma (POAG) representing a leading cause of irreversible blindness worldwide,² and because it is largely an asymptomatic condition,³ a tool for screening for this disease should be implemented in healthcare systems of populations with risk factors for glaucoma.¹ POAG is characterized by glaucomatous optic nerve damage and visual field loss in the presence of an open anterior chamber angle. The disease usually has an adult onset, is usually bilateral, and has no specific symptoms except late when patients start losing their central vision.³ Recently, along with the clinical disc signs of glaucoma, Optical coherence tomography (OCT) imaging of the optic nerve head (retinal nerve fiber layer thickness and ganglion cell complex parameters) as well as central corneal thickness have been introduced as factors which can support or defer our diagnosis of glaucoma.⁴ A disc with a wide cup to disc ratio but normal retinal nerve fiber layer (RNFL) parameters on OCT is unlikely to be glaucomatous. A patient with a relatively thick cornea may give a false high intraocular pressure (Goldmann) reading, and thus is unlikely to be a suspect. The issue of who to consider a glaucoma suspect and which patient requires follow up is thus of crucial clinical importance. This article reports the results of a study done to screen for glaucoma suspects within a sample population of Egyptians at initial eye screening.

Subjects and methods

A cross sectional case series of 150 Egyptian patients (300 eyes) of age (30-70) were included in the study. The study included 49 females and 101 males. Patients were recruited from the check up clinic of a private hospital located in Cairo serving mainly middle to high socioeconomic standard subjects. The study conformed with the ethical standards stated in the declaration of Helsinki.⁵ An informed consent was obtained from all participating subjects. Patients were examined for UCVA, BCVA, Goldmann applanation tonometry (GAT) IOP in mmHg, C/D ratio by slit lamp biomicroscopy for best detail, and refraction (recording cases of simple myopia up to -4D). Gonioscopy was done to confirm an open angle and to exclude patients with narrow anterior chamber angles.

Spectral Domain (SD) OCT (Optovue, Fremont, California, USA) on the optic nerve head was done for all cases with a cup to disc ratio of more than 0.4 (to examine the RNFL parameters, ganglion cell complex parameters and cup to disc area ratio). It was also done for all cases found to be glaucoma suspects according to the other parameters which will be mentioned. The patient's age, history of diabetes, family history of POAG especially in siblings/parents was meticulously recorded for all included subjects.

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The presence of any of the following criteria was considered as a glaucoma suspect:

Patients with ocular hypertension (OHT) with an IOP ≥ 25 mmHg but no other finding, an asymmetry in IOP between the two eyes of ≥ 4 mmHg, an IOP of ≥ 22 mmHg with at least one of the other risk factors (family history of POAG, diabetes, simple myopia and or C/D ratio of 0.4 or more), and patients with a normal IOP and 2 or more of the other risk factors. Patients marked as glaucoma suspects were further assessed by gonioscopy (to exclude narrow anterior chamber angle), Humphrey automated standard perimetry, as well as optic nerve head OCT to confirm specific functional/structural changes of glaucoma. Those with confirmed glaucomatous field defects (specific defects like arcuate scotomas, nasal steps and enlarged blind spots) as well as significantly decreased OCT RNFL and GCC parameters (significant RNFL thinning, reversed ISNT rule, flattened RNFL double humped curve, significantly decreased GCC parameters like increased focal or global loss volume percentage, and decreased rim area) were considered to have POAG after confirming an open angle by gonioscopy.

Statistical analysis was done using Chi Square tests for cross tabulation. A p value of ≤ 0.05 was considered significant. One way ANOVA test was done to compare mean IOP between different age groups, and Post Hoc test was done for multiple comparisons.

Results

Demographic data of included patients:

- i. Of the 150 patients, 67% were males, and 32% were females. 26.7% of the screened subjects were diabetics, 56% had simple myopia up to -4D, 12.7% had a positive family history of glaucoma, and 12.7% had a C/D ratio of > 0.4 .
- ii. 18% fell in the group of 30-39years, 30.7% in the age group of 40-49, 34.7% in the age group of 50-59 and 16.7% in the group of 60-70years.
- iii. Age group to suspect relationship was statistically significant $p=0.048$ with 20% of glaucoma suspects falling in the 60-70 age group, and 26.9% in the 50-59yrs age group, as opposed to 7.4% of suspects falling in the 30-39 age group, and 8.7% in the 40-49 age group.

- iv. Correlation between sex, DM, and the presence of simple myopia to glaucoma suspect were all statistically non significant.
- v. A positive family history to suspect relationship was found to be statistically significant $p=0.02$ (36.8% of subjects with a positive family history of glaucoma as opposed to 13.7% of subjects without a family history of glaucoma were found to be suspects).
- vi. C/D ratio and mean IOP to suspect relationship was found to be statistically highly significant ($p<0.001$). 88.9% of subjects with a C/D ratio of ≥ 0.5 as opposed to 40% of subjects with a C/D ratio of 0.3–0.5 and 9.9% of subjects with a normal C/D ratio were considered glaucoma suspects.
- vii. A statistically highly significant difference was found between mean IOP between subjects with a larger C/D ratio to those with a normal C/D ratio ($p<0.001$), as well as between suspects (+/- 19mmHg) and non suspects (+/- 13.5mmHg) ($p<0.001$).
- viii. Despite a relatively higher mean IOP in diabetics than non diabetics (+/- 1.6 mmHg) the difference was not statistically significant. In a similar fashion, no statistically significant difference was found in mean IOP between the different age groups ($p=0.2$), males and females ($p=0.8$), myopes and non myopes ($p=0.6$), and patients with and without a family history of glaucoma ($p=0.3$).
- ix. The overall percentage of suspects from the total population was initially found to be 25 patients (16.6%) according to the criteria previously mentioned, of which 6 patients (24%) were confirmed to be glaucomatous by OCT and field examination. So the final true suspect percentage was 12.6% (19 subjects).
- x. The percentage of confirmed open angle glaucoma patients to the original population was found to be 4% (6 out of 150 subjects).

Discussion

In our study, a prevalence of 4% for POAG was found in our sample population which is close to the percentage found in white populations (0.3 – 4%) and Hispanics (2%) and much less than that found in dark populations (2.9 – 8.8 %) (6). Being mostly a population of Caucasians, the percentage obtained was acceptable when compared to other Caucasian populations. An elevated IOP, a positive family history of glaucoma, increasing age, and a high cup to disc ratio confirmed by OCT imaging of the optic nerve head were found to be all significant risk factors for developing POAG. The percentage of suspects to the original population in this sample was 12.6%. No association was found between the presence of diabetes or simple myopia and being a glaucoma suspect. In our study, an elevated IOP, a positive family history of glaucoma, increasing age and a large cup to disc ratio were all significant risk factors for POAG

development. This agrees with most studies done worldwide.^{6,7} All glaucoma suspects found in our study were advised to be regularly followed up for the possible development of glaucoma. A yearly field examination as well as measuring the IOP every 3months was advised. As high IOP remains to be the only controllable risk factor for the development of POAG. There is a slight limitation to our study. A sample bias leading to a slightly lower ratio of suspects to glaucoma patients could be possible. This came from the fact that the sample was taken from population already seeking a private hospital for a general check up. This might have accidentally excluded non ambulatory patients, severely ill, too old and too young patients who could not come to hospital, but who would have been calculated in other home reach screening programs.

Conclusion

Screening for glaucoma suspects is essential in Egyptians as a high percentage of suspects were found to be undiagnosed glaucoma patients.

Acknowledgements

None.

Conflict of interest

Author declares that there is no conflict of interest.

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