Association of risk factors with primary open angle glaucoma in adults over the age of 40

Arturo Gálvez-Rosas1, Aurelio Tirzo Serrano-Miranda2, Carlos Ridaura-Valencia2, Eva Elizabeth Mundo-Fernández3 and Everardo Barojas-Weber3

1Division of Neurosciences; 2Hospital Epidemiological Surveillance-Sociomedical Research Unit; 3Ophthalmology Department, Instituto Nacional de Rehabilitación, Ciudad de México, Mexico

Abstract

Objective: To determine the association of systemic diseases, as well as smoking and alcohol with primary open-angle glaucoma (POAG) in adults over 40 years age. Method: A revision of the records of patients older than 40 years aged who had been diagnosed with glaucoma, which were selected at the outpatient care dept. Information was obtained through the automated hospital information system, which included socio-demographic and clinical variables. Data base was created and was processed by SPSS V20 program. Results: 1,020 patient, 548 (53.7%) with a diagnosis of POAG, mean age of patients 73.2 ± 11.16 years, of which 193 (35.2%) were male and 355 (64.8%) female. A significant relationship was found between POAG and increasing age (p = 0.000), diabetes mellitus (p = 0.056) and hypertension (p = 0.098). While no relationship was found between POAG and cancer, smoking and alcohol intake was found. Conclusions: These results display the need of carrying out more specific studies of causal type to establish best possible partnerships and thus carry out prevention programs for early diagnosis.

KEY WORDS: Risk factor. Primary open-angle glaucoma. Epidemiologic study. Adults.

Introduction

Glaucoma is a complex and heterogeneous disease, characterized by progressive degeneration of retinal ganglion cells and their axons at specific regions1,2. Worldwide, it is the second cause of blindness, and it affects more than 70 million people3. Among the different types, primary open-angle glaucoma (POAG) is the most common4, which is a multifactorial condition5.6 for which triggering risk factors have been observed, such as family history7, old age8, increased intraocular pressure (IOP)9,10, type 1 or 2 diabetes mellitus (DM)11, arterial hypertension (AH)12, alcohol consumption13 and smoking14, among others.

In Mexico, only few studies have been carried out on the prevalence of glaucoma in different zones of the country, and they address only risk factors related to DM, AH and family history15,16. For example, the study conducted by Gilbert-Lucido et al.17 in Mexico City reported that POAG was related with a family history thereof in 15% of cases (p = 0.016), with the following figures being established for DM and AH: 22.7% (n = 110); p = 0.054) and 33.9% (n = 127), respectively17. Since there are no studies focused on risk factors for glaucoma in Mexico, we consider performing this type of studies in our population to be necessary in order to try to prevent the progression of this disease.

Method

Patients with newly-diagnosed glaucoma were enrolled via Mexico City’s Instituto Nacional de...
**Rehabilitación** (INR) ophthalmology department outpatient clinic within the 2010-2012 period. Information was obtained through the hospital automated information system, where the following patient data were collected: name, age, gender, family history, DM, AH, cancer, alcohol consumption and smoking. Ophthalmologic data included visual acuity, both eyes’ IOP, biomicroscopy, gonioscopy and fundoscopy. The patients were divided in two groups: with POAG and with other glaucomas (OG; primary angle-closure glaucoma, neovascular glaucoma, secondary pseudoexfoliative glaucoma, suspected glaucoma and other secondary glaucomas) according to diagnostic criteria by means of imaging and clinical studies. The groups were compared in terms of glaucoma, DM, AH, cancer, alcohol consumption and smoking. The procedures were conducted according to the Declaration of Helsinki and the study was approved by the INR research committee (registry number; 33/13).

Male and female gender patients, with an age ≥ 40 years, with clinical diagnosis of glaucoma established and confirmed by the INR ophthalmology department, with characteristics of damage to the optic disc due to its cup/disc ratio, with typical visual field loss and IOP measurement by means of applanation tonometry were included. Exclusion criteria were: patients without confirmed clinical diagnosis and with incomplete medical record.

Data were analyzed with the statistical package SPSS V.20, and descriptive statistics was performed by means of central tendency tests, and to assess for possible associations, the chi-square test, Student’s t-test and logistic regression analysis were used. The data epidemiological analysis Epidat V.4.1 program was used for the difference between proportions. A p-value < 0.05 was considered to be statistically significant.

### Results

A total of 1020 glaucoma-diagnosed patients were analyzed. The most common type of glaucoma was found to be POAG, with 548 cases (53.7%). As for gender, 193 were males (35.2%) and 355 were females (64.8%) (Table 1). Patients were divided in two groups: with POAG and with OG. Associations between POAG and age and other factors are shown in table 2. In this sense, there was association between POAG and old age (p = 0.000), DM (p = 0.056) and AH (0.098). On the other hand, no significant difference was found for POAG between males and females (p = 0.192) (Table 3).

### Discussion

Glaucoma is an irreversible disease that has no symptoms until advanced stages, and is one of the leading causes of blindness in the world, which affects the population older than 40 years and limits their daily activities.

In this investigation, where risk factors for POAG were assessed, the first factor to be analyzed was age, and the logistic regression analysis demonstrated that old age is a risk factor associated with POAG and that, with each decade of life, the percentage of glaucoma increases progressively. There are several reports that confirm that the prevalence of glaucoma...
increases with age. An additional finding also revealed by this study is that, for each year of age, the probability of having POAG increases 4.6-fold, in comparison with the OG groups.

The Blue Mountains Eyes trial reported a statistically significant relationship between POAG, DM and AH. In our research, a slight relationship between POAG, DM and AH was found, and no significant association was found with cancer. Many studies have found a positive relationship between POAG, DM and AH, but many others have failed to find any relationship. In conclusion, the relationship between POAG and both vascular conditions is still controversial, and carrying out other studies about causality is necessary.

Among personal habits, alcohol consumption and smoking were investigated, with no association with POAG being found. As with systemic diseases, there are studies reporting a positive association between POAG, smoking and alcohol consumption, but a similar number of other studies don’t find any relationship, which is highly arguable.

Finally, an average value of 17.1 mmHg was found for both eyes’ IOP, which does not correspond to a risk factor, a facts that is reported in several studies.
In this study, some factors were not analyzed, including myopia, corneal thickness, optical disc hemorrhage, migraine, etc. On the other hand, vascular pathologies were dichotomously investigated, without taking blood and pressure values into account. One of the variables with the highest relevance in glaucoma is IOP, but so far there is no consensus on measurement position and timing, or on fluctuations; in this study, the value was only taken at diagnosis.

Conclusions

Given that glaucoma in older adults is a multifactorial condition, continuing with this type of studies is necessary in order to look for other risk factors that allow for the course of disease to be modified and being able to opportunistically establish an adequate diagnosis, and thus prevent people from experiencing blindness at early ages.

Conflicts of interests

None of the authors have any conflicts of interests relevant to this publication.

References