

Knowledge about primary open angle glaucoma among medical students

Nível de conhecimento sobre glaucoma primário de ângulo aberto entre os estudantes de medicina

Saulo Costa Martins¹, Marcos Henrique Mendes¹, Ricardo Augusto Paletta Guedes², Vanessa Maria Paletta Guedes³, Alfredo Chaoubah⁴

ABSTRACT

Objective: To assess the knowledge of primary open-angle glaucoma among medical students from Federal University of Juiz de Fora. **Methods:** In this cross sectional study, we conducted a survey among students attending the last two years of Medical School. The questionnaire consisted in 11 questions about epidemiology, risk factors, symptoms, diagnosis, treatment and primary open-angle glaucoma (POAG) consequences. The students were also asked if they considered their knowledge about POAG sufficient. Students' characteristics (age, sex and intended area of specialization) were identified. **Results:** Women comprised 52.9% of the students. Only 22.5% identified POAG as having a genetic origin. Almost half of them (46.1%) did not know that POAG is asymptomatic and 1 out of 3 students did not know that glaucoma blindness is irreversible. The great majority (91.2%) correctly identified tonometry as an important tool for diagnosis and that glaucoma can be treated through medications (70.6%) or surgery (71.6%). However, few students identified fundoscopy (35.3%) and perimetry (28.7%) as important tools for glaucoma assessment. Almost everyone (95.1%) considered their knowledge insufficient. **Conclusion:** The majority of the participants believe that their knowledge of POAG is insufficient. This gap can lead to some serious consequences from both individual (blindness) and collective (negative impact in health system and society) perspectives.

Keywords: Glaucoma, open-angle/diagnosis; Glaucoma, open-angle/prevention & control; Ophthalmology/education; Medical, students; Education, medical

RESUMO

Objetivo: Avaliar o conhecimento dos alunos de graduação do curso de Medicina da Universidade Federal de Juiz de Fora em relação ao glaucoma primário de ângulo aberto. **Métodos:** Neste estudo transversal, aplicou-se aos alunos dos 5º e 6º ano um questionário contendo 11 questões referentes a epidemiologia, fatores de risco, sintomas, diagnóstico, tratamento, consequências do glaucoma e por último se consideram os conhecimentos adquiridos na universidade como suficientes. Características dos alunos (idade, sexo, especialidade pretendida) foram identificadas. **Resultados:** Entre os estudantes, 52,9% eram mulheres. A origem genética da doença foi identificada por 22,5%. Quase a metade (46,1%) não sabia que o glaucoma na maioria das vezes é assintomático. Aproximadamente 1 em cada 3 alunos não sabia que a cegueira do glaucoma era irreversível. A grande maioria (91,2%) identificou corretamente que a tonometria era um exame importante na avaliação do glaucoma e que o tratamento poderia ser clínico (70,6%) ou cirúrgico (71,6%). Porém, poucos alunos deram a real importância para os exames de fundoscopia (35,3%) e campimetria (28,7%). Quase a totalidade (95,1%) dos entrevistados considerou o próprio conhecimento como insuficiente. **Conclusão:** A maioria dos entrevistados acha que o conhecimento sobre glaucoma primário de ângulo aberto adquirido na graduação é insuficiente. Tal desconhecimento pode levar a oportunidades de diagnóstico perdidas e gerar consequências graves tanto do ponto de vista individual (cegueira) quanto do ponto de vista coletivo (impacto para o sistema de saúde e sociedade).

Descritores: Glaucoma de ângulo aberto/diagnóstico; Glaucoma de ângulo aberto/prevenção & controle; Oftalmologia/educação; Estudantes de Medicina; Educação em graduação de Medicina

¹ Medical Student, Medical School of the Federal University of Juiz de Fora (UFJF), Juiz de Fora/MG, Brazil.

² Ophthalmologist, Researcher at the Federal University of Juiz de Fora (UFJF), Juiz de Fora/MG, Brazil.

³ Ophthalmologist, Head of the Ophthalmology Department, Santa Casa de Misericórdia Hospital, Juiz de Fora; Researcher at the Federal University of Juiz de Fora (UFJF), Juiz de Fora/MG, Brazil.

⁴ Professor and Researcher at the Department of Statistics, Federal University of Juiz de Fora (UFJF), Juiz de Fora/MG, Brazil

Work conducted at the Federal University of Juiz de Fora (UFJF), Juiz de Fora/MG, Brazil.

The authors declare no conflict of interest.

Received for publication 25/09/2012 - Accepted for publication 29/8/2014

INTRODUCTION

Glaucoma is a chronic optic neuropathy with marked changes in the optic disc and the retinal nerve fibre layer, leading to significant visual field changes⁽¹⁻³⁾.

The disease is classified according to the mechanisms of obstruction of aqueous humour drainage as primary open angle glaucoma (POAG), primary angle closure glaucoma (PACG), and secondary glaucoma⁽⁴⁾.

According to the World Health Organization, glaucoma is the second leading cause of blindness in the world (12.3%) after cataract (47.8%). Studies in Brazil have found a prevalence of 3.4% for glaucoma, with POAG being the most prevalent type (2.4%)⁽¹⁾. It is important to note that cataract blindness can be reversed with surgical treatment, while glaucoma blindness is irreversible⁽⁵⁾.

Several predictive and prognostic risk factors have been described for POAG, such as increased intraocular pressure (IOP), family and genetic history, ethnic origin, myopia, and diabetes mellitus^(1,2). Of these, IOP is more consistently associated with glaucoma and is the most important factor, as it is the only one that can be acted upon effectively⁽¹⁻³⁾.

The disease is asymptomatic in its early stages, and its insidious onset often leads to late diagnosis⁽¹⁻³⁾. Thus, it is estimated that over half of glaucoma cases remain undiagnosed and untreated^(6,7).

Given that ophthalmic consultations represent 9% of all medical visits and that ophthalmologists are unevenly distributed throughout the country, it is clear that general practitioners have an important role in the prevention of blindness^(8,9).

In this context, medical education should train medical students to diagnose, refer patients appropriately, and even treat some of the most prevalent and disabling eye diseases, including glaucoma^(5,10,11). For POAG in particular, students should learn to identify its key risk factors, refer patients for glaucoma testing, and stress the importance of prevention, especially in higher-risk cases. Medical education should also stress the need to promote adherence to continuous treatment, which contributes to reducing disease progression⁽⁵⁾.

However, studies have shown that the basic knowledge of ophthalmology among undergraduate students is insufficient, suggesting the need to reassess the way ophthalmology is taught in medical school^(8,10).

It is thus important to study the knowledge of POAG among students who will soon become general practitioners, offer them appropriate training, and contribute to discussions on curriculum reform.

The aim of this study was to assess the level of knowledge of POAG among students in the last two years of Medical School in the Federal University of Juiz de Fora, Brazil.

METHODS

A cross-sectional observational study was conducted from August to September 2012. The sample included medical students of the Federal University of Juiz de Fora (UFJF), and a sampling error of $\pm 4.5\%$ was considered. The study subjects were approached while in the university, being randomly selected and invited to answer the questionnaire voluntarily, free of any charge.

Inclusion criteria were: medical students over 18 years of age attending the 9th, 10th, 11th or 12th semesters and immediately available to answer the questionnaire. Students in other semesters, who were not immediately available to answer the questionnaire, who refused to participate, who did not answer the questionnaire in full, or who did not provide their Free and Informed Consent were excluded from the study.

Participants were approached in a standardised manner by a trained researcher, having previously provided their free and informed consent to answer the questionnaire individually and voluntarily. Two medical students were responsible for data collection. Training on data collection was done during a pilot study conducted on 16 subjects in order to test the instrument, identify difficulties in understanding the questions, make appropriate changes to the questionnaire, and organise the field work.

The data collection instrument was a structured questionnaire (Appendix 1) including 11 questions on the risk factors, symptoms, diagnosis, treatment, and consequences of glaucoma, aimed at testing the knowledge of subjects about the condition. Student characteristics (age, sex, and the medical specialty they intended to pursue) were collected.

SPSS software (SPSS Inc., Chicago, USA) was used to prepare the database and for statistical analysis. Results were analysed using a confidence interval of 95% and a p-value under 0.05.

The study followed the guidelines on human research provided for in Resolution 196/96 of the Brazilian National Health Council/Ministry of Health. The study was submitted to the Research Ethics Committee of Santa Casa de Misericórdia Hospital in Juiz de Fora, having been approved under Opinion 73374/2012.

RESULTS

In total, 102 students were invited and agreed to participate in the study. They were distributed as follows: 25 in the 9th semester, 27 in the 10th semester, 25 in the 11th semester, and 25 in the 12th semester. The mean age (\pm standard deviation) of respondents was 24.9 (± 2.2) years. Most respondents (52.9%) were female.

Only 2.9% of respondents intended to specialise in ophthalmology, while 80.4% intended to pursue another medical specialty and 16.7% had not yet chosen a specialty.

A family history of glaucoma was found in 15.7% of respondents. Approximately 7% were unaware of glaucoma cases in their family, while most respondents (76.5%) stated there were no cases of the disease in their family.

Figure 1 shows the responses of students when asked about the leading cause of irreversible blindness worldwide. Most students (59.8%) gave the correct answer, glaucoma. However, 25.5% of respondents chose diabetic retinopathy. All students intending to specialise in ophthalmology answered correctly, but among the other students (those intending to pursue another specialisation, or still undecided), 26.3% thought the correct answer was diabetic retinopathy.

Glaucoma blindness was classified as irreversible by 64.7% of respondents, but 17.6% thought it was reversible with some treatment, and a similar number did not know the answer, i.e. 35.3% of students (approximately 1 in 3) did not know that

glaucoma blindness is irreversible. There were no significant differences between answers when respondents were grouped based on their intended medical speciality ($p = 0.964$, chi-squared test), study semester ($p = 0.076$, chi-squared test), or a family history of glaucoma ($p = 0.122$, chi-squared test).

POAG was identified as the most common type of glaucoma by 58.8%, but 19.6% (1 in 5) did not know what the answer. Again, no differences were found between groups based on intended medical speciality ($p = 0.387$, chi-squared test), study semester ($p = 0.045$, chi-squared test), or a family history of glaucoma ($p = 0.782$, chi-squared test).

Most students (67.6%) wrongly thought IOP was a causal factor of POAG. Only 22.5% correctly identified genetic factors as a cause of POAG, and 16.7% did not know the answer. There were no differences between groups based on intended medical speciality, study semester, or a family history of glaucoma.

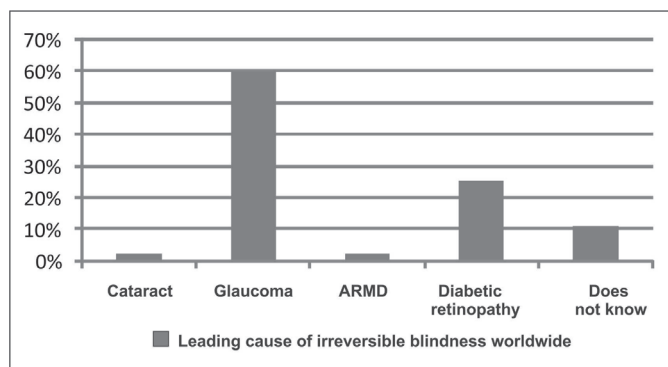


Figure 1: Leading cause of irreversible blindness, according to respondents.

Figure 2 shows the variables identified by the respondents as risk factors for POAG. High IOP was mentioned by 88.2% of students, but many other important factors were missed by most students, including: hypertension (49%); diabetes mellitus (26.5%); myopia (4.9%); ocular trauma (15.7%); corticosteroids (43.1%); and black race (15.7%). A family history of glaucoma was correctly identified as a risk factor by 72.5% of respondents. There were no differences between groups based on intended medical speciality, study semester, or a family history of glaucoma.

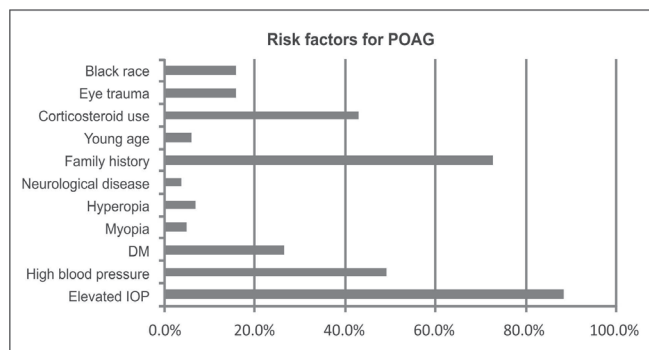


Figure 2: Risk factors of primary open-angle glaucoma, according to respondents.

In total, 15.7% of respondents stated they did not know what the signs and symptoms of POAG were. Only 53.9% correctly replied that POAG was asymptomatic. Several signs

and symptoms were mentioned by respondents as part of the clinical picture of POAG: sudden loss of central vision (24.5%); eye pain (33.3%); red eye (9.8%); tearing (11.8%); periocular headache (24.5%); frontal headache (5.9%); photophobia (11.8%). There were no differences between groups based on intended medical speciality, study semester, or a family history of glaucoma.

The vast majority of respondents (91.2%) correctly replied that tonometry (IOP measurement) is an important test in the assessment of glaucoma. However, only 35.3% considered fundus examination and 28.7% considered perimetry as important tests for glaucoma. There were no differences between groups based on intended medical speciality, study semester, or a family history of glaucoma.

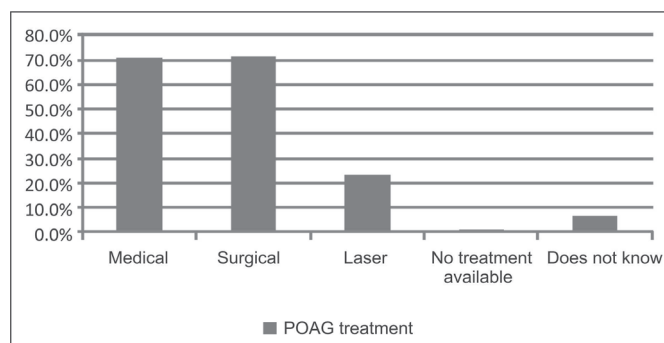


Figure 3: Possibilities of treatment of the primary open-angle glaucoma according to respondents.

Figure 3 shows the distribution of answers regarding the treatment of glaucoma. Most respondents correctly replied that glaucoma can be treated medically (70.6%) and surgically (71.6%). Laser therapy, however, was only mentioned as a treatment alternative by 23.5% of respondents. There were no differences between groups based on intended medical speciality, study semester, or a family history of glaucoma.

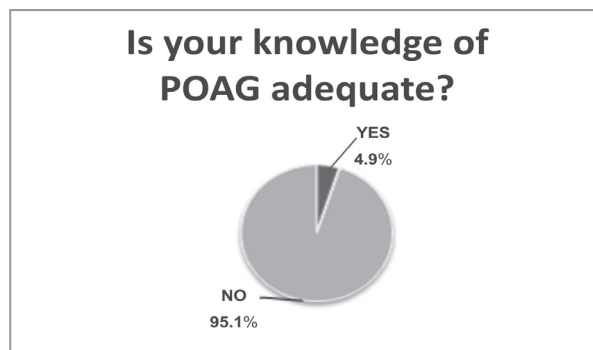


Figure 4: Proportion of respondents who thought they had acquired sufficient knowledge on primary open-angle glaucoma during medical school.

Figure 4 shows the proportion of respondents who considered they had learned enough about POAG during their medical studies.

DISCUSSION

This study found that students in the last two years of medical school at the Federal University of Juiz de Fora feel

unable to identify the main epidemiological and clinical characteristics and the therapeutic possibilities for POAG. This was confirmed by their responses to the standardised questionnaire used in this study.

General clinical knowledge is key to increasing the number of early POAG diagnoses and therefore the number of patients who receive treatment. Furthermore, misconceptions and knowledge gaps are important barriers to preventive eye health actions^(5,12). Assessing the knowledge of medical students in the last years of medical school is a tool that can be used to prompt reflections on the knowledge of physicians, as many of those students will soon be managing patients⁽⁵⁾.

This assessment is particularly relevant because an increase in the prevalence of glaucoma is expected worldwide as a result of population ageing and insufficient ophthalmic resources for effective intervention against the condition⁽⁵⁾.

In our sample, most respondents correctly ranked glaucoma as the most prevalent cause of irreversible blindness worldwide, although approximately one quarter of them thought the correct answer was diabetic retinopathy. This could suggest that preventive campaigns led by organisations such as the American Diabetes Association and the Brazilian Diabetes Society raise more awareness than glaucoma campaigns. This is evidenced by the continuous, broad-scope nature of programmes like the Hiperdia (Hypertension and Diabetes) campaign and the National Diabetic Retinopathy Campaign^(13,14) and the lack of investment and programme continuity in actions such as the Glaucoma Campaign by the Brazilian Ministry of Health^(5,14). Furthermore, there is a greater focus on diabetes during medical education because it involves more subjects in the medical curriculum, while glaucoma is only studied during the ophthalmology course.

As regards the classification of glaucoma, most students correctly identified POAG as the most common type of glaucoma, but it is noteworthy that 1 in 5 respondents did not know what the most common type of glaucoma was.

One of the most common sources of error in the assessment of glaucoma is to consider elevated intraocular pressure as a causal factor. High IOP is only a risk factor⁽¹⁾, and there are cases of ocular hypertension that never progress to glaucoma. Likewise, there are cases of glaucoma with normal IOP levels⁽¹⁾. When asked about the causal factor of POAG, most respondents incorrectly answered that an elevated IOP was a causal factor. Only 22.5% correctly mentioned genetic factors as the cause of POAG.

On the other hand, and contradictorily (a causal factor cannot be a risk factor at the same time!), most respondents correctly identified elevated IOP as an important risk factor for glaucoma. A family history of glaucoma was correctly identified as a risk factor by 72.5% of respondents. POAG is a multifactorial disease, and it is essential that physicians know its risk factors⁽¹⁾. The subjects of this study were medical students who will soon become medical doctors, a large part of which will probably work in Primary Health Care. Since primary care is the gateway to a network of services providing universal access, it is responsible for coordinating care in the network in all of its dimensions⁽⁵⁾. The results of this study, however, indicate a gap in the functions of primary care with regard to eye health, i.e. the need to recognise risk factors in order to prevent and control certain causes of preventable blindness and visual impairment⁽⁵⁾.

Recognising the clinical presentation of glaucoma is key to preventing and controlling the condition⁽⁵⁾. Glaucoma is a neurodegenerative disorder characterised by insidious and progressive retinal ganglion cell degeneration⁽³⁾, and it is asymptomatic in its early stages^(1,2,5). Thus, physicians should know that patients with suspected or confirmed glaucoma will not present with exuberant symptoms or directly complaining of ocular involvement. This assessment of the knowledge of the clinical features of POAG among medical students found that 15.7% did not know the signs and symptoms of POAG, and just over half of respondents (53.9%) correctly stated that POAG is most often asymptomatic.

When asked about the key tests for diagnosing POAG, the vast majority of respondents correctly identified tonometry as an important test. However, important tests such as fundus examination and perimetry and were only mentioned by a few respondents. This study indicates a serious deficiency in medical education, as glaucoma is a disease of the optic nerve (optic neuropathy) whose evaluation (diagnosis and management) can only be done through adequate and reliable fundus examination and perimetry⁽¹⁾.

Current recommendations for the treatment of POAG include lowering the IOP, which remains the only demonstrated treatable risk factor for the disease⁽³⁾. This can be done through medical, surgical and laser treatment. In our study, most respondents correctly stated that glaucoma can be treated medically and surgically. Laser treatment is also an alternative, but it was only mentioned by 23.5% of participants.

In all questions there were no differences between groups based on intended medical speciality, study semester, or a family history of glaucoma. This shows that misconceptions regarding important factors related to glaucoma are not limited to a particular class in medical school. It also suggests that patients with glaucoma and their families do not receive proper guidance and have insufficient knowledge about the condition.

In this study, almost all participants felt their knowledge of glaucoma was insufficient. A similar study conducted with students in the last semesters of medical schools in the state of São Paulo found significant gaps in the knowledge of ophthalmology of future general practitioners⁽¹⁵⁾, while a study conducted at the Federal University of Piauí in 2011 found that 99.1% of students felt insecure about treating eye disorders⁽¹⁰⁾. The results of our work are thus in line with those of studies conducted in other medical schools, showing that students recognise the gaps in their ophthalmology training and consequently feel unprepared to manage patients with eye complaints. This suggests the need to change how the subject is taught — ophthalmology courses should be targeted at primary care⁽¹⁶⁾, with a stronger focus on prevention and early diagnosis.

CONCLUSION

The results of this study show that most respondents think the knowledge of glaucoma they acquired during medical school was insufficient. This gap creates major misconceptions about key issues such as the aetiology, risk factors, clinical picture, and treatment of glaucoma, which can lead to missed diagnoses with serious individual (blindness) and collective (impact on the healthcare system and society) consequences.

Appendix 1

Questionnaire applied to medical students.

Age: _____ Sex: _____ Semester: _____
 Intended specialization : _____

Do you have any family members with glaucoma?

- Yes
- No
- I don't know

The most prevalent cause of irreversible blindness worldwide is:

- Catarat
- Glaucoma
- Age-related macular degeneration
- Diabetic retinopathy
- I don't know

Glaucoma can lead to blindness. Glaucoma blindness is:

- Reversible with any type of treatment (medical or surgical)
- Reversible only through surgical treatment
- Irreversible
- I don't know

The most common type of glaucoma is:

- Primary open angle glaucoma
- Primary narrow angle glaucoma
- Congenital glaucoma
- Secondary glaucoma
- I don't know

The **causes** of primary angle glaucoma include :

- Genetic factors
- Elevated intraocular pressure
- Infection
- I don't know

Please mark the main **risk factors** for primary open angle glaucoma (one or more):

- Elevated intraocular pressure
- High blood pressure
- Diabetes
- Neurological disease
- Young age
- Hiperopia
- Myopia
- Family history of glaucoma
- Eye trauma
- Corticosteroids
- Black race

Please mark the most common signs and symptoms of primary open angle glaucoma:

- Sudden loss of central vision
- Eye pain
- Red eye
- Tearing
- Periocular headache
- Frontal headache
- Photofobia
- The condition is mostly asymptomatic
- I don't know

The main diagnostic tests for glaucoma include:

- Visual acuity
- Fundus examination
- Measuring intraocular pressure (tonometry)
- Perimetry
- Magnetic resonance imaging
- I don't know

Glaucoma can be treated using (one or more):

- Eye drops
- Surgery
- Laser
- No treatment exists for the condition
- I don't know

Successful glaucoma treatment promotes:

- Cure
- Disease control, preventing blindness
- Symptomatic relief, although the condition inevitably leads to blindness
- No treatment exists for the condition
- I don't know

Do you think the knowledge of glaucoma you acquired during medical school is sufficient to recognise a possible case of primary open angle glaucoma?

- Yes
- No

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Corresponding author:

Saulo Costa Martins
Rua Doutor Constantino Paletta 10/401 - Centro
CEP: 36015-450, Juiz de Fora (MG), Brazil
E-mail: saulo.cmartins@gmail.com