IJMRP

International Journal of Medical Research Professionals

Original Article

Analysis of Prevalence of Glaucoma in a Known Population: An Institutional Based Study

Amol Chawhan
Assistant Professor, Department of Ophthalmology,
SVS Medical College, Mahabubnagar, Telangana, India.

Article History
Received: 01 Nov 2015
Revised: 17 Nov 2015
Accepted: 16 Dec 2015

***Correspondence to:**
Dr. Amol Chawhan,
Assistant Professor,
Department of Ophthalmology,
SVS Medical College,
Mahabubnagar,
Telangana, India.

ABSTRACT

Background: Glaucoma is the largest cause of bilateral blindness, second only to the cataract, however, the disability caused by glaucoma is irreversible. Prevalence data for glaucoma in the Indian subcontinent are relatively scarce. Present study was conducted to determine the prevalence of glaucoma in known population. **Materials & Methods:** A total of 250 individuals aged between 40 and 60 years were enrolled. The prevalence of glaucoma was calculated as a percentage with 95% confidence intervals (CI). Data analysis was performed using SPSS software. **Results:** The prevalence of glaucoma was 0.5% among individuals aged 40–45, and it rose to 2.48% in those aged 56–60. There was a significant association between aging and the likelihood of developing glaucoma.

Conclusion: At advanced ages, there was a notably high prevalence of glaucoma.

KEYWORDS: Prevalence, Glaucoma, Age.

INTRODUCTION

Glaucoma is the leading cause of global blindness second to cataracts. It was responsible for 8% of cases of blindness in 2010.[1] Including refractive errors, glaucoma is one of the top 3 main causes of visual impairment around the world.[1] In some developed countries, increasing rates of cataract surgery and treatment have made glaucoma the leading cause of visual impairment and blindness. Glaucoma is a major public health problem, causing visual impairment which hampers day to day work.[2] Glaucoma is the largest cause of bilateral blindness, second only to the cataract, however, the disability caused by glaucoma is irreversible. It is a 'silent killer' as most of the time, it is asymptomatic up to the very advanced stage and at the time of presentation to the ophthalmologist, the visual loss is often irrecoverable. [3] The World Health Organization recommended to its member countries to combat this public health problem through a program approach. [4] To plan the strategies, it is of utmost importance that the prevalence, distribution and risk factors of glaucoma are identified. Such a study has been a challenge due to variation in the definitions and diagnostic criteria for glaucoma. [4] There are a few population-based studies on glaucoma in India. [5,6] But none of them were conducted in central India.

Glaucoma is the second leading cause of blindness and a major source of morbidity and disability in the United States. Several population-based surveys have estimated the prevalence of glaucoma in general population samples in the United States, [7,8] but most surveys were restricted to specific regional or ethnic populations and were not generalizable to the overall US population. A 2004 meta-analysis pooled data from population-based studies and estimated the prevalence of primary open-angle glaucoma (POAG) in the US population 40 years and older at 1.86% (95% confidence interval, 1.75%–1.96%), [8] while another meta-analysis in 2014 estimated the prevalence to be 3.29 (95% confidence interval [CI], 1.83–5.53). [9] These estimates, however, were limited by sparse data on blacks and Latinos and lacked information on other minorities.

Prevalence data for glaucoma in the Indian subcontinent are relatively scarce. The Hyderabad study found a prevalence of primary open angle glaucoma (POAG) and primary angle closure glaucoma (PACG) of 1.6% and 0.7%, respectively. [10,11] In neighbouring Vellore, Tamil Nadu, the rates were 0.4% and 4.3%. [12] Both these studies recruited people aged 30 years and older, although the Vellore study only recruited subjects aged up to 60 years. A recent report from Maduri, also in Tamil Nadu, found a prevalence of POAG and PACG of 1.7% and 0.5% respectively in people aged 40 years and older (the corresponding figures from Hyderabad were 2.6% and 1.1%). [13] Hence, this study was conducted to determine the prevalence of glaucoma in known population.

MATERIALS & METHODS

Present study was conducted in Department of Ophthalmology, SVS Medical College, Mahabubnagar, Telangana, India. A total of 250 individuals aged between 40 and 60 years were enrolled. All participants underwent comprehensive eye examinations, optometry assessments, and imaging procedures. Stereoscopic optic disc photography, visual field evaluations, and intraocular pressure (IOP) measurements by ophthalmologists were conducted before pupil dilation.

The participants were divided into two groups as glaucomic and non-glaucomic. There were 50 participants in non-glaucoma group. The identification of glaucoma followed standardized criteria outlined by the International Society for Geographical and Epidemiological Ophthalmology (ISGEO). The prevalence of glaucoma was calculated as a percentage with 95% confidence intervals (CI). Data analysis was performed using SPSS software.

Table 1: Prevalence of glaucoma according to age and gender

Age groups (years)	N	Total (200) % (95%CI)	Female (n=100) %(95%CI)	Male (n=100) %(95%CI)
40-45	50	0.5	0.4	1.05
46-50	50	0.56	0.66	0.69
51-55	50	1.65	1.08	2.14
56-60	50	2.48	2.79	4.18

CI: Confidence intervals

Table 2: Mean biometric components and their 95% confidence intervals (CI) in both groups

Biometric components	Glaucoma	Non-glaucoma	P-value
AL (mm)	23.38	23.13	0.000 (Significant)
CCT (micron)	523	523	0.9
LT (mm)	4.39	4.26	0.2
CR (mm)	7.76	7.62	0.001 (Significant)

AL: Axial length; CCT: Central corneal thickness; LT: Lens thickness; CR: Radius of corneal curvature

RESULTS

The prevalence of glaucoma was 0.5% among individuals aged 40–45, and it rose to 2.48% in those aged 56–60. There was a significant association between aging and the likelihood of developing glaucoma (odds ratio = 1.05; 95% confidence interval: 1.03–1.15; P < 0.001). When comparing ocular biometric components in participants with and without glaucoma, it was observed that those with glaucoma had a longer mean axial length and a significantly higher mean radius of curvature.

DISCUSSION

Visual field loss in glaucoma is irreversible, so detection and treatment are essential to limit the progression of disease and delay additional optic nerve damage. However, nearly half of those with glaucoma in our study were unaware of their diagnosis, a percentage that has been relatively constant in recent decades despite advances in diagnostic techniques. [14-16] Compared to participants who self-reported a diagnosis of glaucoma, those with undiagnosed glaucoma tended to be younger and were less likely to have visual field defects or clear optic disc changes such as a focal notch or a disc hemorrhage. Older individuals were more likely to have had more visits to an eye doctor and therefore may have been more likely to have the disease detected during these exams. Hence, this study was conducted to determine the prevalence of glaucoma in known population.

In the present study, the prevalence of glaucoma was 0.5% among individuals aged 40–45, and it rose to 2.48% in those aged 56–60. There was a significant association between aging and the likelihood of developing glaucoma (odds ratio = 1.05; 95% confidence interval: 1.03–1.15; P < 0.001).

In the present study, when comparing ocular biometric components in participants with and without glaucoma, it was observed that those with glaucoma had a longer mean axial length and a significantly higher mean radius of curvature. Another study by Palimkar A et al, seven thousand four hundred and thirty-eight (87.3%) persons were examined. The age-sex standardized prevalence of glaucoma was 3.68% (95% CI 3.27 to 4.07). Gender variation of glaucoma was not significant. [OR = 1.13 (CI 95% 0.88 to 1.44)] Glaucoma varied significantly by age groups. (X2 = 48.2, degree of freedom = 3 P <0.001) Among those patients diagnosed to suffer from glaucoma, the proportion of open angle, closed angle, secondary glaucoma, ocular hypertension and glaucoma suspects was 13.1%, 21.2%, 21.2%, 14.5% and 30% respectively. Different types of visual disabilities were

associated with glaucoma. However, unilateral blindness in glaucoma was unusual. Twenty-five per cent of the glaucoma cases were detected for the first time during the survey. The prevalence of glaucoma was high and the angle closure type was more compared to the open angle glaucoma.[17] Nangia V et al, assessed the prevalence of glaucoma in rural Central India. The population-based Central India Eye and Medical Study is a population-based study performed in a rural region of Central India. The study included 4711 subjects (aged 30+ years). A detailed ophthalmic and medical examination was performed. Optic disc photographs were available for 4570 (97.0%) subjects. Glaucoma was detected in 122 subjects (51 unilateral) (2.67% (95%CI: 2.20, 3.14). Glaucoma prevalence for the age groups of 30–39yrs, 40–49yrs, 50–59yrs, 60–69yrs, 70–79yrs, and 80+ years was 0.54% (95%CI: 0.11, 0.98), 1.03% (95%CI: 0.49, 1.57), 1.40% (95%CI: 0.58, 2.23), 6.62% (95%CI: 4.92, 8.31), 8.71% (95%CI: 5.55, 11.75), and 14.3% (95%CI: 4.13, 24.4), respectively. In multivariable analysis, glaucoma was associated with higher age (P<0.001), lower body mass index (P=0.025), lower blood hemoglobin concentration (P=0.03), higher intraocular pressure (P<0.001), disc hemorrhages (P<0.001), higher prevalence of myopic retinopathy (P<0.001), lower level of education (P=0.03), longer axial length (P<0.001), thinner retinal nerve fiber layer (P<0.001), higher vertical cup/disc diameter ratio (P<0.001), and narrow anterior chamber angle (P=0.02). Ratio of open-angle glaucoma to angle-closure glaucoma was 7.7:1 (1.93% (95%CI: 1.64, 2.22) to 0.24% (95%CI: 0.14, 0.34)). Using the ISGEO criteria, glaucoma prevalence was 2.8% (95%CI: 2.3, 3.3) with a less clear association with older age. Glaucoma prevalence in remote rural Central India is comparable to other regions. Associated factors were older age, lower body mass index, lower blood concentration of hemoglobin, lower level of education, higher intraocular pressure, disc hemorrhage, myopic retinopathy, and longer axial length. The ratio of open-angle glaucoma to angle-closure glaucoma was about 8:1.[18] Rahman MM et al, determined the prevalence of glaucoma of Dhaka, Bangladesh. A multistage, stratified, clustered sample was drawn from Dhaka Division, Bangladesh, using systematic sampling to identify individual subjects aged 35 years and older. Examination of all subjects included Snellen visual acuity, slit lamp examination (including gonioscopy and applanation tonometry) and a stereoscopic assessment of the vertical cup: disc ratio (CDR). In selected subjects, a threshold visual field examination was performed. Glaucoma was diagnosed on the basis of statistical abnormality of the vertical CDR combined with an abnormal visual field test, or in subjects with advanced glaucoma who could not complete field testing, a grossly abnormal CDR. If it was not possible to examine the optic discs and the subject was blind, glaucoma was diagnosed on the basis of a raised intraocular pressure. Of 3562 eligible subjects, 2347 were examined (66%). Among people aged 40 years and older, the prevalence of definite glaucoma was 2.1% (95% confidence interval: 1.5 to 2.9; 39 people). The prevalence of definite and probable glaucoma was 3.1% (95% CI: 2.4 to 4.0; 58 people) in subjects of the same age. Primary open angle glaucoma was the most common form of glaucoma, accounting for 75% of the total. Among cases of blindness not attributable to refractive error, 5% were caused by glaucoma. Glaucoma prevalence was higher in men than women but did not show the typical increase with age. Glaucoma prevalence is relatively high in Bangladesh, although it accounts for only a small proportion of blindness in the community. It is estimated that there are approximately 586 000 people 40 years and older with definite or probable glaucoma in Bangladesh.[19] Quigley HAet al, estimated the number of people with open angle (OAG) and angle closure glaucoma (ACG) in 2010 and 2020. A review of published data with use of prevalence models. Data from population-based studies of age specific prevalence of OAG and ACG that satisfied standard definitions were used to construct prevalence models for OAG and ACG by age, sex, and ethnicity, weighting data proportional to sample size of each study. Models were combined with UN world population projections for 2010 and 2020 to derive the estimated number with glaucoma. There were 60.5 million people with OAG and ACG in 2010, increasing to 79.6 million by 2020, and of these, 74% will have OAG. Women comprised 55% of OAG, 70% of ACG, and 59% of all glaucoma in 2010. Asians represent 47% of those with glaucoma and 87% of those with ACG. Bilateral blindness was present in 4.5 million people with OAG and 3.9 million people with ACG in 2010, rising to 5.9 and 5.3 million people in 2020, respectively. Glaucoma is the second leading cause of blindness worldwide, disproportionately affecting women and Asians. [20]

CONCLUSION

At advanced ages, there was a notably high prevalence of glaucoma. However, it is crucial to highlight specific ocular biometric factors, such as axial length and corneal radius of curvature, as significant risk factors for glaucoma even in younger age groups.

REFERENCES

1. Pascolini D., Mariotti S.P. Global estimates of visual impairment: 2010. Br J Ophthalmol. 2012;96(5):614–618.

2. Goldberg I, Graham SL, Healey PR. Primary open-angle glaucoma. Med J Aust. 2002;177:535–6.

3. Hitchings RA. Glaucoma screening. Br J Ophthalmol. 1993;77:326

4. Thylefors B, Negrel AD. The global impact of glaucoma. Bull World Health Organ. 1994;72:323–6.
5. Report on a regional planning workshop 'Implementation of VISION 2020 in the Eastern Mediterranean Region'; Cairo, Egypt. 2003.
6. Ramakrishnan R, Nirmalan PK, Krishnadas R, Thulasiraj RD, Tielsch JM, Katz J, et al. Glaucoma in a rural population of southern India: The Aravind comprehensive eye survey. Ophthalmology. 2003;110:1484–90.
7. Tielsch JM, Sommer A, Katz J, Royall RM, Quigley HA, Javitt J. Racial variations in the prevalence of primary open-angle glaucoma. The Baltimore Eye Survey. JAMA. 1991; 266: 369–74.
8. Friedman DS, Wolfs RCW, O'Colmain BJ, et al. Prevalence of open-angle glaucoma among adults in the United States. Arch Ophthalmol. 2004; 122: 532–8.
9. Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY. Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. Ophthalmology. 2014; 121: 2081–90.
10. Dandona L, Dandona R, Srinivas M, et al. Open-angle glaucoma in an urban population in southern India. The Andhra Pradesh Eye Disease Study. Ophthalmology 2000;107:1702–9.
11. Dandona L, Dandona R, Mandal P, et al. Angle-closure glaucoma in an urban population in southern India. The Andhra Pradesh Eye Disease Study. Ophthalmology 2000;107:1710–16.
12. Jacob A, Thomas R, Koshi SP, et al. Prevalence of primary glaucoma in an urban south Indian population. Indian J Ophthalmol 1998;46:81–6.
13. Ramakrishnan R, Nirmalan PK, Krishnadas R, et al. Glaucoma in a rural population of southern India: the Aravind Comprehensive Eye Survey. Ophthalmology 2003;110:1484–90.
14. Leske MC, Connell AM, Schachat AP, Hyman L. The Barbados Eye Study. Prevalence of open angle glaucoma. Arch Ophthalmol. 1994; 112: 821–829.
15. Mitchell P, Smith W, Attebo K, Healey PR. Prevalence of open-angle glaucoma in Australia. The Blue Mountains Eye Study. Ophthalmology. 1996; 103: 1661–69.
16. Wensor MD, McCarty CA, Stanislavsky YL, Livingston PM, Taylor HR. The prevalence of glaucoma in the Melbourne Visual Impairment Project. Ophthalmology. 1998; 105: 733–739.
17. Palimkar A, Khandekar R, Venkataraman V. Prevalence and distribution of glaucoma in central India (Glaucoma Survey 2001). Indian J Ophthalmol. 2008 Jan-Feb;56(1):57-62.
18. Nangia V, Jonas JB, Matin A, Bhojwani K, Sinha A, Kulkarni M, Gupta R, Khare A, Agarwal S, Bhate K, Nangia P, Nangia P, Panda-Jonas S. Prevalence and associated factors of glaucoma in rural central India. The Central India Eye and Medical Study. PLoS One. 2013 Sep 30;8(9):e76434.
19. Rahman MM, Rahman N, Foster PJ, Haque Z, Zaman AU, Dineen B, Johnson GJ. The prevalence of glaucoma in Bangladesh: a population based survey in Dhaka division. Br J Ophthalmol. 2004 Dec;88(12):1493-7.
20. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. Br J Ophthalmol. 2006 Mar;90(3):262-7..

Cite this article as: Amol Chawhan. Analysis of Prevalence of Glaucoma in a Known Population: An Institutional Based Study. Int J Med Res Prof. 2016, 2(1); 206-09.