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Occurrence of Glaucoma among Fishermen Community of Naliya Taluka of Kutch District: An Observational Study

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Abstract

Aim: To determine the Occurrence of glaucoma and risk factors for primary open-angle glaucoma among fishermen community of Naliya taluka of Kutch district. *Material and Methods:* A Observational Study was conducted to assess the prevalence of glaucoma among fishermen community of Naliya Taluka of Kutch district. All participants had a comprehensive eye examination at the base hospital, including visual acuity using logarithm of the minimum angle of resolution illiterate E charts and refraction, slit-lamp biomicroscopy, gonioscopy, applanation tonometry, dilated fundus examinations, and automated central 24-2 full-threshold perimetry. *Results:* The prevalence of any glaucoma was 2.5%, of POAG it was 1.6%, and if PACG it was 0.6% and secondary glaucoma excluding pseudoexfoliation was 0.2%. On multivariate analysis, increasing age, male gender, myopia greater than 1 diopter, and pseudoexfoliation were significantly associated with POAG. *Conclusion:* The prevalence of glaucoma in this population is not lower than that reported for other populations elsewhere. A large proportion of those with POAG had not been previously diagnosed. Early detection of glaucoma in this population will reduce the burden of blindness in India.

Keywords: Cross Sectional; Glaucoma; Fishermen; Naliya; Prevalence.

Introduction

Glaucoma is second only to cataract as a leading cause of global blindness, and is the leading cause of irreversible visual loss, largely due to primary open-angle glaucoma (POAG). The term "glaucoma" covers a number of different eye conditions, all of which involve damage to the optic nerve. One common cause is that there is too much pressure inside the eye. This pressure is called intraocular pressure. Intraocular pressure is caused by a fluid called aqueous humor produced by the eye itself in the chambers of the eye between the cornea and the lens. If the aqueous humor is prevented from draining properly, it starts to collect and pressure within the eye builds up. This presses against the optic nerve and there is a risk that nerve cells die. Whether the increased intraocular pressure does cause damage depends on, among other things, how well the optic nerve can resist this pressure. Intraocular pressure is measured in mm Hg (millimeters of mercury), the same unit used for blood pressure. Readings between 10 and 21 mm Hg are considered normal. Someone who has glaucoma does not always have above-average intraocular pressure [1].

By the year 2020 this number is predicted to increase to 79.6 million. The majority (74%) of these individuals will have OAG. Of the group with ACG, 70% will be women and 87% will be Asian. Bilateral blindness from glaucoma is projected to affect 8.4 million individuals worldwide by 2010 and greater than 11 million by 2020. Globally, glaucoma is a significant cause of vision loss that disproportionately affects women and Asians.India

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is the second most populated country and has more than 1 billion people. The impact of visual disability and blindness from glaucoma is most likely costly. Despite its public health significance, there have been limited data available on the prevalence of glaucoma and possible risk factors for glaucoma in India. Previous population-based studies from India have reported the prevalence of glaucoma in urban populations. There has been no report on the prevalence of glaucoma in rural populations from India. In addition, in these prior studies, perimetry was limited to those who fulfilled certain conditions, such as elevated intraocular pressure (IOP) or optic disc cupping. In this article, we report on the prevalence of glaucoma in a rural population of southern India and evaluate possible associated risk factors for primary open-angle glaucoma (POAG) [2].

Material and Methods

A descriptive cross sectional survey was conducted to assess the occurrence of glaucoma among fishermen community of Naliya taluka of Kutch district.

Sampling Design

Present Study was conducted at Department of Ophthalmology, Gujarat Adani Institute of Medical Science, Bhuj, Kutch. Multi-stage random sampling was employed to select the study population. Trained social workers performed enumeration after a door-to-door survey; demographic details were recorded for all enumerated subjects. Subjects aged 40 years and older were invited to the base hospital for comprehensive ocular examinations.

We measured presenting distance and near visual acuity and visual acuity with best correction after refraction using illiterate E logarithm of the minimum angle of resolution charts. Blindness was defined as a best-corrected vision 3/60 in the better eye. For all fishermen subjects 45 years or older, all examinations consisted of the following: subjective retinoscopic refraction, measurements of presenting and best-corrected visual acuity, automated full-threshold visual fields for subjects with best-corrected visual acuity better than 6/60 using the C-24-2 full-threshold program on the Humphrey 650 Visual Field Analyzer, evaluation of pupillary response, external and anterior segment examination at the slit-lamp biomicroscope, measurement of IOP with a Goldmann applanation tonometer, and gonioscopy using a Goldmann lens. After papillary dilatation, grading of the lens was conducted using the Lens Opacities Classification System III9; stereoscopic examination of the vitreous, retina, and optic nerve was done at the slit lamp with a 78-diopter lens and with an indirect ophthalmoscope using a 20-D lens.

Visual field examination was deferred for participants who either refused or had visual acuity less than 6/30 in the eye to be tested. If the visual field was determined to be abnormal and/or unreliable, it was repeated on a subsequent day or on the same day after the subject had adequate rest. Criteria used to determine abnormality included abnormal glaucoma hemifield test or corrected pattern standard deviation $P \leq 0.05$. Criteria used to determine unreliability of the fields included false-positive results ≥50%, false-negative results e ≥33%, and fixation losses ≥50%, 16 IOP was measured using Goldman applanation tonometry at the slit lamp with the patient under local anesthesia; three consecutive measurements were taken and recorded, and the median measurement was considered as the IOP for analysis. Gonioscopy was attempted on all subjects using a single-mirror Goldman contact lens, and the angle was graded using the Shaffer system of classification. The clock hours for each grade were also recorded. Angles were considered open if more than 10 clock hours were clearly visible up to the scleral spur in each eye. All participants with open angles determined on gonioscopy had their eyes dilated using tropicamide, 1%, and/or phenylephrine, 10%. Participants who had dilatation deferred because of occludable/narrow angles had dilated examinations performed after laser iridotomy either on the same day or on a subsequent day.

Before dilatation, we looked for pseudoexfoliation (PXF) deposits on the corneal endothelium, iris, and iris margins using detailed high-magnification slit-lamp assessment. We also looked for changes in the angle, including increased pigmentation, PXF deposition, and PXF material within the angle during gonioscopy. After dilatation, the anterior lens surface was examined from left to right using a narrow slit-lamp beam under full illumination and high magnification. Early signs of PXF were looked for, including pregranular radial lines and established granular deposits. PXF was diagnosed by the presence of typical white deposits on the iris and/or anterior lens surface; additional sites where we found PXF included the cornea, anterior vitreous face, posterior capsule, and even intraocular lenses. Lenses were graded at the slit lamp using the Lens Opacities Classification System III [3]. Posterior segment assessments, including optic disc were performed after dilatation using both a 78-D fundus

lens at the slit lamp and indirect ophthalmoscopy using a 20-D lens. Vertical and horizontal cup-to-disc ratios were measured and recorded; asymmetry of discs, notching, bayoneting, disc hemorrhages, nerve fiber layer defects, peripapillary atrophy, tilted discs, and atrophy of discs were looked for and recorded. The width and location of the thinnest neuroretinal rim was also recorded in clock hours. A standard set of photographs of discs ranging from 0.0 to 1.0 was used to grade the disc. The study ophthalmologists were standardized to each other and to a senior ophthalmologist, considered the "gold standard" before the actual study. Such standardization was repeated during the study.

Assessment of Glaucoma

The definition of glaucoma used in this study required evidence of glaucomatous optic nerve damage and did not rely on IOPs. Such evidence was demonstrated by the presence of one or both of the following: glaucomatous changes in the appearance of the optic nerve head or nerve fiber bundle pattern perimetric defects typical of glaucomatous damage. To operationalize this criterion, subjects with a vertical cup-to-disc ratio >0.8 or a narrowest neuroretinal rim width <0.2 (including classic notching) or asymmetry <0.2 between eyes coupled with a visual field defect in the matching location were considered cases of glaucomatous optic nerve damage. In individuals in whom visual fields were not available because of poor visual acuity or poor reliability, the presence of significant optic disc excavation compatible with glaucoma, or end-stage glaucoma with severe central vision loss, or total optic disc cupping was sufficient for diagnosing glaucomatous optic nerve damage.

The following definitions were used to classify persons into specific diagnostic categories: Ocular hypertension. Intraocular pressure >21 mmHg without evidence of optic nerve damage or visual field abnormalities characteristic of glaucoma; open and normal-appearing anterior chamber angle by gonioscopy.

POAG. Anterior chamber angles open and normal appearing by gonioscopy, typical features of glaucomatous optic disc as defined earlier, and visual field defects corresponding to the optic disc changes. Primary angle-closure glaucoma. At least two of the following criteria: glaucomatous optic disc damage or glaucomatous visual field defects in combination with anterior chamber angle partly or totally closed, appositional angle closure or synechiae in angle, absence of signs of secondary angle closure (e.g., uveitis, intumuscent, or dislocated lens; microspherophakia; evidence of neovascularization in the angle; or congenital angle anomalies).

Statistical analysis was performed using SPSS 16 software. P values ≤ 0.05 have been taken to indicate statistical significance.

Results

Four thousand Nine Hundred of the eligible 5500 persons aged 45 years or more were examined. The median age of those examined was 51.0 years, and 54.9% were females. The prevalence of glaucoma of any type was 2.6%. The prevalence of POAG was 1.2%. In decreasing prevalence were primary angle-closure glaucoma, PXF, secondary glaucoma from other causes excluding pseudoexfoliation, and absolute glaucoma.

Of the 65 persons diagnosed with POAG, 46 underwent visual field testing at least once. Visual fields could not be performed on 20 of those diagnosed with POAG; 15 of the 19 subjects had visual acuity ≤ 6/60; the 4 remaining subjects had a visual acuity of 6/48. Diagnosis of POAG in such subjects was primarily based on optic disc findings alone.

After best correction with refraction, 19 persons with POAG were visually impaired, including a person who was blind. An additional 12 persons had unilateral blindness caused by glaucomatous optic neuropathy in that eye, thus 13 (20.3%) per sons with POAG were blind in one or both eyes as a result of POAG. The prevalence for POAG with increasing age is shown in Table 1.

Table 1: Prevalence of Primary Open-angle Glaucoma by Age and Gender

	Females		Males		Overall	
Age	N	N (p)	N	N (p)	N	N (p)
40-49	1100	2 (0.2,)	786	5 (0.6)	1886	7 (0.)
50-59	795	7 (0.9)	601	16(2.4)	2261	23(1.6)
60-69	607	8 (1.3)	594	9 (2.4)	1201	22 (1.8)
70 or more	154	3 (1.9)	263	14 (3.4)	417	12 (2.9)
Total	2656	28 (0.7)	2244	58 (1.9)	4900	64 (1.2)

N _ total subjects; n _ number with POAG; p _ prevalence

Of the 65 subjects diagnosed with POAG, 33 had seen an ophthalmologist previously; none of these 32 subjects had an ocular consultation within the year before our study. Six of these 32 subjects who had an ocular consultation had previously been diagnosed with glaucoma, 2 had undergone trabeculectomies, and 4 were taking antiglaucoma medications. After best corrections with refraction, six persons with POAG were bilaterally blind (Table 2). An additional 12 persons had unilateral blindness because of glaucomatous optic neuropathy in that eye; thus 18 persons (20.9%) with POAG were blind in one or both eyes as a result of POAG. We did not find a significant difference in IOP across ages.

Ocular hypertension was present in 57 subjects (1.1%; 95% CI, 0.84,1.4). The median age of those with ocular hypertension was 52.0 years (range, 40–75 years), and there was no significant gender difference in prevalence (P 0.59).

Discussion

To date, limited data from India are available on the prevalence of glaucoma. Previous studies have reported the prevalence from two urban populations in southern India. 12–14Definite POAG was considered present in 3.8% of those aged 40 years and older. This is higher than that reported for white populations [4,5] 18–20 in North America, Europe, and Australia but still lower than that reported for populations of West African origin [6].

Because approximately half of our eyes with glaucoma had screening IOPs < 21 mmHg, these eyes would have been missed had perimetry not been performed. Another reason might be the difference in the age of the study participants; the Vellore study did not include those aged more than 60 years, whereas we found significant increasing odds for glaucoma older than the age of 60 years. Our prevalence of POAG among those aged 40 to 60 years is 0.7, similar to that found in Vellore.

The potential relationship between diabetes and POAG has been controversial. The Baltimore Eye Survey [7] suggested that diabetes and POAG were not related; more recently, the Blue Mountains Eye Study [8] supported the association between diabetes and POAG. We did not find any significant association between diabetes and POAG in our study.

Females were less likely to have POAG in our study even after adjusting for other potential risk factors. This is different from what has been seen in Andhra Pradesh of south central India [9], where the odds of females having POAG were 1.3, although this was not statistically significant.

The prevalence of glaucoma in this population is not lower than that reported for white populations elsewhere. A large proportion of those with POAG had not been previously diagnosed. One fifth of those with POAG had blindness in one or both eyes from glaucoma. Early detection of glaucoma in this population will reduce the burden of blindness in India.

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