

## SPECTRUM OF GLAUCOMA IN CATARACT PATIENTS AT MINTO REGIONAL INSTITUTE OF OPHTHALMOLOGY

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### ABSTRACT

#### BACKGROUND

Glaucoma is an irreversible disease characterised by progressive optic neuropathy. Glaucoma being next to cataract for visual loss do not present early. Early diagnosis and treatment is very important in such patients. All patients with cataract being subjected to cataract surgery should be screened for glaucoma to explain the guarded visual prognosis associated with glaucoma and also to effectively start treatment for glaucoma.

The aim of the study is to study the various types and spectrum of glaucoma in patients admitted for cataract in Minto Regional Institute of Ophthalmology.

#### MATERIALS AND METHODS

A hospital-based prospective study was conducted from January 2017 to June 2017 on 100 patients admitted for cataract surgery in Minto Regional Institute of Ophthalmology. After ethical clearance and informed consent, each patient was subjected to detailed evaluation for glaucoma including assessment of visual acuity, slit-lamp examination, IOP by Perkins tonometry, CCT, gonioscopy, fundus examination and visual fields in glaucoma suspected cases. Diagnosis was done considering all these aspects.

#### RESULTS

In total of 100, about 53% of patients had features of glaucoma, including both glaucoma suspect and glaucoma. Among them, there were 58% males and 41% females. Age wise distribution was studied varying from 40 yrs. to 80 yrs. and mean value was  $43 \pm 7$ . About 84% of patients were found to have open angles and 16% of patients had closed angles. Among the various types, primary open-angle glaucoma, primary angle closure, secondary glaucomas and disc suspect were found to be 15%, 3%, 38% and 33%, respectively.

#### CONCLUSION

Glaucoma is in relatively higher incidence in patients above 40 years of age. Increased frequency of open-angle glaucomas was found compared to closed angle. Secondary glaucomas, which included lens-induced glaucoma and pseudoexfoliative glaucoma were also found to be in high incidence. Study infers that glaucoma evaluation should be given attention in all elderly group of patients for early diagnosis and treatment.

#### KEYWORDS

Types of Glaucoma, Cataract, Gonioscopy.

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#### BACKGROUND

Glaucoma is the largest cause of 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 irreversible.<sup>1</sup> The World Health Organization has estimated that India has a 1% prevalence of blindness.<sup>2</sup> Of the estimated 8.9 million blind in India, 12.8% are due to glaucoma. The problem is expected to reach alarming proportions by the turn of the century.<sup>3</sup>

Glaucoma is a complex disease that comprises a group of heterogeneous optic neuropathies characterised by a progressive degeneration of the optic nerve head and visual field defects.<sup>4</sup> Elevated Intraocular Pressure (IOP) is a major risk factor in glaucoma and experimental elevation of IOP has resulted in glaucoma in animal models.<sup>5</sup> The other common risk factors include age, race, family history, thin cornea, myopia and oxidative stress.<sup>6</sup> Family history of glaucoma is estimated to account for a risk of 1-10 folds among the first-degree relatives of an affected individual.<sup>7</sup>

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Glaucomas are categorised into primary and secondary based on their aetiology and aqueous humour dynamics. Based on gonioscopy, primary glaucomas are further classified as Primary Open-Angle Glaucoma (POAG) and Primary Angle-Closure Glaucoma (PACG). POAG may be associated with or without an elevated IOP and has an adult onset (usually >35 years) or juvenile onset (usually <35 years). Secondary glaucomas are characterised by diseases such as uveitis, trauma and diabetes, thereby resulting in an alteration of aqueous humour dynamics. These include Pseudoexfoliation Glaucoma (XFG) and Pigmentary Glaucoma (PG).<sup>8</sup>

Racial variations in the prevalence of primary glaucoma are well known.<sup>9</sup> Amongst the Caucasian races, 75-95% of Primary glaucoma is Open-Angle Glaucoma (POAG).<sup>10</sup> These figures are almost reversed amongst Eskimos and East Asians where Primary Angle-Closure Glaucoma (PACG) constitutes 80-90% of primary glaucoma.<sup>11</sup> A population-based study in urban Hyderabad found 30% of adult blindness was attributable to cataract, while glaucoma accounted for 12%.<sup>12</sup> A similar study in Nepal suggested that only 1.7% of blindness was attributable to glaucoma.<sup>13</sup> 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.<sup>14,15</sup> In neighbouring Vellore, Tamil Nadu, the rates were 0.4% and 4.3%.<sup>16</sup> A recent report from Madurai, 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.<sup>17</sup>

Our study sought to evaluate the different types of glaucoma in cataract patients admitted in Minto Hospital and to diagnose glaucoma in early stages to effectively start the treatment and prevent the progression of optic nerve damage.

**MATERIALS AND METHODS**

The study was conducted on 100 patients above 40 yrs. admitted in Minto Ophthalmic Hospital for cataract surgery. After ethical clearance and written informed consent from each patient was subjected to detailed evaluation of glaucoma.

Visual acuity was recorded using Snellen’s chart. Detailed slit-lamp examination of anterior segment is done to grade the cataract, look for presence of pseudoexfoliation and also look for anterior chamber depth by using Van Herick grading. IOP was recorded using Perkins applanation tonometer. Gonioscopy was performed using Goldmann three-mirror gonio lens and angle were classified as open angle and closed angle based on Shaffer’s classification. Angles were examined to look for Sampaolesi line in cases of pseudoexfoliation and pigmentation in pigment dispersion syndrome.

Patients diagnosed with closed angle, fundus examination was done with direct ophthalmoscope. Patients with glaucomatous changes were subjected to visual field testing to look for field defects and to confirm diagnosis.

Diagnosis was done based on IOP, gonioscopy, fundus examination and visual fields. Patients were classified as

primary open-angle glaucoma, primary closed-angle glaucoma and secondary glaucoma, which includes lens-induced glaucoma, pseudoexfoliation glaucoma and others. Some of the patients had features of disc suspect and angle suspect who were advised for regular check up to assess for diagnosis of progression of the disease. Primary Angle-Closure Glaucoma (PACG) was defined as an eye with glaucoma as defined in the presence of narrow angles and features of trabecular obstruction by peripheral iris (such as peripheral anterior synechiae, elevated IOP, iris whorling, “glaukomflecken”, lens opacities or excessive pigment deposition on the trabecular surface). Subjects with glaucoma and an open, normal drainage angle with no identifiable secondary pathologic processes were said to have Primary Open-Angle Glaucoma (POAG). Phacomorphic and phacolytic glaucoma were included in secondary glaucoma. Pseudoexfoliation glaucoma was diagnosed on the basis of pseudoexfoliation material on slit-lamp examination over lens, angle, iris and increased intraocular pressure >21 mm of Hg, glaucomatous optic nerve head damage, gonioscopy findings with corroborative visual field changes when a reliable visual field was obtained and was included in secondary glaucoma.

**Statistics-** Descriptive analysis.

**RESULTS**

Total 100 patients admitted in Minto Ophthalmic Hospital were included in our study. Our study is a descriptive analysis and no comparison was done. Study included all those patients with cataract above 40 years with glaucoma or glaucoma suspect. About 53% of patients had features of glaucoma, including both glaucoma suspect and glaucoma. Among them, there were 31 males (58%) and 22 females (41%) (Table 1). Age wise distribution was studied varying from 40 yrs. to 80 yrs. and mean value was 43 ± 7 (Table 2). Among the total cases, 32 (60%) cases had unilateral involvement and 21 (40%) cases had bilateral involvement (Table 3).

| Gender  | Number | Percentage |
|---------|--------|------------|
| Males   | 31     | 58         |
| Females | 22     | 42         |

**Table 1. Sex Distribution**

| Age   | Number | Percentage |
|-------|--------|------------|
| 40-50 | 6      | 11         |
| 51-60 | 11     | 20         |
| 61-70 | 21     | 39         |
| 71-80 | 15     | 28         |

**Table 2. Age Distribution**

| Laterality | Number | Percentage |
|------------|--------|------------|
| Unilateral | 32     | 60         |
| Bilateral  | 21     | 40         |

**Table 3. Laterality**

Among 53 patients with glaucomatous changes, IOP was found to be more 21 mmHg in about 18 (33%) patients and IOP was less than 21 mmHg in 35 (66%) patients.

Gonioscopy could not be done in cases of lens-induced glaucoma due to corneal oedema and hazy view. Among the remaining patients, about 35 (84%) patients were found to have open angles and 6 (16%) patients had closed angles (Table 4). Table 5 summarises the various types of glaucoma classified among, which it is shown that open-angle glaucoma are more than closed angle. High number of disc suspect were found about 18 (33%). Cup-disc ratio was taken as the criteria to define glaucoma suspect. Overall, prevalence of increased IOP was found about 33% of the patients with cataract. About 83% of glaucoma suspect had IOP less than 20 mmHg.

| Type         | Number | Percentage |
|--------------|--------|------------|
| Open angle   | 35     | 84         |
| Closed angle | 6      | 16         |

**Table 4. Type of Glaucoma Based on Gonioscopy**

| Type                           | Number | Percentage |
|--------------------------------|--------|------------|
| Primary open-angle glaucoma    | 8      | 15         |
| Primary angle-closure glaucoma | 2      | 3          |
| Pseudoexfoliative glaucoma     | 9      | 16         |
| Lens-induced glaucoma          | 12     | 22         |
| Disc suspect                   | 18     | 33         |
| Angle-closure suspect          | 4      | 7          |

**Table 5. Type of Glaucoma**

## DISCUSSION

In this population-based study, which we conducted on cataract patients, we found that there is significantly higher incidence of glaucoma and glaucoma suspect, i.e. about 53%. As glaucoma is second most common cause of blindness next to cataract and because glaucoma is more prevalent in patients above 40 years as also seen in cataract, we took cataract patients admitted in our hospital for the study. As in other studies done on various types of glaucoma such as The Aravind Comprehensive Eye Study,<sup>17</sup> The West Bengal Glaucoma Study,<sup>18</sup> The Chennai Glaucoma Study<sup>19,20</sup> and The Andhra Pradesh Eye Study. Our study also showed open-angle glaucoma are more prevalent than closed-angle glaucoma.

In contrast to our study, there are studies where angle-closure glaucoma are more prevalent than open-angle glaucoma. A study performed on the Cape People of South Africa of predominantly Southeast Asian origin (many of whom originated from Malaysia and Indonesia) found a higher rate of PACG compared with POAG.<sup>21</sup>

Gender distribution did not show any preponderance. This finding is consistent with other studies. Age wise distribution showed increased prevalence in age group of 50-70 years. This is also consistent with previous studies.<sup>14,17</sup> An unexpected observation in the Dhaka Survey was that the prevalence of glaucoma was relatively high in younger people (age 35-49 years) and did not increase with age. Although, the present study only included people aged 50 years and over, glaucoma prevalence increased with increasing age, which does not support the finding in the Dhaka Survey.<sup>22</sup> Our study has shown high incidence of lens-induced glaucoma. The reason for this could be, our hospital

is a tertiary center where the cases are referred from surrounding primary health centres.

Our study was intended to know the types and epidemiology of glaucoma in patients admitted for cataract. Drawback of our study was visual field could not be done on many patients due to noncompliant and financial issues. Apart from this, as our group of patients were cataract, vision was not sufficient in many cases for visual field and in such patients diagnosis was mainly of fundusoscopic features glaucoma. Such patients were advised for visual fields in later stages after removal of cataract. However, our main concern of the study to evaluate for glaucoma in cataract patients, so that guarded vision prognosis could be explained and for early diagnosis, so that patients can be treated before complete irreversible optic nerve damage occurs.

## CONCLUSION

In our study, we observed that glaucoma and glaucoma suspects are significantly higher in age group of more than 40 years. Patients subjected to cataract surgery expect significant visual improvement. There is need for evaluation of each patient to rule out glaucoma in patients of cataract to explain guarded vision prognosis. As glaucoma results in irreversible damage, early diagnosis of the condition and prompt treatment is very important.

## REFERENCES

- [1] Hitchings RA. Glaucoma screening. Br J Ophthalmol 1993;77(6):326.
- [2] Thylefors B, Negrel AD, Pararajasegaram R, et al. Global data on blindness. Bull World Health Organ 1995;73(1):115-121.
- [3] Quigley HA. Number of people with glaucoma worldwide. Br J Ophthalmol 1996;80(5):389-393.
- [4] Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. Br J Ophthalmol 2006;90(3):262-267.
- [5] Levkovitch-Verbin H, Quigley HA, Martin KR, et al. Translimbal laser photocoagulation to the trabecular meshwork as a model of glaucoma in rats. Invest Ophthalmol Vis Sci 2002;43(2):402-410.
- [6] Leske MC, Connell AM, Wu SY, et al. Risk factors for open-angle glaucoma. The Barbados eye study. Arch Ophthalmol 1995;113(7):918-924.
- [7] Green CM, Kearns LS, Wu J, et al. How significant is a family history of glaucoma? Experience from the glaucoma inheritance study in Tasmania. Clin Exp Ophthalmol 2007;35(9):793-799.
- [8] Shields MB, Allingham RR, Damji KF, et al. Shields' Textbook of Glaucoma. 5<sup>th</sup> edn. Philadelphia: Lippincott Williams and Wilkins 2005.
- [9] Tielsch JM, Sommer A, Katz J, et al. Racial variations in the prevalence of primary open-angle glaucoma. The Baltimore eye survey. JAMA 1991;266(3):369-374.
- [10] Leske MC. The epidemiology of open-angle glaucoma: a review. Am J Epidemiol 1983;118(2):166-191.

- [11] Congdon N, Wang F, Tielsch JM. Issues in the epidemiology and population-based screening of primary angle-closure glaucoma. *Surv Ophthalmol* 1992;36(6):411-423.
- [12] Dandona L, Dandona R, Naduvilath TJ, et al. Is current eye-care-policy focus almost exclusively on cataract adequate to deal with blindness in India? *Lancet* 1998;351(9112):1312-1316.
- [13] Pokharel GP, Regmi G, Shrestha SK, et al. Prevalence of blindness and cataract surgery in Nepal. *Br J Ophthalmol* 1998;82(6):600-605.
- [14] 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(9):1702-1709.
- [15] 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(9):1710-1716.
- [16] Jacob A, Thomas R, Koshi SP, et al. Prevalence of primary glaucoma in an urban south Indian population. *Indian J Ophthalmol* 1998;46(2):81-86.
- [17] Ramakrishnan R, Nirmalan PK, Krishnadas R, et al. Glaucoma in a rural population of southern India: the Aravind comprehensive eye survey. *Ophthalmology* 2003;110(8):1484-1490.
- [18] Raychaudhuri A, Lahiri SK, Bandyopadhyay M, et al. A population-based survey of the prevalence and types of glaucoma in rural West Bengal: the West Bengal Glaucoma Study. *Br J Ophthalmol* 2005;89(12):1559-1564.
- [19] Vijaya L, George R, Paul PG, et al. Prevalence of open-angle glaucoma in a rural south Indian population. *Invest Ophthalmol Vis Sci* 2005;46(12):4461-4467.
- [20] Vijaya L, George R, Arvind H, et al. Prevalence of angle-closure disease in a rural southern Indian population. *Arch Ophthalmol* 2006;124(3):403-409.
- [21] Salmon JF, Mermoud A, Ivey A, et al. The prevalence of primary angle-closure glaucoma and open-angle glaucoma in Mamre, Western Cape, South Africa. *Arch Ophthalmol* 1993;111(9):1263-1269.
- [22] Rahman MM, Rahman N, Foster PJ, et al. The prevalence of glaucoma in Bangladesh: a population based survey in Dhaka division. *Br J Ophthalmol* 2004;88(12):1493-1497.