A Clinical Study of Secondary Glaucoma with Special Reference to Its Proportion, Causes and Its Risk Factors in a Tertiary Care Hospital - A Cross Sectional Study

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ABSTRACT

BACKGROUND

Secondary glaucoma is an anatomically identifiable abnormality which in turn is an underlying cause of the events that lead to aqueous outflow obstruction and rise in the intraocular pressure. This prospective study mainly highlights the secondary glaucoma with special reference to its proportion, causes and its risk factors in a tertiary care hospital.

METHODS

This study was a cross sectional study. Patients, who attended the Department of Ophthalmology after fulfilling the inclusion and exclusion criteria diagnosed with secondary glaucoma, were included in the study. The study period was from February 2018 to June 2020. A standard form was filled up for each patient documenting parameters and findings of various examinations and was evaluated as per protocol.

RESULTS

Secondary glaucoma was seen in 0.2 % patients who visited during the study period. Out of 106 patients, males were 50, females were 56, with a male: female ratio of 1:1.1. The most common cause of secondary glaucoma was lens induced glaucoma seen in 44.34 % followed by uveitic glaucoma in 20.8 % cases, traumatic 17.9 %, neovascular 10.4 %, pseudoexfoliation glaucoma 2.8 %, pigmentary glaucoma 1.9 %, silicon oil induced 0.9 %, and uveitis-glaucoma-hyphema syndrome in 0.9 % cases. Around thirty five percent (34.9 %) cases presented with sudden onset of painful diminution of vision with nausea and vomiting.

CONCLUSIONS

Secondary glaucoma is still one of the prevalent diseases in this part of country. Lens induced glaucoma is still the most common cause of secondary glaucoma. Hypermature cataract, uveitis, trauma and neovascularisation are the different risk factors.

KEYWORDS

Secondary Glaucoma, Lens Induced Glaucoma, Phacomorphic Glaucoma**,** Uveitic Glaucoma

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BACKGROUND

Glaucoma is a group of disorders with characteristic optic neuropathy and associated visual function loss[1]. Unlike primary open angle glaucoma (POAG), secondary glaucoma (SG) has been classified as an anatomically identifiable abnormality and as an underlying cause of the events that lead to aqueous outflow obstruction and rise in the intraocular pressure (IOP)[1]. The prevalence of the glaucoma may vary from place to place [2,3,4]. While most of the well-established studies available are about primary open and angle closure glaucomas but studies related to secondary glaucomas are very limited.

In secondary glaucomas, there is an obvious form of obstruction to aqueous outflow, with an underlying identifiable cause. There are number of reasons that lead to develop secondary glaucomas. There can be disorders within the eye, various systemic diseases or adverse effects of their medications which are responsible for raised intraocular pressure. In secondary glaucomas, if the main underlying problem causing the raised intraocular pressure is treated (if possible) then the pressure may normalize. But once the optic nerve is totally damaged in advanced untreated cases, vision cannot be restored. Individual with secondary glaucoma needs prompt diagnosis and intervention for better visual outcome.

Causes mainly localized within the eye includes lens induced glaucomas (LIG)[1] (phacomorphic, phacolytic, phacoantigenic), steroid induced glaucomas,[2] uveitic glaucomas,[5] aphakia, post trauma,[6] post vitreoretinal surgery,[7] neovascular glaucomas, post penetrating keratoplasty,[8] secondary to intraocular tumours, pigment dispersion syndrome,[9] pseudoexfoliation syndrome,[10] aniridia, chemical injury, iridocorneal endothelial syndrome, glaucoma secondary to retinopathy of prematurity. Various systemic conditions in which systemic steroids are prescribed that can lead to secondary glaucomas. Uncontrolled thyroid disease leads to thyroid eye disease, may lead to raised intraocular pressure. Diabetes per se may not directly relate to glaucoma but in uncontrolled cases one may develop neovascular glaucomas.

Although very few studies are reported worldwide about this particular entity. Quigley[11] in 1996, in his study established that 6 million people in the world have secondary glaucoma compared to 67 million people with primary glaucomas. A population-based study published by Ramakrishnan R et al.[12] from south India reported an incidence of 0.7 % cases of secondary glaucomas compared to total prevalence of glaucoma was 2.6 %. Study done by Das J et al.[13] from north India reported 6.72 % of their patients had secondary glaucoma. But a retrospective study done at AIIMS, New Delhi, by Ritu Gadia et al,[14] reported 22.07% of the total glaucoma patients were of secondary glaucoma. A study from Pakistan,[15] had reported incidence of secondary glaucoma was 35 % and from Finland[16] reported an incidence of 33 %. Study in the Japanese population by Yamamoto T et al.[17] reported the prevalence of secondary glaucoma was 0.6 % and primary angle closure glaucoma was 0.5 % among total incidence of glaucoma of 5 %. This shows variations in the prevalence of secondary glaucoma in different regions of the world.

The aim of the study is to know the proportions of secondary glaucoma, its various causes and mode of presentation.

METHODS

This study was a cross sectional study. The patients, who attended the Department of Ophthalmology at Tripura Medical College & Dr. BRAM Teaching Hospital were diagnosed with secondary glaucoma after fulfilling the inclusion and exclusion criteria, were enrolled in the study. The study period was from February 2018 to June 2020. Sample size was taken as all the patients attending the out-patient department during the study period and sampling process was convenience sampling procedure. A standard form was filled up for each patient for documenting various parameters and findings of various examinations. Informed consent was taken from all the patients before enrolling in the study.

The institutional ethical committee approval was taken before starting the study. Patients with primary glaucomas were excluded. Detailed history like age, sex, onset and duration of the symptoms with any history of diabetes, hypertension, steroid use, trauma or any ophthalmic surgery in past was noted. A detailed ophthalmological examination includes visual acuity by Snellen's chart and anterior segment examination by slit lamp biomicroscopy, intraocular pressure measured by Schiotz's tonometer.

Gonioscopy was done wherever necessary. Optic disc examination was done by Volk + 90 D convex lens whenever visible. Secondary glaucoma was diagnosed with raised intraocular pressure I≥ 22 mmHg with or without glaucomatous optic neuropathy (optic cup disc ratio ≥ 0.7) with a positive history of trauma, previous ocular surgery (except glaucoma surgery), with obvious sign of inflammation, neovascularisation, pseudoexfoliation materials and presence of hypermature cataract.

Those cases with acute presentation were managed with both topical and systemic anti-glaucoma medication. Blood investigations were performed in those with history of systemic diseases. The statistical analysis was done in percentage and proportions.

RESULTS

During the study period a total number of 53543 patients attended in ophthalmology outdoor. A total 106 cases of secondary glaucoma (0.2 %) was observed. The socio demographic distributions of the secondary glaucoma cases are mentioned in below table (Table 1). In the present study, it was observed that females (52.8 %) were slightly suffering more from secondary glaucoma compared to males (47.2 %). Retired persons (39.6 %) were more in number, in secondary glaucoma cases followed by housewives (31.1 %). Married (75.5 %) and literate persons (50.9 %) were suffering more in secondary glaucoma in the present study.

Variables	Frequency	Percentage
Gender		
Male	50	47.2
Female	56	52.8
Occupation		
Students	9	8.5
Housewife	33	31.1
Govt. employees	7	6.6
Shopkeeper	9	8.5
Daily labour	6	5.7
Retired	42	39.6
Marital Status		
Unmarried	6	5.7
Married	80	75.5
Widowed	20	18.9
Education		
Illiterate	52	49.1
Literate	54	50.9

Table 1. Socio Demographic Distribution of Secondary Glaucoma Cases in the Present Study

Past History of Illness	Frequency	Percentages
Hypertension	25	23.6
Diabetes mellitus	10	9.4
Hypertension + Diabetes mellitus	11	10.4
Hypertension + Diabetes mellitus + Coronary arterial disease	5	4.7
No history present	55	51.9

Table 2. Distribution of the Secondary Glaucoma Cases According to Past History of Illness in the Present Study

Causes	Frequency	Percentages
Lens induced glaucoma	47	44.34
Uveitic glaucoma	22	20.8
Traumatic glaucoma	19	17.9
Neovascular glaucoma	11	10.4
Pseudoexfoliation glaucoma	3	2.8
Pigmentary glaucoma	2	1.9
Silicon oil induce glaucoma	1	0.9
UGH syndrome	1	0.9

Table 3. Causes of the Secondary Glaucoma in the Present Study

Types of Lens Induced Glaucoma	Frequency	Percentages
Phacomorphic glaucoma	37	34.9
Phacolytic glaucoma	8	7.5
Phacoantigenic glaucoma	2	1.9
Total	**47**	**44.34**

Table 4. Types of Lens Induced Glaucoma Patients Seen amongst the Study Group.

In the study most of the cases with secondary glaucoma (51.9 %) do not have any significant history of past illness followed by 25 cases (23.6 %) having history of hypertension. 34.9 % cases presented with sudden onset of painful diminution of vision with nausea and vomiting.

The most common causes of secondary glaucoma were of lens induced glaucoma seen in 44.34 %, followed by uveitic glaucoma (20.8 %), traumatic glaucoma (17.9 %), neovascular glaucoma (10.4 %) and phacolytic glaucoma (7.5 %). In lens induced glaucoma group 34.9 % were of phacomorphic type, 7.5 % were of phacolytic glaucoma, 1.9 % were of phacoantigenic glaucoma.

In the present study, the female participants have higher intra ocular pressure (41.78 ± 11.88) mmHg compared to males (40.03 ± 9.63) mmHg, but it was not statistically significant (p = 0.41).

Literate participants have more intraocular pressure (41.75 ± 10.54) mmHg compared to illiterate participants (40.78 ± 11.23) mmHg. Shopkeepers have highest intraocular pressure (42.51 ± 8.36) mmHg followed by govt. employee (42.17 ± 9.81) mmHg and daily labourers have lowest (39.35 ± 8.72) mmHg, but these differences were not statistically significant (p = 0.992). The unmarried participants (42.90 ± 14.72) mmHg have highest intraocular pressure and widowed (38.87 ± 10.28) mmHg have lowest intraocular pressure and not significant (p = 0.605).

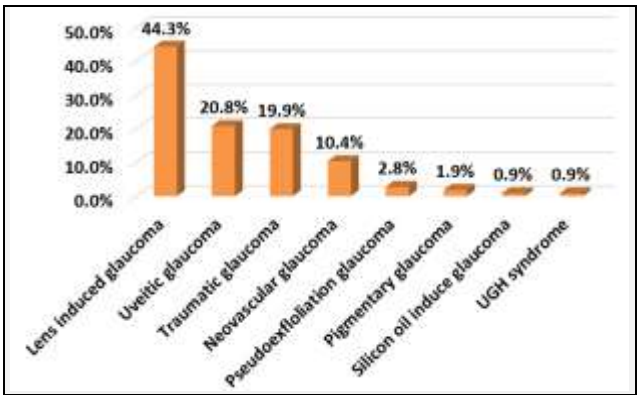

Figure 1. Bar Chart Showing the Causes of Glaucoma in the Present Study

Clinical Presentation	Frequency	%
Sudden onset of painful diminution of vision, nausea & vomiting.	37	34.9
Acute pain, redness and progressive blurring of vision	22	20.75
Sudden onset diminution of vision, pain and redness	19	17.92
Progressive blurring, headache & eye ache	11	10.38
Progressive pain, redness and blurring of vision	10	9.43
Headache & blurring of vision	5	4.72
Slowly progressive eye ache & redness	1	0.94
Intermittent blurring, photophobia, redness & pain.	1	0.94

Table 5. Distribution of the Secondary Glaucoma Cases According to Clinical Presentation

Variables	Mean	Standard Deviation	Test Value	P Value
Gender				
Male	40.03	9.63	T test value 0.82	0.41
Female	41.78	11.88		
Education				
Illiterate	40.12	11.23	T test value 0.59	0.44
Literate	41.75	10.54		
Occupation				
Student	41.43	11.84	F test value 0.98	0.992**
Housewife	40.37	10.86		
Govt. employee	42.17	9.81		
Shopkeeper	42.51	8.36		
Daily labour	39.35	8.72		
Retired	40.99	12.01		
Marital status				
Unmarried	42.90	14.72	F test value 0.505	0.605**
Married	41.32	10.78		
Widowed	38.87	10.28		

Table 6. Distribution of intraocular pressure in Different Socio-Economic Variables

*p value < 0.05 considered as a statistically significant, **ANOVA

DISCUSSION

There are very few studies available regarding frequency of various types of secondary glaucoma and the frequency may vary from place to place. A study done by a large tertiary eye care centre at Aravind eye care centre,[12] Madurai, South India reported a 0.7 % incidence of secondary glaucoma and total prevalence of glaucoma was 2.6 %. Gadia R et al.[14] from RP Centre AIIMS, New Delhi showed about 22.07 % of

secondary glaucoma were seen in all newly diagnosed glaucoma. The Hooghly River Glaucoma Study also showed prevalence of secondary glaucoma as 0.15 % in urban and 0.10 % in rural population in eastern Indian population.[18] The present study has secondary glaucoma of 0.2 % cases amongst the visiting patients in outpatient department during the study period.

In the present study, it was observed that females (52.8 %) were slightly suffering more from secondary glaucoma compared to male (47.2 %), with male female ratio 1:1.1. Gadia R et al.[14] had male female ratio of 2.2:1 and Ramanarao & Jain[19] showed male predominance with 56 % and male to female ratio was 1.3:1.

The most common type of secondary glaucoma in our study was lens induced glaucoma seen in 44.34 %. The study done in Aravind eye care centre[12] also had 43 % of the secondary glaucomas were of lens induced. Study done by Ramanarao & Jain[19] showed 48 % of their secondary glaucoma was of lens induced glaucoma. In our study females had more lens induced glaucomas than males. Females with lens induced glaucomas comprised of 57.45 %, with male: female ratio of 0.74:1. This may be because females are more prone to develop cataract and treatment seeking behaviour amongst females are low. Study done by Pradhan D et al.,[20] also showed lens induced glaucomas more in females with female: male ratio of 1.7:1.

Phacomorphic and phacolytic glaucoma are the most common lens induced glaucoma seen in our study. In our study 34.9 % were phacomorphic, 7.5 % were phacolytic and 1.9 % were phacogenic. Phacomorphic glaucoma cases were managed initially with topical and systemic antiglaucoma medications and later cataract extraction with intraocular lens implantation were performed.

In our study uveitic glaucoma was the second most common cause of secondary glaucoma seen in 20.8 % cases. All the cases were of acute anterior uveitis. There is a study from Massachusetts Eye and Ear Infirmary by J. Merayo-Lloves et al.,[21] where they found secondary glaucoma was more frequent in anterior uveitis (67 %) compared to posterior uveitis (13 %) and pars planitis (4 %). Traumatic glaucoma in our study was 17.9 %. More than 60 % of traumatic glaucoma were due to blunt trauma and rest are due to work related and post road traffic accident. Some of them had lens subluxation, hyphema and vitreous haemorrhage.

Neovascular glaucoma was found in 10.4 % cases. Out of 11 neovascular cases, 7 cases were due to proliferative diabetic retinopathy and 4 cases were of post central retinal vein occlusion. Glaucoma due to pseudoexfoliation was noticed in 2.8 % cases.

Mean intraocular pressure in males and females were 40.03 mmHg & 41.78 mmHg respectively. The intraocular pressure was noticed highest in patients of neovascular glaucoma with mean intraocular pressure was 45.57 mm Hg. Secondary glaucoma can present with various signs and symptoms depending on the type of glaucoma. Often some of the cases show poor intraocular pressure control despite topical and systemic intraocular pressure lowering drugs. Most of the patients in our study presented with painful diminution of vision with nausea and vomiting.

The limitation of the study is that the sample size is less. Most of the patients are self-reporting.

CONCLUSIONS

Secondary glaucoma is still a common disease in this part of country. Hypermature cataract leading to phacomorphic glaucoma is still one of the major causes of secondary glaucoma and can be commonly seen in female population. Next common risk factors for secondary glaucoma are uveitis, trauma and neovascularisation. By creating awareness amongst the population and providing quality cataract surgeries we can prevent them from progressing to permanent blindness.

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