

COMPREHENSIVE EYE EXAMINATION IN OUT-REACH CAMP PATIENTS REFERRED FOR CATARACT SURGERY- AN EFFECTIVE INSTRUMENT FOR ASSESSING OCULAR COMORBIDITIES IN COMMUNITIES: A RETROSPECTIVE STUDY.

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Abstract

Introduction

The aim of modern cataract surgery is to provide optimum visual acuity to the patient according to his requirements and with early visual rehabilitation. A detailed evaluation prior to cataract surgery can help in planning proper intervention, prevent post-operative visual impairment and appropriate patient counseling. This study aimed to determine the prevalence of ocular co-morbidities in out-reach camp patients referred for cataract surgery.

Materials and methods

This retrospective study was conducted among patients admitted in Hi-Tech Medical College and Hospital, Rourkela, Odisha, India. Patient details were obtained from hospital records from January 2021 to January 2022. Data was analyzed using SPSS version 21.

Results

A total of 3109 patients were considered out of which 1060 (34.1%) presented with some comorbidities other than cataract. Retinopathy comprised of 26.4% followed by pterygium (24.8%) and post cataract surgery complications (10.4%). Glaucoma was present in 8.5% while nearly 7% presented with corneal involvement and 6.04% with uveitis and its sequel.

Conclusion

A comprehensive examination of patients referred from camps can be a cost-effective and efficient tool to identify the hidden ocular diseases in the community. It not only aids in identifying but also providing optimum management of the comorbidities to provide maximum benefit to the patients.

Recommendation

Thorough examination of the patients with ocular comorbidities can help in identifying the ocular diseases earlier and planning their management efficiently.

Keywords: Co-morbidities, Retinopathy, Pterygium, Glaucoma

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Introduction

It has been estimated that globally, nearly 15.2 million people older than 50 years are blind due to cataract and there has been an increase of 29.7% in cases of cataract blindness from 2000 to 2020.¹ According to National blindness and visual impairment survey (2015-19) cataract is the most common cause of blindness (66.2%) as well as of moderate to severe visual impairment in India in the same age group.² Cataract surgery is also the most performed elective surgery

worldwide with more than 20 million surgeries performed annually.^{3,4} The number of cataract surgeries performed per year reflects the accessibility and accomplishment of ophthalmic health care services.⁵

The aim of modern cataract surgery is to provide optimum visual acuity to the patient according to his requirements and with early visual rehabilitation. Various studies round the world and in India suggest that poor outcome of cataract surgery in terms of visual acuity were due to pre-existing

ocular co-morbidities, post-operative complications or incorrect IOL power.^{1,5,6} A detailed evaluation prior to cataract surgery can help in planning proper intervention, prevent post-operative visual impairment and appropriate patient counselling.

Detailed examination of the camp patient at the tertiary centre can be a cost-effective method to find out the prevalence of ocular diseases in the community. In spite of a rapid advancement in eye-care services and ease of communication, the patients from rural pockets are either apathetic or ignorant of their eye care needs. Financial constraints, transportation, lack of attendants or myths associated with cataract surgery prevent the patients from reaching the referred hospital from camps.⁷ Screening such patients in out-reach camps along with their proper counselling and prompt referral to tertiary care hospital aims at bridging this barrier.

At the base hospital, a thorough examination of the referred patients can help in estimating the burden of visual impairment or blindness due to other co-morbidities like glaucoma or retinopathy. A rise in the prevalence of communicable diseases in India is also reflected in terms of rise in the prevalence of retinopathies especially diabetic retinopathy.⁸ Such undetected causes of visual impairment or blindness can be unearthed at the tertiary center using ocular and systemic examination and investigations. This will serve as an efficient and economical use of eye care services. Our study thus aims at finding out the hidden prevalence of different ocular and systemic comorbidities in patients referred from rural camps.

Methods and materials

Study design

A retrospective study conducted on the patients being referred from out-reach camps to a tertiary center.

Study setting

The study was conducted at Department of Ophthalmology, Hi-Tech Medical College and Hospital, Rourkela, Odisha, India, from January 2022-July 2023.

Data Collection and Analysis

According to standard protocol, the patients at the out-reach camps were screened by trained ophthalmic assistants and post graduate trainees using Snellen's chart, torch light examination and IOP measurement with i-care tonometer. Refraction was done in the mobile eye van fitted with auto-refractometer and I-chart. Those with best corrected visual acuity (BCVA) with 6/18 or less or with other ocular

symptoms are referred to the tertiary hospital for further management.

Participants

The study comprised of a total of 3109 patients.

Sample size

The sample size for this study was determined based on specific inclusion criteria and a comprehensive evaluation process. Patients aged 40 years or older with visual impairment of 6/18 or worse were considered eligible for inclusion. This selection criterion was crucial in focusing on individuals who potentially required ophthalmic intervention. The study involved a rigorous assessment, including a detailed ophthalmological examination, which encompassed slit lamp examination, gonioscopy, applanation tonometry, slit lamp bicroscopy using a 90D lens, indirect ophthalmoscopy, perimetry, and the utilization of available Optical Coherence Tomography (OCT) reports. Additionally, a systemic evaluation was conducted, which entailed recording blood pressure, fasting blood sugar levels, and echocardiograms. However, it's important to note that patients with incomplete records were excluded from the study, ensuring the integrity and completeness of the data for the analysis of the selected participants.

Statistical analysis

The results were tabulated in excel sheet and analyzed using SPSS version 21 using descriptive statistics.

Ethical consideration

The study was initiated after taking due approval of institutional ethics committee (IEC). The details of the patient were obtained from the hospital records and patient case sheets.

Results

In this study period, a total of 3109 patients comprising of 1621 males (53.5%) and 1407 females (46.5%) referred from the camp were included. The mean age of patients was 63.67 +/- 9.6 years Out of which 1060 (33.3%) patients presented with some ocular morbidities other than cataract. Mean age of patients with comorbidities is 61.42+/-10.36 years while that without co-morbidities was 63.67+/-9.6 years (p-value=0.038, T test 4.982, 2-tailed hypothesis) which is statistically significant (p-value < 0.05). It indicates patients with co-morbidities are of a higher age group. The table 1 illustrates the age and gender distribution in camp patients with co-morbidities.

Table 1: Age and Gender Distribution

AGE (YEARS)	MALE (%)	FEMALE (%)	TOTAL (%)
40-50	90 (8.49)	99 (9.34)	189 (17.83)
51-60	155 (14.6)	144 (13.58)	299 (28.2)
61-70	196 (18.5)	161 (15.18)	357 (33.67)
71-80	100 (9.43)	88 (8.3)	188 (17.73)
>81	21 (1.98)	6 (0.56)	27 (2.54)

A total of 280 (26.4%) patients presented with some form of retinopathies while 8.5% (90) presented with glaucoma. Nearly one fourth of those patients (24.8%) had pterygium in different stages and pterygium excision with auto conjunctival graft was performed in 40% (107) of those.

Corneal opacity and other corneal involvement (keratitis, corneal degeneration and dystrophy) comprised of 7% of the patients with comorbidities. Tables no.2-6 have details of comorbidities found and their prevalence in the population.

Table 2: Distribution of Different Ocular comorbidities

CO-MORBIDITIES	NUMBER OF PATIENTS	PERCENTAGE (PATIENTS WITH COMORBIDITIES)	PREVALENCE (%)
RETINOPATHY	280	26.4	9.01
PTERYGIUM	263	24.8	8.46
POST-CATARACT SURGERY COMPLICATIONS	111	10.47	3.57
GLAUCOMA	90	8.5	2.9
CORNEAL DISEASES	75	7.08	2.41
UVEITIS	64	6.04	2.05
OPTIC NERVE DISEASES	45	4.25	1.44
DACROCYSTITIS & DISEASES OF OCULAR ADENEXA	34	3.21	1.09
CRANIAL NERVE PALSIES	19	1.79	0.61
STRABISMUS	12	1.12	0.38
AMBLYOPIA	10	0.94	0.32
VITREOUS HEMORRHAGE	8	0.75	0.26

Table 3: Distribution of corneal diseases

	CORNEAL OPACITY			KERATITIS			CORNEAL DYSTROPHY/ DEGENERATION		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
40-50	11	13	24	5	2	7	0	0	0
51-60	6	3	9	2	5	7	3	2	5
61-70	9	2	11	1	0	1	0	2	2
71-80	5	2	7	0	1	1	0	0	0
>81	0	0	0	0	0	0	1	0	1
TOTAL	31	20	51	8	8	16	4	4	8
MEAN AGE (years)	56.2+/-2.9			52.5+/-4.5			61+/-7.1		
PERCENTAGE	4.8%			1.5%			0.74%		

Table 4: Distribution of Glaucoma in the Study Population

AGE	PRIMARY OPEN ANGLE GLAUCOMA (POAG)			PRIMARY ANGLE CLOSURE GLAUCOMA (PACG)			SECONDARY GLAUCOMA		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE GROUP	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
40-50	3	3	6	0	0	0	2	1	3
51-60	10	6	16	0	4	4	1	5	6
61-70	12	9	21	1	0	1	5	5	10
71-80	5	2	7	0	5	5	4	3	7
>80	1	0		1	1	2	1	0	1
TOTAL	31	20	51	2	10	12	13	14	27
MEAN AGE (years)	63.04+/-9.5			68.9+/-9.25			64.5+/-10.9		
PERCENTAGE	4.8%			1.13%			2.54%		

Table 5: Distribution of retinopathy, Optic nerve, and Vitreous and Uveal diseases

CO-MORBIDITIES	NUMBER OF PATIENTS	PERCENT-AGE	MEAN AGE (μ) WITH SD	PREVALENCE (In 1000)	95% CI OF PREVALENCE
RETINOPATHY					
Diabetic Retinopathy	135	12.74	56.46±9.68	43.42	0.036 – 0.050
ARMD	50	4.72	61.64±9.92	16.08	0.012 – 0.021
Hypertensive Retinopathy	33	3.11	62.18±8.01	10.61	0.007 – 0.015
Maculopathy	32	3.02	55.53±10.12	10.29	0.007 – 0.014
Retinal Detachment	06	0.57	63.67±8.88	1.93	0.0007 – 0.0042
Retinitis Pigmentosa	16	1.51	56.25±9.82	5.14	0.003 – 0.008
Chorioretinitis	08	0.75	64.0±7.35	2.57	0.0011 – 0.0051
BRVO/CRVO	08	0.75	63.75±8.13	2.57	0.0011 – 0.0051
Other Retinopathy	05	0.47	52.8±9.55	1.61	0.0005 – 0.0038
Vitreous Hemorrhage	08	0.75	53.0±12.83	2.57	0.0011 – 0.0051
OPTIC NERVE INVOLVEMENT					
Optic Atrophy	26	2.45	62.42±12.78	8.36	0.005 – 0.012
Papilloedema	06	0.57	50.34±11.26	1.92	0.0007 – 0.0042
Optic neuritis	02	0.19	54.5±5.5	0.64	0.0001 – 0.0023
AION	02	0.19	74.5±1.5	0.64	0.0001 – 0.0023
Toxic Amblyopia	02	0.19	53.5±3.5	0.64	0.0001 – 0.0023
UVEAL DISEASES					
Anterior Uveitis	13	1.23	55.53±7.76	4.18	0.002 – 0.007
Intermediate Uveitis	02	0.19	57.5±7.07	0.64	0.0001 – 0.0023
Posterior Uveitis	13	1.23	59.61±8.76	4.18	0.002 – 0.007
Uveitis Sequel	24	2.26	61.70±9.36	7.72	0.005 – 0.012

Table 6: Prevalence of Risk Factors for Glaucoma

AGE	DISC SUSPECT			OCULAR HYPERTENSION			PACS			PEX		
	MA LE	FEMA LE	TOT AL	MA LE	FEMA LE	TOT AL	MA LE	FEMA LE	TOT AL	MA LE	FEMA LE	TOT AL
40-50	7	4	11	0	1	1	0	1	0	0	0	0
51-60	15	17	32	5	4	9	1	6	4	3	2	5
61-70	19	17	36	8	3	11	4	16	16	9	4	13
71-80	10	5	15	8	3	11	3	10	12	9	7	16
>81	1	0	1	0	1	1	0	1	1	3	2	5
TOTAL	52	43	95	21	12	33	8	34	42	24	17	39
MEAN AGE	61.9+/-8.4			66.6+/-8.9			68.7+/-6.1			69.9+/-7.6		
PREVAL ENCE	3.05%			1.06%			1.35%			1.25%		

Cataract surgery was performed in 400 patients (28.4%) while 34 required cataract surgery with trabeculectomy. Cataract surgery was deferred in 41 patients due to co-existing comorbidities. About 36.7% (390) patients had ocular involvement other than cataract and 111 (10.3%) had post cataract surgery complication like aphakia or posterior capsular opacification (PCO) or corneal decompensation. About 95 (3.05%) of total patients were glaucoma suspects. Primary angle closure glaucoma suspects (PACS) and pseudo exfoliation comprised of nearly 1% each. All those patients with risk factor for glaucoma and those with ocular hypertension (1.06%) were advised regular follow up.

Discussion

About 33.4% of the total patient (3109) presented with ocular involvement other than cataract with retinopathy (26.4%), pterygium (24.8%) and cataract surgical complications (10.47%) together constituting 60% of those with co-morbidities. In a similar study by Gangwe et al 22.9% of out-reach camp patients required specialist referral with glaucoma and retinopathy constituting 51% of those.⁹ Cataract is the most common cause of visual impairment in patients aged > 40 years (81.13%) in our present study. According to National Blindness and Visual Impairment Survey cataract remains the most important cause of blindness (66.2%), severe visual impairment (80.7%) and moderate visual impairment (70.2%). Since refraction is done at the camp site it prevents unnecessary transportation of patients from the out-reach camp to base hospital. Only the patients with best corrected visual acuity worse than 6/18 were referred from the outreach camps hence refractive error is not significant in our cohort of patients.

Patient with pterygium contributed a significant number to the co-morbidities. The high prevalence of pterygium (8.46%) in our study may be due to the rural population involved in agriculture and hence exposure to prolonged sun light. According to CIEMS study the prevalence of pterygium increased from 6.7±0.8% in less than 40 years to 25.3±2.1% age greater than 70 years with an overall prevalence of 8.47% which is similar to findings of our

study.¹¹ Prevalence of post- cataract surgery complications was 3.57% (111) with 89 patients having posterior capsular opacification in either eye. The National blindness survey indicates that nearly 7-8% of blindness or visual impairment is due to cataract surgical complication.²

Prevalence of retinopathy was 9% with nearly half of them (135 patients) presenting with diabetic retinopathy (DR). More than 70% (96) of those with DR were unaware of their diabetes and retinopathy status. This signifies the importance of comprehensive screening in detecting the hidden cases in the community. According to Pan India Diabetic Retinopathy Project, data from West Bengal presents a prevalence of DR at 21.51% with a higher prevalence in rural population (26.5%).⁸ The lower prevalence of DR in our study may be because patients with visual impairment (BCVA<6/18) were considered. According to IDF Diabetes Atlas 2021, the prevalence of diabetes is set to increase from 8.6 in 2021 to 12.8% in 2045.¹² In such situation screening for diabetic retinopathy in the rural patients becomes paramount.

Prevalence of Age-Related Macular Degeneration (ARMD) in our study is 1.25% with 71.8% (28) presenting with dry ARMD. According to Hamati et al, prevalence of ARMD in a hospital setting in patient aged more than 60 years was 1.68%.¹³ Ours is lower since patients from a younger age group 40-60 years have been considered in the study.

About 8.5% of the patients with comorbidities had glaucoma with prevalence of POAG, secondary glaucoma and PACG being 1.64%, 0.86% and 0.38% respectively. The hindrance in glaucoma management is due to ignorance, undetected cases, inadequate accessible treatment, financial constraints and treatment compliance.¹⁴ Meticulous screening in referred patients will render timely intervention for glaucoma in rural population as well as help in detecting the population at risk for developing glaucoma (disc suspects, ocular hypertension, PEX etc.) Prevalence of PEX is 1.25% which is similar to CIEMS study (1.49+/-0.18%) but much lower than study done in South India (3.8%).^{15,16} About 10% (4) of PEX presented with glaucomatous optic atrophy.

A meta-analysis and systemic review by Mehta et al have found a poor outcome of cataract surgery in the presence of active uveitis as well as posterior uveitis.¹⁷ Uveitis along with complication due to uveitis such as uveitic glaucoma and complicated cataract presented in more than 6% of patients with comorbidities. Cataract surgery was deferred in the presence of active uveitis. Presence of uveitis and its sequel can determine the post-operative visual outcome of the patient. It was interesting to note that even with the presence of active uveitis (anterior or posterior) in 22(2.1%) patients and presence of keratitis in 1.5% (16), the patients had not presented to the hospital rather were detected on routine outreach camp. This shows the apathy and reluctance to access health care services by rural population, or it may be due to financial constraints or transportation issues.

Generalizability

This study's findings affect a wider community, notably rural visual impairment and ocular health. Understanding cataract comorbidities is important since 15.2 million persons over 50 worldwide have cataract-related blindness, and 29.7% more cases were reported from 2000 to 2020. This study in rural India found that 33.4% of outreach camp patients had eye diseases other than cataracts. Retinopathy, pterygium, and post-cataract surgery problems made up 60% of comorbidities. To effectively treat vision impairment, extensive screening and early intervention are essential. Outreach camps are crucial in finding hidden cases of diabetic retinopathy, as many patients were unaware of their disease. The study also showed the prevalence of glaucoma, posterior capsular opacification, and uveitis, emphasizing the necessity for prompt treatment. This study sheds light on rural ocular comorbidities and emphasizes the need for accessible eye care and thorough screening programs to enhance visual health.

Conclusion

A comprehensive examination of patients referred from camps can be a cost-effective and efficient tool to identify the hidden ocular diseases in the community. It not only aids in identifying but also providing optimum management of the comorbidities to provide maximum benefit to the patients. The merit of our study lies in meticulous examination of outreach patients and highlighting not only on cataract surgery but also a planned management of other com-morbidities.

Limitation

The limitation of our study was its retrospective nature and the lack of follow up data of patient.

Recommendation

Thorough examination of the patients with ocular comorbidities can help identify the ocular diseases earlier and plan their management efficiently and effectively. It will also prevent post cataract surgery complications.

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List of abbreviations

IEC- Institutional ethics committee.
BCVA- Best corrected visual acuity
OCT- Optical Coherence Tomography
PCO- Posterior capsular opacification
ARMD- Age-Related Macular Degeneration
DR- Diabetic retinopathy

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Conflict of interest

The authors have no competing interests to declare.

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