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Original Research Article

A Study to Assess the Visual Outcome after Cataract Surgery in Rural Population: A Descriptive Observational Study

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Abstract:

Aim: The aim of the present study was to assess the visual outcome after cataract surgery in rural population of Bihar.

Material & Methods: We carried out a population-based cross-sectional study in the Bihar state . All the adults who were 50 years and older for over 1 year were included in the study.

Results: The odds of poor visual outcomes among those aged over 80 years was 2.5 times higher than for those 50–59 years. The most likely causes were visual impairment and blindness in eyes with presenting visual acuity worse than 6/18. Factors associated with risk of poor visual outcomes were evaluated using univariate multivariate logistic regression.

Conclusion: Cataract outcomes can be definitely improved with a good follow-up component in the cataract blindness program that results in elimination of the treatable causes for poor outcomes. Though the proportion of IOL implant surgery has increased, support services such as the availability of YAG lasers and infrastructure for follow-up have not kept pace. There is a need to enhance the cataract surgery program to include adequate infrastructure for postoperative monitoring and appropriate management. By improving this facility, the prevalence of visual impairment in pseudophakics can be minimized.

Keywords: Cataract Surgery, Epidemiology, India, Population, Visual Impairment.

Introduction

Cataract remains the leading cause of blindness in India. [1] It is particularly common in developing countries. [2] Cataract is defined as opacity within the clear lens inside the eye that reduces the amount of incoming light and results in deterioration of vision. [3] According to the World Health Organization (WHO), cataract is the leading cause of blindness all over the world, responsible for 47.8% of blindness and accounting for 17.7 million blind people. [4]

In India, major cause of blindness is cataract, which accounts 62.6%. [5] Age-related cataract or senile cataract occurs in people aged >50 years of age and results from increasing opacification of the ocular lens, eventually leading to visual impairment or loss among older adults throughout the world. [6] The role of environmental and personal risk factors for the development of age-related cataract in this population is uncertain.

The main emphasis of the National Program for Control of Blindness (NPCB) in India was on cataract blindness control. [7] Cataract surgery is the only method of restoring vision for those with vision impairment due to cataract. As a result, the number of cataract surgeries performed increased from 1.2 million/year in 1992 to 3.86 million/year in the year 2003. [8] In the “Vision 2020: The Right to Sight” initiative the target was to perform 21.1 million cataract surgeries during 2002-07 with 80% intraocular lens implantation. [9] Even though the cataract surgical targets are met, poor outcomes of cataract surgery are a major problem in developing countries. [10-13]

Population-based studies of persons aged over 50 years in India have noted that good presenting vision following cataract surgery ranges from 31.5% to 64%, improving with best correction to 61.1–83.5% of eyes. [14-16] In the 2007 RAAB, 55.9% of participants who underwent cataract surgery previously had PVA better than 6/18, 21.3% had PVA worse than 6/18 but better than or equal to 6/60, and 22.8% had PVA less than 6/60. [17] The prevalence of cataract surgery was lower in women18 and the risk of blind- ness after surgery higher.[14]

The purpose of this study was to report the visual outcome of cataract surgery and associated factors that influenced visual outcomes in the population.

Material & Methods

We carried out a population-based cross-sectional study in the Bihar state. All the adults who were 50 years and older for over 1 year were included in the study.

Identification of study subjects: The Community Health Department maintains an updated computerized, demographic surveillance system for all individuals in a block. Health aides visited individuals on the list and identified persons who had undergone cataract surgery in one or both eyes and invited them to study clinics specially set up in the villages on specific dates. Following written informed consent, eligible individuals were recruited at the study clinic and examined, over a period of 5 months. PVA and best-corrected visual acuity (BCVA) were determined by an optometrist using a retro-illuminated, logarithm of the minimum angle of resolution (LogMAR) tumbling E chart at 4 m, assessed indoors in a dimly lit room. A Heine retinoscope was used for retinoscopy in a darkened room. Two trained social workers administered the questionnaires, which included details on demo- graphic characteristics, SES, systemic comorbidities, site of inclusion to study, questions relating to surgery (place of screening, date, place of surgery) and post- operative follow-up. The principal investigator examined all eyes to get information on type of surgery, presence of complication, pupil status, lens status and posterior capsular status using a handheld slit lamp (Heine HSL 100 (X-99.105). Individuals with BCVA 6/18 or worse in the operated eye were examined in further detail. This included detailed examination of the anterior segment, instillation of 1 drop of tropicamide for dilatation of the pupil, and indirect ophthalmoscopy. The principal investigator determined the type of cataract surgery based on discharge summary and/or clinical examination. Where more than one cause of visual impairment was noted, the principal investigator assigned the most important contributor as the primary cause. Refractive error was considered the primary cause in eyes that improved to 6/15 or better with best correction. After qualifying the status of correction as uncorrected, presenting, pinhole or best-corrected, “blindness in an eye” was defined as distance visual acuity <6/60 (logMAR >1). Visual out- comes were defined as good if visual acuity in the operated eye was better than or equal to 6/18 (logMAR ≤0.47), fair if worse than 6/18 but better than or equal to 6/60 (logMAR ≥0.48 but ≤1.0) and poor if worse than 6/60 (logMAR >1).

Non-respondents were contacted at home (home visit), where visual acuity was tested on a daylight illuminated logMAR E chart validated for 3 m. Pinhole visual acuity was assessed instead of BCVA. All patients visited at home received anterior segment examination as in the study clinic, and where required, dilated direct ophthalmoscopy (Heine beta 200). Those requiring further evaluation or treatment were referred to the base hospital and provided care free of cost. We looked at the association of literacy, systemic comorbidities, years since surgery, type of surgery, causes of poor vision, place of screening, place of surgery, site of recruitment and SES with visual outcome.

A socioeconomic score was determined from data in the database using a previously validated scoring system, which included details regarding caste, type of house, occupation, education and land ownership (low <7, middle 7–9, high >9).

Ethics

The study was approved by the institutional ethical committee and conformed to the Declaration of Helsinki and the ethical guidelines for biomedical research on human participants enunciated by the Indian Council of Medical Research.

Statistics: Frequencies of all quantitative variables were computed. Prevalence of good, fair, and poor visual out- comes along with 95% CIs were determined. Effect of duration was studied using the chi square test for trends. Associations with poor visual outcomes were assessed using logistic regression models while adjusting for age at first eye surgery, sex, literacy, socioeconomic score, site of screening and surgery, and duration since surgery. All statistical analyses was conducted using SPSS version 15.0 (SPSS Inc, Chicago, IL, USA).

Results

Table 1: Association between age and poor visual outcomes in eyes having undergone cataract surgery

Poor visual outcome		**Odds ratio**
Age group, years	**n**	**(95% CI)**
50–59	10	1 (reference)
60–69	22	1.0 (0.4–2.5)
70–79	32	1.4 (0.6–3.4)
80–100	21	2.5 (1.0–6.5)
Total	85	

The odds of poor visual outcomes among those aged over 80 years was 2.5 times higher than for those 50–59 years.

Table 2: Most likely causes of poor and fair presenting visual acuity in study eyes

Cause	Poor, n	Fair, n	Total, n
Treatable	50	300	350
Corneal pathology	16	6	15
Unilateral aphakia	24	4	20
Refractive error	4	225	240
Posterior capsular opacity	6	65	75
Preventable	7	17	20
Glaucoma	5	17	17
Wound dehiscence	1	0	1
Fibrous ingrowth	1	0	1
Retained lens matter	0	1	1
Incurable	43	84	110
Endophthalmitis	1	0	1
Cystoid macular edema	1	14	15
Macular pathology	18	49	58
Other retinal causes	17	11	20
Optic atrophy	6	10	16
Known	100	400	480
Unknown			15
Missing			5
Total	100	400	500

The most likely causes were visual impairment and blindness in eyes with presenting visual acuity worse than 6/18.

Table 3: Association of age, sex, literacy, socioeconomic score, place of screening, place of cataract surgery and duration since surgery with poor visual outcomes

Factor	Odds ratio (95% CI)
Age at first eye surgery ≥64 years	0.9 (0.5–1.5)
Male sex	0.8 (0.5–1.4)
Illiterate	1.0 (0.6–1.7)
Low socioeconomic score	1.0 (0.6–1.8)
Screening (first eye) at camp	0.8 (0.5–1.4)
Cataract surgery at government hospital	2.3 (1.2–4.3)
Duration since surgery ≥3 years	7.7 (1.9–32.1)

Factors associated with risk of poor visual outcomes were evaluated using univariate multivariate logistic regression.

Discussion

More than 90% of disability-adjusted life years lost due to cataract occur in low- and middle-income countries, highlighting the inequalities in the burden of cataract. [19] A rapid assessment of avoidable blindness (RAAB) survey conducted in 2006 across India found that the prevalence of blindness (presenting visual acuity <6/60 in the better eye) in those aged 50 years and older was 8.0% (95% confidence intervals, CI, 7.5–8.5%), with cataract contributing to 77.5% of blindness. [20] The National Program for Control of Blindness (NPCB) facilitates a public private partnership involving governmental and non-governmental organizations delivering eye care within districts in India. [21] While mass camps conducted in the field for screening and surgery at a base hospital is a cost effective strategy, [22] the most critical performance indicator is visual outcomes after surgery. The World Health Organization (WHO) recommends that over 80% of eyes undergoing cataract surgery should result in good presenting visual acuity (PVA) of 6/18 or better. [23]

The odds of poor visual outcomes among those aged over 80 years was 2.5 times higher than for those 50–59 years. Risk factors predicting blindness in first operated eyes were similar to those in Tirunelveli (those operated in government facilities having 2–6-fold higher odds of blindness compared to those operated at non-governmental organizations), [24] also no significant difference between the sexes were seen and higher adjusted odds for blindness among those operated before 1998. [25] The trend for duration since surgery was exponential, and the risk of poor visual outcome at 3 years was twice as high as for those undergoing surgery more recently due to posterior capsular opacification. The odds of poor visual outcomes in those operated >10 years prior was 13 times greater than those operated in the last 1–2 years.

The most likely causes were visual impairment and blindness in eyes with presenting visual acuity worse than 6/18. Factors associated with risk of poor visual outcomes were evaluated using univariate multivariate logistic regression. Like other studies [26-28] increasing age was a risk factor for poor outcome and it is likely that with increasing age, there are other co-existing morbidities, which could affect outcomes. Similarly, those in rural areas were also having poor outcomes and it could be due to the fact that most of these surgeries were done in government and NGO hospitals, including free of cost surgeries. Most of these surgeries in rural areas are done through outreach programs as part of the National Program for Control of Blindness (NPCB) activity where they are transported to the base hospital for surgeries and given one-time free glasses six weeks after cataract surgery. It is seen that, if the glasses are broken or lost, many of these patients do not get a replacement of a new pair of glasses, and manage with the existing vision, thus affecting outcomes. Socioeconomic score did not appear to significantly affect visual outcome or access to screening camps. This may reflect the fact that people from all socioeconomic score categories perceive screening camps to be equally good. Although it has been reported that SES is an important determinant for visual impairment. [29]

Conclusion

Cataract outcomes can be definitely improved with a good follow-up component in the cataract blindness program that results in elimination of the treatable causes for poor outcomes. Though the proportion of IOL implant surgery has increased, support services such as the availability of YAG lasers and infrastructure for follow-up have not kept pace. There is a need to enhance the cataract surgery program to include adequate infrastructure for postoperative monitoring and appropriate management. By improving this facility, the prevalence of visual impairment in pseudophakics can be minimized.

References

1. Vijaya L, George R, Rashima A, Raju P, Arvind H, Baskaran M, Ramesh SV. Outcomes of cataract surgery in a rural and urban south Indian population. Indian journal of ophthalmology. 2010 May;58(3):223.
2. Pascolini D, Mariotti SP, Pokharel GP, Pararajasegaram R, Etya'Ale D, Négrel AD, Resnikoff S. 2002 global update of available data on visual impairment: a compilation of population-based prevalence studies. Ophthalmic epidemiology. 2004 Jan 1;11(2):67-115.
3. Robert S, Randall LK, editors. Cataracts-overview life extension.
4. Liu YC, Wilkins M, Kim T, Malyugin B, Mehta JS. Cataracts. The Lancet. 2017 Aug 5; 390(10094):600-12.
5. Directorate general of health services, MOHFW, GOI. National Blindness and Visual Impairment Survey, 2019. mmeforControl-ofBlindnessVisual.aspx. Accessed on 19th April 2020
6. Sundaresan P, Ravindran RD, Vashist P, Shanker A, Nitsch D, Talwar B, Maraini G, Camparini M, Nonyane BA, Smeeth L, Chakravarthy U. EPHA2 polymorphisms and age-related cataract in India. PloS one. 2012 Mar 8;7(3):e33001.
7. Jose R, Bachani D. World Bank-assisted cataract blindness control project. Indian journal of ophthalmology. 1995 Mar;43(1):35-43.
8. National Programme for Control of Blindness, India. Performance of cataract surgery between April2002 and March 2003, National Programme for Control of Blindness-India, Quarterly Newsletter 2003;2:2.
9. National Programme for Control of Blindness,India. Revised pattern of assistance under NPCB, National Programme for Control of Blindness-India, Quarterly Newsletter 2004 ;3:2.
10. Dandona L, Dandona R, Naduvilath TJ, McCarty CA, Mandal P, Srinivas M, Nanda A, Rao GN. Population-based assessment of the outcome of cataract surgery in an urban population in southern India. American journal of ophthalmology. 1999 Jun 1;127(6):650-8.
11. Murthy GV, Ellwein LB, Gupta S, Tanikachalam K, Ray M, Dada VK. A population-based eye survey of older adults in a rural district of Rajasthan: II. Outcomes of cataract surgery. Ophthalmology. 2001 Apr 1; 108(4):686-92.
12. Nirmalan PK, Thulasiraj RD, Maneksha V, Rahmathullah R, Ramakrishnan R, Padmavathi A, Munoz SR, Ellwein LB. A population based eye survey of older adults in Tirunelveli district of south India: blindness, cataract surgery, and visual outcomes. British Journal of Ophthalmology. 2002 May 1;86(5):505-12.
13. Anand R, Gupta A, Ram J, Singh U, Kumar R. Visual outcome following cataract surgery in rural Punjab. Indian Journal of Ophthalmology-New Delhi. 2000 Jun 1;4 8(2):153-8.
14. Dandona L, Dandona R, Naduvilath TJ, McCarty CA, Mandal P, Srinivas M, Nanda A, Rao GN. Population-based assessment of the outcome of cataract surgery in an urban population in southern India. American journal of ophthalmology. 1999 Jun 1;127(6):650-8.
15. Nirmalan PK, Thulasiraj RD, Maneksha V, Rahmathullah R, Ramakrishnan R, Padmavathi A, Munoz SR, Ellwein LB. A population based

eye survey of older adults in Tirunelveli district of south India: blindness, cataract surgery, and visual outcomes. British Journal of Ophthalmology. 2002 May 1;86(5):505-12.
16. Murthy GV, Vashist P, John N, Pokharel G, Ellwein LB. Prevalence and vision-related outcomes of cataract surgery in Gujarat, India. Ophthalmic epidemiology. 2009 Dec 1;16(6): 400-9.
17. Murthy GVS Jr., Vashisht P, John N. Rapid assessment of avoidable blindness – India, 2006–2007. New Delhi: Ministry of Health and Family Welfare, Government of India, 20 07.
18. Nirmalan PK, Padmavathi A, Thulasiraj RD. Sex inequalities in cataract blindness burden and surgical services in south India. British Journal of Ophthalmology. 2003 Jul 1;87(7): 847-9.
19. Khanna R PS, Sangwan V. Cataract surgery in developing countries. Curr Opin Ophthalmol 2011; 22:10–14.
20. Neena J, Rachel J, Praveen V, Murthy GV, RAAB India Study Group. Rapid assessment of avoidable blindness in India. PloS one. 2008 Aug 6;3(8): e2867.
21. Jose R, Rathore AS, Rajshekar V, Sachdeva S. Salient features of the National Program for Control of Blindness during the XIth five-year plan period. Indian Journal of Ophthalmology. 2009 Sep;57(5):339.
22. Dua AS. Background papers: Burden of disease in India. National program for control of blindness. New Delhi, India: National Commission on Macroeconomics and Health, Ministry of Health and Family Welfare, Government of India, 2005.
23. Fletcher AE, Ellwein LB, Selvaraj S, Vijaykumar V, Rahmathullah R, Thulasiraj RD. Measurements of vision function and quality of life in patients with cataracts in southern India: report of instrument development. Archives of Ophthalmology. 1997 Jun 1;115(6):767-74.
24. Nirmalan PK, Thulasiraj RD, Maneksha V, Rahmathullah R, Ramakrishnan R, Padmavathi A, Munoz SR, Ellwein LB. A population based eye survey of older adults in Tirunelveli district of south India: blindness, cataract surgery, and visual outcomes. British Journal of Ophthalmology. 2002 May 1;86(5):505-12.
25. Murthy GV, Vashist P, John N, Pokharel G, Ellwein LB. Prevalence and vision-related outcomes of cataract surgery in Gujarat, India. Ophthalmic epidemiology. 2009 Dec 1;16(6): 400-9.
26. Murthy GV, Ellwein LB, Gupta S, Tanikachalam K, Ray M, Dada VK. A population-based eye survey of older adults in a rural district of Rajasthan: II. Outcomes of cataract surgery. Ophthalmology. 2001 Apr 1; 108(4):686-92.
27. Thulasiraj RD, Reddy A, Selvaraj S, Munoz SR, Ellwein LB. The Sivaganga Eye Survey: II. Outcomes and cataract surgery. Ophthalmic epidemiology. 2002 Jan 1;9(5):313-24.
28. Vijaya L, George R, Rashima A, Raju P, Arvind H, Baskaran M, Ramesh SV. Outcomes of cataract surgery in a rural and urban south Indian population. Indian journal of ophthalmology. 2010 May;58(3):223.
29. Tielsch JM, Sommer A, Katz J, Quigley H, Ezrine S. Socioeconomic status and visual impairment among urban Americans. Archives of ophthalmology. 1991 May 1;109(5):637-41.