International Journal of Community Medicine and Public Health
Nadkarni S et al. Int J Community Med Public Health. 2019 Jun;6(6):2514-2518
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20192314

Original Research Article

Eight year longitudinal study of cataract surgeries in an urban Indian population

Snehal Nadkarni[1], Priti Patil[2], Nobhojit Roy[3], Martin Gerdin[4], Prashant Bhandarkar[5]*

[1]Department of Ophthalmology, Bhabha Atomic Research Centre Hospital, Mumbai, Maharashtra, India
[2]Department of Statistics, Medical Division, Bhabha Atomic Research Centre Hospital, Mumbai, India
[3]School of Public Health and Preventive Medicine, Monash University, Melbourne, Vic, Australia
[4]Department of Public Health Sciences, Health Systems and Policy, Karolinska Institutet, Stockholm, Sweden
[5]WHO Collaborating Center for Research in Surgical Care Delivery in Low and Middle Income Countries, BARC, Mumbai, India

Received: 18 March 2019
Accepted: 08 May 2019

***Correspondence:**
Mr. Prashant Bhandarkar,
E-mail: prashant_bhandarkar@yahoo.com

ABSTRACT

Background: The aim was to study cataract surgery incidence in an urban community of 100,000 peoples in Mumbai.
Methods: A retrospective observational community based study was performed for the period from January 01, 2008 to December 31, 2015. Electronic patient records were used to track surgeries performed in the members of community. Mid-year community census was considered as baseline population to estimate gender specific and age specific incidence of cataract surgery. Logistic regression was performed assuming gender and age-group as independent variables.
Results: The rate of cataract extraction surgery varies from 786 to 952 surgeries per 100,000 per year. 6971 cataract surgeries were recorded with an overall average of 872/100,000/years. Increase in age was strongly associated with increase in incidence of cataract surgery and peak incidence was recorded for age group of 66–70 years. The odds of having surgery were similar in females and males 1.012 (95% CI 0.952 - 1.077).
Conclusions: This study documented the rate of 872 cataract surgeries per year in an Indian population over eight years. Average incidence is found in the similar range of studies published from United States and Sweden. This community-based estimates of cataract surgery are useful for planning and managing resources at the national level.

Keywords: Cataract, Surgery incidence, Surgical needs, Community health, Eye surgery

INTRODUCTION

Cataract is a common eye disease in which the normal clear lens of the eye gradually becomes cloudy or opaque, causing impaired vision. Most cataracts are age related and can be cured by surgery.[1–4] However, un-operated cataract disease causes significant morbidity and constitutes a major cause of visual impairments and blindness worldwide. Globally, around 285 million people are visually impaired, of which, about 90% live in developing countries.[5] An estimated 63 million people with visual impairments live in India with 62.4% of bilateral blindness due to cataract.[5,6]

Cataract extraction is a common surgery in the geriatric population (>65 years).[7] In tropical countries cataract onset in younger age groups has been reported[7]. In the age group of above 80 years, more than half of the population either have a cataract in at least on one eye or has previously undergone through cataractsurgery.[8] According to WHO criteria, a person with visual acuity less than 6/18 is recommended to undergo cataract

surgery.[5] Because cataract is a slowly disabling disorder, patients may not approach to health facility until the condition is fairly advanced and affects their daily life.[9]

Thus, estimates of disease prevalence are likely to be low; whereas many more individuals may be classified as "potential cataracts." Accurate and reliable estimates of cataract incidence are necessary to manage design and implementation of the ophthalmological infrastructural needs, allocation of resources and manpower, for this elective planned surgery. Hence, our research question was: what is the incidence of cataract in an urban community in Mumbai? In answering this question, we assumed that the incidence of cataract surgery in a defined population with complete and free universal access to surgical services can be used as a proxy measure of cataract incidence among the beneficiaries of a healthcare scheme.

METHODS

Design

We conducted a retrospective observational study for an eight-year period, from January 1, 2008 to December 31, 2015.

Settings

Our setting was the Contributory Health Service Scheme (CHSS) provided by the Department of Atomic Energy (DAE) in Mumbai. The CHSS covers Government employees at DAE and their dependant family members for universal healthcare (UHC). Therefore beneficiaries are not subject to financial barriers for seeking treatment. Children can avail the facility till the age of 25 years; whereas employees and spouses can access the CHSS services after retirement as well. The CHSS is a comprehensive medical facility, provided through a central multispecialty hospital with 390 beds and 13 primary health centres spread across Mumbai urban and sub-urban areas. All patient data is recorded electronically in a centralized Hospital information system (HIS).

Participants

All CHSS beneficiaries registered in Mumbai were the potential participants for this study. We identified CHSS beneficiaries who underwent cataract extraction surgery during the study period using operation notes. Patients operated for both eyes and single eye cataract surgeries were considered in this study. Patients' referred for complex cataract extraction surgery to other specialist hospitals in Mumbai, were tracked from HIS during study period and considered in this study.

Primary outcome

Incidence of cataract surgery was considered the primary outcome, defined as number of persons undergoing cataract extraction surgery per 100,000 population per year.

Covariates

We defined gender and age group as covariates.

Data sources and measurements

We used the HIS as the data source for all variables. To estimate the incidence of cataract surgery, we used data on population size using the CHSS mid-year census.

Bias

The Department of Ophthalmology is managed by three ophthalmologists. The bias in surgery rates that occurred due to absenteeism of an individual ophthalmologist, which was eliminated by a linear standardization technique (see statistical methods and analyses for details). Another bias originated from the fact that the CHSS population is a self-selected population as children of DAE employees drop out of the health scheme, after 25 years of age. We were unable to adjust for this bias.

Study size

Our sample was an exhaustive sample, i.e. all CHSS beneficiaries were included.

Statistical analyses

Cataract surgeries affected during the leave period of an individual doctor for more than one month was adjusted. A linear trend standardization technique was used to calculate such values, using SPSS 20.0 (IBM Inc., Chicago, USA). Missing value in a month for an individual doctor on leave was substituted by the estimated values to eliminate associated bias.

Logistic regression was used to estimate the association between cataract surgery, gender and age. Three models were fitted, each with cataract surgery as the dependent variable. The first model had gender as the independent variable, with male as the reference category. The second model had age as the independent variable, with <51 years as the reference category. The last model included both gender and age as independent variables; gender specific graph of surgery incidences was plotted. Trend of cataract surgery incidence over the period of eight year was observed.

Study was approved by the Institutional Ethics Committee of BARC Hospital during their meeting held on June 12th, 2015 (Ref No BHMEC/47/2015 dated July 08, 2015).

RESULTS

A community population of 100,000 beneficiaries was the potential sample for this study. The mid-year community population was considered as the baseline population for calculating the incidence of cataract surgeries. On an average 18000 yearly visits were recorded at the ophthalmic clinics, while 750 per year cataract extraction surgeries were performed.

Table 1: Demographical breakup of patients undergone through cataract surgery (2008–2015).

Age group	Male	%	Female	%	All	%
<41	34	1	34	1	68	1
41-45	39	1	71	2	110	2
46-50	96	3	159	5	255	4
51-55	184	5	250	7	433	6
56-60	437	12	462	14	899	13
61-65	641	18	735	22	1,376	20
66-70	833	23	816	24	1,649	24
71-75	787	22	541	16	1,327	19
76-80	430	12	224	7	653	9
>80	133	4	66	2	198	3
Total	3,614		3,357		6,971	

In total 6494 patients were operated for cataract during study period. The mean age at surgery was 66 years ±9.2 (SD). Females were operated earlier than males with mean age at surgery of 64 years ±9.2 (SD) compared to 66 years±9.1 (SD) in men (Table 1). A total of 1955 patients were operated for both eyes during study period, while 2584 were operated for a single eye.

After using the linear standardization technique, the total number of surgeries was estimated to be 6971. The majority of surgeries (90.2%) were performed at community hospital while 9.8% were performed at specialist hospitals across the city.

The average incidence of cataract surgery was found to be 872 surgeries per 100,000 during the study period. In males, the average yearly incidence of cataract surgery was 916 surgeries per 100,000 population compared to 863 surgeries per 100,000 population in females. The highest incidence of cataract surgery was observed in the seventh decade of life. The overall surgery incidence trend was found to be increasing during the study period. Annual incidence of cataract extraction surgery before and after linear standardization technique are shown in Figure 1 and 2 respectively.

Table 2: Effect of background characteristics on cataract surgery incidence (2008-2015).

Variable	Category	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Sex	Male [R]	Referent Category	
	Female	1.012 (0.952-1.077)	0.989 (0.932-1.050)
Age group (years)	<50 [R]	Referent Category	
	51–60	15.059 (13.232-17.139)	15.062 (13.235-17.142)
	61–70	39.345 (34.909-44.346)	39.354 (34.916-44.355)
	71–80	42.286 (37.279-47.967)	42.253 (37.252-47.925)
	>81	13.427 (10.847- 16.619)	13.431 (10.851-16.624)

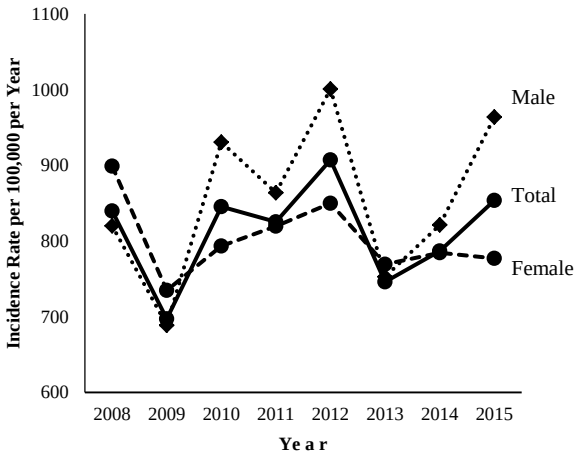

Figure 1: Overall and sex-specific incidence of cataract surgery, 2008 – 2015 – Before Linear Standardization when surgeries during the leave period of doctors were not considered.

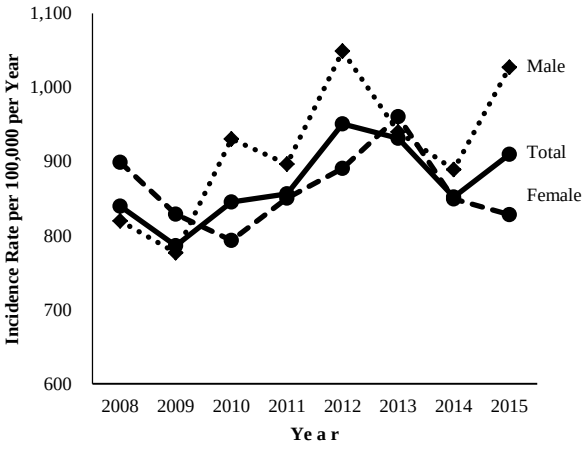

Figure 2: Overall and sex-specific incidence of cataract surgery, 2008 – 2015– After Linear Standardization when surgeries during the leave period of doctors were considered.

Binary logistic regression analysis was performed with cataract surgery as the dependent variable and age and gender as independent variables (Table 2). Compared to males, females did not have significantly higher odds of cataract surgery (adjusted OR 1.012, 95% CI 0.952–1.077). Considering the age group of less than 51 years as the reference category, older patients were found to have higher odds of cataract surgery.

DISCUSSION

The overall trend of the incidence of cataract surgery steadily increased during the study period of 2008 to 2015. The association between age and cataract surgery was the same for both genders (Table 2). Out of all operated patients, 93.7% were older than 50 years. Moreover it was found that, 3 of 4 operated patients' were older than 60 years of age.

As highlighted in the recent Lancet Commission report on global surgery, in low and middle income countries (LMICs)the delivery of surgical care are affected by the affordability, accessibility and availability of surgical infrastructure.[10] Especially lower socioeconomic conditions may be responsible for visual disability due to easily treatable conditions like cataract.[11] LMICs reported strong gender bias, with higher priority of treatment often exercised by males.

One study from developing countries (China, India, Nepal, Malawi and South Africa) reported that for females, the odds ratio of having cataract surgery, compared to males, was 0.67 (95% CI: 0.60–0.74).[12] Another study from Sweden reported significantly higher cataract surgery rate for females compared to males.[13] It is to be noted that the present study showed that females had similar odds of cataract surgery compared to males. One hypothetical explanation for this would be that, study population health care is heavily subsidized which eliminates the cost of treatment as a barrier to surgery. Furthermore, this study included primarily participants from urbanized and educated community.

The Swedish National Cataract Register (SNCR) with more than 1 million cataract surgeries documented a yearly incidence of cataract surgery between 800 to 900 per 100,000 during 2002. These estimates were reported to be stable up to 2009.[14] Another study based on Mayo Clinic, US data reported average yearly incidence in the range of 850 to 1100 per 100,000 population during 2005 to 2011.[15] It is interesting to note that in this study of CHSS beneficiaries from Mumbai we found a similar rate for cataract surgery as compared to High-income countries (HIC) once the financial barriers for access to surgery was removed, as in this universal access health scheme.

We acknowledge the limitation that some cases might have been excluded who were operated outside the community healthcare setup. However as seen towards financial constraints and middle income community that volume possible to be negligible.

India, with 8.5% of its population belong to the geriatric age group in 2011 was tagged as an ageing country. The proportion of geriatric population is expected to increase.[16] Therefore, cataract surgical needs are expected to increase in the future.

A study based on blindness program, Vision 2020 states that, though the prevalence of cataract blindness would decrease, the absolute number of cataract blind would increase. This study concludes that it will be difficult to achieve elimination of cataract blindness by 2020.[17] The results estimated in our study may be generalizable to the national population, though with caution. More emphasis is needed towards the unmet cataract surgery burden across the globe.

CONCLUSION

This study documented the rate of 872 cataract surgeries per year, in an Indian population of 100,000, over eight years. To avoid cataract related blindness, overall growth observed in cataract surgery incidence are need to be addressed with an adequate resources. Population based estimates are useful while future planning of cataract based surgical services. The community based cataract estimates of this study may be for used for various population with caution for effective strategy and planning.

ACKNOWLEDGEMENTS

We are thankful to Dr. Anita Gadgil, Head, Department of Surgery, Bhabha Atomic Research Center Hospital for her boundless support and Thursday Truth Seekers Group, Mumbai for their support during the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee of BARC Hospital

REFERENCES

1. Sapkota YD, Pokharel GP, Nirmalan PK, Duala S, Maharjan IM, Prakash K. Prevalence of blindness and cataract surgery in Gandaki Zone, Nepal. Br J Ophthalmol. 2006;90:411–6.
2. Tsai SY, Hsu WM, Cheng CY, Liu JH, Chou P. Epidemiologic study of age-related cataracts among an elderly Chinese population in Shih-Pai, Taiwan. Ophthalmology. 2003;110:1089–95.
3. Klein BEK, Klein R., Lee KE, Gangnon RE. Incidence of Age-Related Cataract over a 15-Year Interval. The Beaver Dam Eye Study. Ophthalmology. 2008;115:477–82.
4. Danquah L, Kuper H, Cristina E, Mamunur RA, Liza B, Foster A, et al. The long term impact of

cataract surgery on quality of life, activities and poverty: Results from a six year longitudinal study in Bangladesh and the Philippines. PLoS One. 2014;9(4):e94140.
5. Global Data on Visual Impairment 2010. World Health Organization. Correspondenceto: Silvio P. Mariotti, World Health Organization, 20 Avenue Appia, 1211 Geneva 27,Switzerland, 2010.
6. Murthy GVS, Gupta SK, Bachani D, Jose R, John N. Current estimates of blindness in India. Br. J. Ophthalmol. 2005;89:257–60.
7. Rao GN, Khanna R, Payal A. The global burden of cataract. Curr Opin Ophthalmol. 2011;22:4–9.
8. Panchapakesan J, Mitchell P, Tumuluri K, Rochtchina E, Foran S, Cumming RG. Five year incidence of cataract surgery: the Blue Mountains Eye Study. Br J Ophthalmol. 2003;87:168–72.
9. Grimes CE, Bowman KG, Dodgion CM, Lavy CBD. Systematic review of barriers to surgical care in low-income and middle-income countries. World J Surg. 2011;35:941–50.
10. Meara JG, Hagander L, Alkire BC, Alonso N, Ameh EA. Global Surgery 2030: Evidence and solutions for achieving health, welfare, and economic development. Lancet. 2015;386:569–624.
11. Dandona R, Dandona L. Socioeconomic status and blindness. Br J Ophthalmol. 2001;85:1484–8.
12. Lewallen S, Courtright P. Gender and use of cataract surgical services in developing countries. Bull. World Health Organ. 2002;80:300–3.
13. Lundstrom M, Stenevi U, Thorburn W. Gender and cataract surgery in Sweden 1992-1997. Acta Ophthalmol. Scand. 1999;77:204–8.
14. Behndig A, Montan P, Stenevi U, Kugelberg M, Lundström M. One million cataract surgeries: Swedish National Cataract Register 1992-2009. J Cataract Refract Surg. 2011;37:1539–45.
15. Gollogly HE, Hodge DO, St. Sauver JL, Erie JC. Increasing incidence of cataract surgery: Population-based study. J. Cataract Refract. Surg. 2013;39:1383–9.
16. United Nations Population Division (UN), World Population Prospects: The 2010. (New York: United Nations, 2011.
17. Murthy GVS, Gupta SK, John N, Vashist P. Current status of cataract blindness and Vision 2020: The right to sight initiative in India. Indian J. Ophthalmol. 2008;56:489–94.

Cite this article as: Nadkarni S, Patil P, Roy N, Gerdin M, Bhandarkar P. Eight year longitudinal study of cataract surgeries in an urban Indian population. Int J Community Med Public Health 2019;6:2514-8.