Cataract Surgery Incidence Trends in a Tertiary Public Hospital in Malaysia

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ABSTRACT

Background

Since cataract is the leading cause of blindness and no study has been done on the surgical incidence trends, we conducted this research in Melaka.

Objective

To describe incidences of cataract surgery according to basic demographic variables and types of surgery performed.

Method

Using the National Eye Database (NED), we performed descriptive statistics calculating incidence rates per 1,000 population by demographic features and types of cataract operations to look at the trends of surgeries in the population. Statistics for population were obtained from the department of statistics.

Result

From 2007-2010, 6270 patients mostly 60-69 years underwent cataract surgery. Phacoemulsification (78.2%) was the commonest surgery performed. The annual incidence rate of cataract surgery reduced from 2.05 per 1000 population in 2007 to 2.02 per 1000 population in 2010 ($p<0.05$). Incidence rates for those aged 60 and above rose while for those aged below nine years it declined. Indians had the highest incidence rates followed by Chinese and Malays per 1000 population. Females had a higher incidence rate although there was a declining trend over the years.

Conclusion

Cataract surgery rates showed a decline. Public health education and awareness on detection and operating upon cataracts should be increased and especially targeted towards vulnerable groups such as women, individuals of Indian ethnicity and those aged 50 years and above.

KEY WORDS

Cataract surgery, Melaka public sector, National eye database

INTRODUCTION

Cataract is a leading cause of blindness in Malaysia and cataract surgery is the commonest type of intraocular surgery performed.[1,2] World Health Organisation (WHO) estimates that 50% of blindness worldwide is due to cataract and an estimated 180 million are visually disabled.[3] Blindness is a public health concern and is a socio economic burden not only to the individual but also to the society and nation. Blindness due to cataracts is preventable and community programs for screening and education will help in eradicating it. WHO and a task force of NGOs have launched a common agenda-Vision 2020-The Right to Sight.[3]

Cataract surgery which has evolved from Intracapsular Cataract Extraction (ICCE) to Extracapsular Cataract Extraction (ECCE) and today to phacoemulsification is the only way to improve loss of vision due to cataract. The indications to undergo cataract surgery vary according to the visual requirement of the individual. Cataract surgery should not be performed if the risks outweigh the benefits. Today, cataract surgery is seen not only as a procedure for visual rehabilitation but also as a refractive procedure.

Fashion and trends are determined by a number of factors, so too in cataract surgery. Trends are determined by costs and affordability, capability of the surgeons and operation theatre staff, availability of equipment and operating time, access to treatment and backlog of cases.

A national population survey conducted in France found that incidence of cataract surgery increased from 9.86 to 11.08/1000 person-years and that of operated patients (1 or both eyes) decreased from 7.39 to 6.89/1000 person-years.[4] A study has been published about the practice pattern of cataract surgery in Ministry of Health Hospitals in Malaysia.[5] However, no study has been done on the incidence trends of cataract surgery in Malaysia.

Melaka Hospital is a Government General Hospital which serves as a referral centre for the state of Melaka which has an area of 1,664 km^2. The population of Melaka is 821,110 as of 2010.[6] Cataract surgeries in the government sector are done only in Melaka Hospital.

METHODS

This was a secondary data analysis of records obtained from the National Eye Database (NED) acquired from Hospital Melaka. Hospital Melaka is a government public hospital located in the state of Melaka, Malaysia. As a secondary and specialist hospital, it serves as a referral centre for patients from primary and health centres in the state of Melaka. It is also a teaching hospital for Melaka Manipal Medical College.

The NED is a clinical database of 6 registries, one of which is the Cataract Surgery Registry (CSR). We are now in the culture of using databases for publication, otherwise there is not much point in having databases. One of the purposes of the National Eye Database is to create a tool to facilitate research on eye diseases and its management. This information is of public health importance and is gathered online. (www.acrm.org.my).

The National Cataract Registry (NCSR) was established in 2002 to collect data on patients' profile, surgical practices and outcomes of cataract surgeries. Ministry of Health, University practitioners and private practitioners are all invited to participate in this registry. The aim of NCSR is to determine the distribution and practice patterns of cataract surgery, to evaluate the outcomes and most importantly from a research point of view-is to facilitate and stimulate research. Online data was made available from 2007.

The demographic characteristics of the patient-age, gender and race were noted. The type of surgery (ICCE, ECCE, phaco, lens aspiration) was noted.

We performed descriptive statistics on cataract surgeries using the available demographic and other variables noted in the Cataract Surgery Register (CSR). We calculated crude incidence rates of selected cataract surgeries per 1000 population by age groups, gender, ethnicity and types of cataract operation. In calculating the incidence rate, the numerator comprised the number of cataract surgeries for that particular year in question while the denominator consisted of the mid-year population of Melaka multiplied by 1000. The denominator data for the computations were obtained from Melaka statistics annual reports.[6] We used Chi square for trend to test statistical significance for the change in incidence rate over time. We used SPSS version 20 for data analyses.

RESULTS

A total of 6270 patients were admitted for and underwent cataract surgeries in Hospital Melaka between 2007 and 2010.

The mean age of these patients was 64.6 years of age (Table 1). Most were between 60 to 69 years of age (38.2% of total patients), 70 to 79 years of age (31.2% of total patients), 50 to 59 years of age (17.6% of total patients) and more than 80 years of age (5.3% of total patients). The 0 to 9 years of age provided 0.8% of total patients for cataract surgery with the 20 to 29 years of age and 10 to 19 years of age providing 0.6% and 0.35 of total patients respectively.

The patients comprised of 52.2% females and 47.8% males (Table 1). The main ethnic group that were operated upon comprised of the Malays (43.5%) followed by Chinese (42.0%) and the Indians (13.2%).

As for types of cataract operation, Phacoemulsification cataract surgery was the commonest type with 78.2% of total cataract operations followed by ICCE at 17.0%, conversion of Phacoemulsification to ECCE at 1.9% and lens aspiration at 0.7% (Table 2).

Table 1. Descriptive statistics of basic variables among patients undergoing cataract operation, Hospital Melaka, 2007 to 2010

Variables	Values
Age, years (mean + standard deviation)	**64.6 + 11.9**
Age groups, n(%)	
0 to 9 years	52 (0.8)
10 to 19 years	20 (0.3)
20 to 29 years	39 (0.6)
30 to 39 years	68 (1.1)
40 to 49 years	298 (4.8)
50 to 59 years	1104 (17.6)
60 to 69 years	2393 (38.2)
70 to 79 years	1957 (31.2)
more than 80 years	335 (5.3)
Gender, n(%)	
Female	3276 (52.2)
Male	2994 (47.8)
Ethnicity, n(%)	
Chinese	2635 (42.0)
Iban	1 (0.0)
Indian	829 (13.2)
Kadazan/Murut/Bajau	1 (0.0)
Malay	2726 (43.5)
Other	48 (0.8)
Total	**6270 (100)**

Table 2. Types of cataract operation, Hospital Melaka, 2007 to 2010

Variables	Values n (%)
Types of cataract operation	
ECCE	26 (0.4)
ICCE	1067 (17.0)
Lens aspiration	45 (0.7)
Phaco	4902 (78.2)
Phaco converted to ECCE	121 (1.9)
Other	22 (0.4)
Not available	87 (1.4)
Total	**6270 (100)**

Hospital Melaka Cataract Database

For the years 2007 to 2010, Hospital Melaka Cataract Database contained information on 6270 unique individuals. Table 3 provides descriptive characteristics for these 6270 individuals and of subgroups by year. The annual number of cataract operated cases increased by 8.6% from a total of 1527 in 2007 to 1659 in 2010.

The annual incidence rate of overall cataract surgery reduced from 2.05 per 1000 population in 2007 to 2.02 per 1000 population in 2010 (p value < 0.05).

As for the age groups, the 70 to 79 years of age had the highest average annual incidence rate of 24.68 per 1000 population followed by 60 to 69 years of age with 14.83 per 1000 population and more than 80 years of age with 11.24 per 1000 population.

The incidence rates of cataract surgery for the 60 to 69 years of age, 70 to 79 years of age and more than 80 years of age declined from 15.56 per 1000 population in 2007 to 13.42 per 1000 population in 2010, 25.00 per 1000 in 2007 to 22.34 per 1000 in 2010 and 13.81 per 1000 in 2007 to 8.88 per 1000 in 2010 respectively (p value < 0.05). However, the incidence rate of cataract surgery for the 0 to 9 years of age rose from 0.05 per 1000 in 2007 to 0.16 per 1000 population in 2010 (p value < 0.05). There were no significant differences in trend for the other age groups with 10 to 19 years of age having an average incidence rate of 0.03 per 1000 population, 20 to 29 years of age with incidence rate of 0.07 per 1000, 30 to 39 years of age with 0.16 per 1000, 40 to 49 years of age with 0.77 per 1000 and 50 to 59 years of age with 3.98 per 1000 (p value > 0.05).

With regards to ethnicity, the Indians had the highest average incidence rate of cataract surgery of 4.42 per 1000 population followed by the Chinese with 3.25 per 1000 population and the Malays with 1.47 per 1000 population. The incidence rate of both the Malays and Chinese declined from 1.49 per 1000 in 2007 to 1.45 per 1000 in 2010 and from 3.38 per 1000 in 2007 to 3.2 per 1000 in 2010 respectively (p value < 0.05). The trend for the incidence rate for the Indians remained unchanged (p value > 0.05).

As for gender, the females had a higher average incidence rate of 2.14 per 1000 in comparison to the males with 1.94 per 1000 population. There was also a reduction in incidence rate for the females from 2.19 per 1000 in 2007 to 2.11 per 1000 in 2010 (p value < 0.05). There was no significant difference for the trend for the incidence rate for the males (p value > 0.05).

With regards to the types of cataract operations, the phacoemulsification for cataract surgery had the highest average incidence rate of 1.59 per 1000 followed by ECCE with average incidence rate of 0.35 per 1000. The incidence rate of ECCE surgery declined from 0.41 per 1000 in 2007 to 0.34 per 1000 in 2010 while phacoemulsification converted to ECCE surgeries rose from 0.03 per 1000 in 2007 to 0.05 per 1000 in 2010. There were no significant differences for the trends of other types of cataract surgery such as ICCE and lens aspiration and others (p value > 0.05).

DISCUSSION

This study looked into the demographic patterns of patients undergoing cataract surgery carried out in the public sector in the state of Melaka. We noted a general trend of decline in the annual incidence rates of reported cataract operations for the year 2007 to 2010. Women had a higher

Table 3. Number, percentage and rate* of reported cataract operations by year, age-group, ethnicity, gender and types of cataract operation, Hospital Melaka, 2007-2010

Total	2007 N (%)	Rate	2008 N (%)	Rate	2009 N (%)	Rate	2010 N (%)	Rate	Total N (%)	Aver-age Rate	P value for Chi Square for Trend
	1527 (100)	**2.05**	**1697 (100)**	**2.25**	**1387 (100)**	**1.82**	**1659 (100)**	**2.02**	**6270 (100)**	2.03	0.019***
Age-groups											
0 to 9 years	8 (0.0)	0.05	11 (0.0)	0.07	11 (0.0)	0.07	22 (0.0)	0.16	52 (0.0)	0.09	0.003***
10 to 19 years	7 (0.0)	0.05	6 (0.0)	0.04	5 (0.0)	0.03	2 (0.0)	0.01	20 (0.0)	0.03	0.060
20 to 29 years	13 (0.0)	0.10	6 (0.0)	0.05	13 (0.0)	0.10	7 (0.0)	0.05	39 (0.0)	0.07	0.229
30 to 39 years	20 (0.0)	0.19	17 (0.0)	0.16	13 (0.0)	0.12	18 (0.0)	0.17	68 (0.0)	0.16	0.591
40 to 49 years	77 (0.1)	0.77	76 (0.0)	0.83	72 (0.1)	0.77	73 (0.0)	0.72	298 (0.0)	0.77	0.604
50 to 59 years	272 (0.2)	4.22	301 (0.2)	4.51	212 (0.2)	3.07	319 (0.2)	4.13	1104 (0.2)	3.98	0.137
60 to 69 years	574 (0.4)	15.56	675 (0.4)	17.76	509 (0.4)	12.98	635 (0.4)	13.42	2393 (0.4)	14.83	P<0.001***
70 to 79 years	465 (0.3)	25.00	514 (0.3)	27.05	482 (0.3)	24.72	496 (0.3)	22.34	1957 (0.3)	24.68	0.027***
more than 80 years	87 (0.1)	13.81	91 (0.1)	13.58	70 (0.1)	10.00	87 (0.1)	8.88	335 (0.1)	11.24	P<0.001***
Ethnicity											
Malay	656 (0.4)	1.49	750 (0.4)	1.68	569 (0.4)	1.26	751 (0.5)	1.45	2726 (0.4)	1.47	0.032***
Chinese	673 (0.4)	3.38	707 (0.4)	3.51	592 (0.4)	2.91	663 (0.4)	3.2	2635 (0.4)	3.25	0.043***
Indian	179 (0.1)	3.93	223 (0.1)	4.83	203 (0.1)	4.34	224 (0.1)	4.57	829 (0.1)	4.42	0.296
Others	18 (0.0)	1.24	12 (0.0)	0.79	8 (0.0)	0.51	12 (0.0)	0.92	50 (0.0)	0.86	0.220
Gender											
Male	718 (0.5)	1.92	806 (0.5)	2.13	673 (0.5)	1.76	797 (0.5)	1.93	2994 (0.5)	1.94	0.275
Female	809 (0.5)	2.19	891 (0.5)	2.38	714 (0.5)	1.88	862 (0.5)	2.11	3276 (0.5)	2.14	0.029***
Types of cataract operation											
ECCE	307 (0.2)	0.41	272 (0.2)	0.36	205 (0.1)	0.27	283 (0.2)	0.34	1067 (0.2)	0.35	0.002***
ICCE	10 (0.0)	0.01	16 (0.0)	0.02	8 (0.0)	0.01	11 (0.0)	0.01	45 (0.0)	0.01	0.568
Lens aspiration	25 (0.0)	0.03	17 (0.0)	0.02	25 (0.0)	0.03	20 (0.0)	0.02	87 (0.0)	0.03	0.505
Phacoemulsification	1151 (0.8)	1.55	1343 (0.8)	1.79	1111 (0.8)	1.46	1297 (0.8)	1.58	4902 (0.8)	1.59	0.236
Phacoemulsification converted to ECCE	24 (0.0)	0.03	24 (0.0)	0.03	29 (0.0)	0.04	44 (0.0)	0.05	121 (0.0)	0.04	0.025***
Other	0 (0.0)	0.00	15 (0.0)	0.02	3 (0.0)	0.00	4 (0.0)	0.00	22 (0.0)	0.01	0.653

*Per 1000 population
***P value significant<0.05

incidence rate as compared to men. The 70 to 79 year old age group had the highest average incidence rate followed by the 60 to 69 year age group, more than 80 years age group and 50 to 59 year age group. The Indian ethnic group was noted to have the highest annual average incidence rate followed by the Chinese and the Malays.

Further studies need to be done to look at why cataract surgery rates showed a decline. First would be to see if the presentation of cataracts showed a decline. Then these patients should be interviewed to see why they did not undergo cataract surgery in the hospital. Staffing increased every year and there was never a shortage to account for the decline.

The main strength of this study is that the Hospital Melaka Cataract Database is the only facility conducting cataract surgeries in the public sector. Additionally Hospital Melaka serves as the main referral centre for patients undergoing cataract surgery in the state. Ideally we should have the details of private practitioners in the database in order to study the incidences of cataract surgeries for the entire population of Melaka. We did invite Private practitioners to participate by providing data but they have declined.

We found that the older age groups from 50 year old onwards had the highest annual average cataract surgery incidence rate with the 70 to 79 year age group having the highest incidences of cataract surgery. Increasing age has been noted to be the most important predictor of cataract surgery with some studies observing up to 80% of respondents would have had undergone cataract surgery by age of 80 years.[7-9] The incidence rate of 22.34 per 1000 population among the 70 to 79 year old age group however was noted to be lower than the Minnesota study which observed 35.38 per 1000 population for 70 years and above.[2] This may be attributed to the fact that patients are seeking treatment in private hospitals in Melaka. The preference for seeking treatment in private hospitals may

be due to shorter waiting time, easy accessibility to these hospitals and the ability to seek treatment directly from a Specialist without a referral.

Our finding of higher annual average incidence rate of cataract surgery among females is consistent with other studies.[10-13] The disparity in incidence rates among gender may well indicate differences in cataract prevalence and incidence among both genders with higher female incidences.[14,15] It may well illustrate the higher tendency of women in seeking earlier health care services in comparison to males.[9]

We found that the ethnic Indians had a much higher average annual incidence rate of cataract surgery compared to the other ethnic groups. Racial variations with regards to incidence of cataract surgery had been noted in other studies.[14,16,17] It has been noted that age-adjusted prevalence of cataract in India was three times that of the US, with 82% of Indians of 75 to 83 years old suffering from cataract, compared to 46% of those aged 75 to 85 years in the US.[18,19] Further studies need to be done to see why Indians in Malaysia use public health facilities more than other races. The database does not cover those details. Percapita human income, cost of living etc. based on races has to be studied.

We noted a decline in the overall annual cataract surgery during the four year study period which was in contrast to that observed in the Swedish population based series.[20,21] The average annual incidence rate of cataract surgery in Melaka of 2.03 per 1000 population is lower than those noted in developed nations such as Sweden's 4.5 per 1000, US's 5.07 per 1000 and Australia's 6.30 per 1000 population.[22-24] We are unable to compare our rates with those of the other states as they have not been published yet. We hope that after this, other states will also publish their work and then we can compare among states and get the attention of policy makers to improve facilities for cataracts.

It is of note that while ECCE numbers have declined, the numbers of phacoemulsifications converted to ECCE have risen. This is perhaps an indication of the surgeons pushing the envelope trying to phacoemulsify more challenging cataracts which would otherwise have had ECCE preformed on them.

CONCLUSION

Cataract surgery showed a decline, with the incidence rates for women, those aged 70 to 79 years and of Indian ethnicity being the most commonly operated on from 2007 to 2010. The highest incidence of cataract was seen in those above 50 years with increasing age being the most important predictor of cataract surgery. The annual incidence rate for cataract surgery was 2.03 per 1,000 population which was lower than developed states such as Sweden's 4.5 per 1000, US's 5.07 per 1000 and Australia's 6.30 per 1000 population.[22-24]

The data on incidence of cataract surgery would be useful for all relevant stakeholders especially those involved in planning future health care spending and in ensuring adequate access to appropriate cataract surgery. In addition, public health education and awareness on detection and operating upon cataracts should be increased and especially targeted towards vulnerable groups such as women, individuals of Indian ethnicity and those aged 50 years and above.

Further studies should be conducted on the National Cataract Registry looking into trends and disparities between states in Malaysia. In the interim, improvements to the National Cataract Registry database could greatly increase its usefulness and utility.

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REFERENCES

1. Zainal M, Ismail SM, Ropilah AR, Elias H, Arumugam G, Alias D et al. Prevalence of blindness and low vision in Malaysian population:results of the National Eye Survey 1996. *Br J Ophthalmol.* 2002;86(9):961-6.
2. Erie JC, Baratz KH, Hodge DO, Schleck CD, Burke JP. Incidence of cataract surgery from 1980 through 2004:25 year population-based study. *J Cataract Refract Surg.* 2007;33(7):1273-7.
3. WHO Blindness Vision 2020. The Global Initiative for the Elimination of Avoidable Blindness. http://www.who.int/mediacentre/factsheets/.../en/ (accessed 12th February 2016).
4. Daien V, Le Pape A, Heve D, Carriere I, Villain M. Incidence and Characteristics of Cataract Surgery in France from 2009 to 2012: A National Population Study. *Ophthalmology.* 2015;122(8):1633-8.
5. Lee MY, Goh PP, Salowi MA, Adnan TH, Ismail MS. The Malaysian Cataract Surgery Registry:Cataract surgery practice pattern. *Asia Pac J Ophthalmol.* 2014;3:343-347. doi: 10.1097/APO.0000000000000030.
6. Department of Statistics, Malaysia. Population Distribution By Local Authority Areas and Mukims. Kuala Lumpur, Malaysia: Department of Statistics Malaysia; 2010.
7. Klein BE, Klein R, Moss SE. Incident cataract surgery: the Beaver Dam eye study. *Ophthalmology.* 1997;104:573-80.
8. Mitchell P, Cumming RG, Attebo K, Panchapakesan J. Prevalence of cataract in Australia: the Blue Mountains eye study. *Ophthalmology.* 1997;104:581-8.
9. 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(2): 168-72.
10. Klein BE, Klein R, Linton KL. Prevalence of age-related lens opacities in a population. The Beaver Dam Eye Study. *Ophthalmology.* 1992;99:546-52.

11. Daien V, Le Pape A, Heve D, Carriere I, Villain M. Incidence and Characteristics of Cataract Surgery in France from 2009 to 2012: A National Population Study. *Ophthalmology.* 2015 Aug;122(8):1633-8. doi: 10.1016/j.ophtha.2015.04.017. Epub 2015 Jun 4.
12. Hiller R, Sperduto RD, Ederer F. Epidemiologic associations with nuclear, cortical, and posterior subcapsular cataracts. *Am J Epidemiol.* 1986;124:916-25.
13. McCarty CA, Mukesh BN, Fu CL, Taylor HR. The epidemiology of cataract in Australia. *Am J Ophthalmol.* 1999;128:446–65.
14. Leske MC, Wu SY, Nemesure B, Li X, Hennis A, Connell AM. Incidence and progression of lens opacities in the Barbados Eye Studies. O*phthalmology.* 2000;107:1267–73.
15. Klein BE, Klein R, Lee KE. Incidence of age-related cataract: the Beaver Dam Eye Study. *Arch Ophthalmol.* 1998;116:219-25.
16. Hennis A, Wu SY, Li X, Leske MC; Barbados Eye Study Group . Lens opacities and mortality: the Barbados Eye Studies. *Ophthalmology.* 2001;108:498-504.
17. Leske MC, Connell AM, Wu SY, Hyman L, Schachat A. Prevalence of lens opacities in the Barbados Eye Study. *Arch Ophthalmol.* 1997;115:105-11.
18. Chaterjee A, Milton RC, Thyle S. Cataract prevalence and aetiology in Punjab. *British Journal of Ophthalmology.* 1982;66:35–42.
19. Kahn HA, Leibowitz HM, Ganley JP, et al. The Framingham eye study: I. *American Journal of Epidemiology.* 1977; 106: 17-32.
20. 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. doi: 10.1016/j.jcrs.2011.05.021.
21. Lundström M, Stenevi U, Thorburn W. The Swedish National Cataract Register: a 9-year review. *Acta Ophthalmol Scand.* 2002 80:248-57.
22. Stenevi U, Lundstrom M, Thorburn W. A national Cataract Register. I. Description and epidemiology. *Acta Ophthalmol Scand.* 1995; 73(1):41-4.
23. Baratz KH, Gray DT, Hodge DO, Butterfield LC, Ilstrup DM. Cataract extraction rates in Olmsted County, Minnesota, 1980 through 1994. *Arch Ophthalmol.* 1997;115(11):1441-6.
24. Taylor HR. Cataract: how much surgery do we have to do? *The Brit J Ophthalmol.* 2000;84(1):1-2.