



Cataract surgical coverage rate among adults aged 40 years and above

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ABSTRACT

Cataract is a leading cause of curable blindness. Hence, in its global declaration of 'Vision 2020 Right to Sight', the World Health Organization (WHO) encouraged its member countries to address the problem of incident cataract. Many factors are related to the cataract surgical coverage rate, such as gender and diabetes mellitus. The objective of this study was to determine the cataract surgical coverage rate and investigate the determinants factors of cataract surgical coverage rate among adults 40 years old and above with cataract. A cross sectional study was conducted using National Basic Health Research (RISKESDAS) 2007 data. Cataract surgery was defined as surgery conducted within the last 12 months before the survey was performed. There were 6939 subjects (3105 male, 3834 female) who fulfilled the study criteria. The cataract surgical coverage rate was 19.3%. The cataract surgical coverage rate was lower in subjects with low education, in the group of farmers/fishermen/laborers, in the 40-49 years age group, in rural areas, and in subjects of low socioeconomic status ($p < 0.05$). The cataract surgical coverage rate was not different between gender and diabetes mellitus ($p > 0.05$). Determinants that were related to cataract surgical coverage rate were age, type of area of residence, socioeconomic status, and region of residence ($p < 0.001$). The implementation of educational programs and reforms to local ophthalmic health services may improve the cataract surgical coverage rate.

Keywords: Coverage rate, cataract surgery, health services accessibility

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INTRODUCTION

Cataract is a leading cause of curable blindness. Hence, in its global declaration of 'Vision 2020 Right to Sight', the World Health

Organization (WHO) encouraged its member countries to address the problem of incident cataract.^(1,2) The existing cataract surgical coverage rate is much lower than expected in most developing countries. The cataract surgical

coverage rate is defined as the number of cataract who have been operated divided by the total number of cataract in the population. Knowledge of factors affecting the coverage of cataract services is crucial for increasing the cataract surgical coverage rate in these countries.⁽³⁾ In Indonesia the prevalence of blindness due to cataract is 0.78% (based on Survey on Vision and Hearing 1993-1996).⁽⁴⁾ Surgery is a safe and effective option for treatment of cataract-induced visual impairment.

The Basic Health Research Report (*Laporan Riset Kesehatan Dasar*, RISKESDAS) for the year 2007 showed the prevalence of cataract in Indonesians aged 30 years and above, based on medical diagnosis and/or symptoms of cataract, for the previous 12 months to be 17.3%. The prevalence was higher in females than in males, being 17.8% in farmers/fishermen/laborers and 16.1% in housewives. The proportion of cataract cases diagnosed by medical personnel and having undergone cataract surgery in the last 12 months was only 18%.⁽⁵⁾ The cataract surgical coverage rate in Indonesia varies between 5.2% and 31.5%. The six provinces with a cataract surgical coverage rate of more than 23% were North Sulawesi, Gorontalo, Nusa Tenggara Barat, DKI Jakarta, Bali, and East Kalimantan, while those with a proportion of less than 10% were South Sumatera, Jambi, Lampung, and West Papua.⁽⁵⁾

Cataract surgery has been reported to be associated with several factors, among others age, gender, and diabetes mellitus.^(2,6,7) Lewallen et al.⁽²⁾ reported on the results of a meta-analysis of 21 community-based surveys conducted up to the year 2000, where there was a difference in cataract surgical coverage rate by gender. Cataract surgical coverage rate in low and middle-income countries was reported to be lower in females than in males. Cataract surgical

coverage rate in males was 1.7-fold higher than in females (95 % CI: 1.48 –1.97). Similar results were reported by Nirmalan et al.⁽⁶⁾ in South India, in that cataract surgical coverage rate in females was lower, although cataract blindness in females aged 50 years and older was significantly higher than in males (adjusted OR 0.71, 95 % CI: 0.57-0.87). Advanced age, male gender and diabetes mellitus were the factors associated with cataract surgical coverage rate.⁽⁷⁾

In Indonesia cataract surgery has been performed in order to overcome the problem of impaired vision due to cataract, but the backlog of cataract cases is fairly high. This has been correlated with several factors, such as low cataract surgical coverage rate, lack of knowledge, high cost of surgery, limited numbers of ophthalmic surgeons and surgical facilities.⁽⁸⁾ Many measures have been taken to identify the factors that affect the cataract surgical coverage rate in the Indonesian community. Information on the role of these factors is expected to assist measures for prevention of cataract blindness and to determine the appropriate strategies for managing the problem.

In connection with the above, this study was performed with the aim to determine the cataract surgical coverage rate and the relationship between individual characteristics, occupation, and type of area of residence on the one hand and cataract on the other.

METHODS

Research design

The research design was analytical with a cross-sectional approach, using secondary data from the RISKESDAS 2007. Inclusion criteria for the study subjects were respondents with cataract diagnosed by medical personnel and aged 40 years and over.

Data collection

The variables used originated from questionnaires from the RISKESDAS 2007 and the *Survei Sosio-ekonomi Nasional* (SUSENAS) 2007. The RISKESDAS 2007 questionnaires used were the *Rumah Tangga* (RKD07.RT) and *Individu* (RKD07.IND) questionnaires, whereas the SUSENAS 2007 questionnaire used was the VSEN2007.K questionnaire. Data on individual characteristics comprising age, gender, occupation, education, type of area of residence and region of residence were obtained from the RKD07.RT questionnaire. Data on cataract, previous cataract operations, and diabetes mellitus (DM) came from the RKD07.IND questionnaire. Data on RT per capita expenditure were from the SUSENAS VSEN2007.K questionnaire.⁽⁹⁾ Socioeconomic status was assessed from the RT per capita monthly household expenditures categorized into 5 quintiles.

In the present study, cataract surgical events were obtained by submitting the following question to the subjects diagnosed as suffering from cataract by medical personnel: Have you ever undergone cataract surgery in the last 12 months? Regions of residence were subdivided into the regions of Sumatera, Java-Bali, and East Indonesia.

Data analysis

The odds ratios (OR) of the cataract surgical coverage rate were calculated for a comparison between gender, age groups, occupation, income, type of area of residence, and region of residence. The strength of association was expressed as OR and their 95% CI. A final multivariate logistic regression model included all of the above variables meeting the preconditions ($p \leq 0.25$ or $p > 0.25$ but theoretically of influence). A p-value of 0.05 was taken as significant for this analysis. SPSS version 15.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis.

RESULTS

The total number of subjects meeting the inclusion criteria was 6939. Data on the variables of age, gender, type of area of residence, and region of residence amounted to an identical total of 6939 (100%). The total numbers of subjects for the variables education, per capita expenditure, and occupation were respectively 6915 (99.7%), 6913 (99.6%), and 6935 (99.9%). For the variables past history of DM and cataract surgery the data obtained were 6929 (99.9%) and 6896 (99.4%), respectively.

The proportion of subjects aged 50 years and over was 84.4% and of those in the age range of 40-49 years 15.6%. The study subjects consisted of 54.6% females and 45.4% males. A total of 75.1% of the subjects had an education lower than junior high school and 24.9% had an education of junior high school and higher. About 30.3% of the subjects were unemployed, 25.6% were farmers/fishermen/laborers, and the proportion of housewives was 18.0%, self-employed 13.0%, employees 7.6%, teachers 7.6% and others 5.0%. Around 51.5% resided in rural areas and 48.5% in urban areas, 58.8% had a low RT monthly per capita expenditure (quintiles 1-3) and 41.2% had a high per capita expenditure (quintiles 4-5). Fifty-nine percent of the subjects originated from the Java-Bali region, 24% from the Sumatera region, and 16.5% from the region of East Indonesia. The proportion of respondents who had previously undergone cataract surgery was 19.3% and those who did not have prior cataract surgery was 80.7%.

Table 1 presents the results of simple logistic analysis between a number of important variables and cataract surgery. The proportion of cataract surgeries was significantly lower among subjects in the age group of 40-49 years, the less educated, residents of rural areas, those with low per capita expenditure per RT, and those from the Sumatera region. In comparison to other

Table 1. Relationships between a number important individual characteristics, DM and cataract surgery

Variables	n	Surgery (%)		OR	95 % CI	p
		Yes	No			
Age group (years)						
40-49	1105	14.0	86.0	0.64	0.50 - 0.83	0.001
≥50	5834	20.3	79.7	Ref		
Gender						
Male	3105	19.5	80.5	1.03	0.87 - 1.21	0.7329
Female	3834	19.1	80.9	Ref		
Education						
< junior high school	5198	18.1	81.9	0.74	0.61 - 0.89	0.001
junior high school + higher	1717	23.1	76.9	Ref		
Occupation						
Unemployed	2003	18.9	81.1	0.71	0.52 - 0.96	0.0001
Teachers	46	29.9	70.1	1.29	0.51 - 3.26	
Housewives	1252	19.0	81.0	0.71	0.51 - 1.00	
Self-employed	799	22.4	77.6	0.87	0.62 - 1.24	
Farmers/fishermen/laborers	2012	15.3	84.7	0.55	0.40 - 0.75	
Employees	321	24.8	75.2	Ref		
Others	502	26.1	73.9	1.07	0.69 - 1.66	
Type of area of residence						
Rural	3943	15.2	84.8	0.59	0.50 - 0.70	0.0001
Urban	2996	23.2	76.8	Ref		
Region of residence						
Sumatera	2570	14.4	85.6	0.63	0.52 - 0.76	0.0001
East Indoneisa	2058	20.1	79.9	0.94	0.78 - 1.14	
Java-Bali	2311	21.1	78.9	Ref		
RT per capita expenditure						
Quintiles 1 - 3	4015	16.9	83.1	0.70	0.59 - 0.82	0.0001
Quintiles 4 - 5	2898	22.6	77.4	Ref		
DM						
Yes	580	21.9	78.1	1.19	0.91 - 1.55	0.2168
No	6349	19.0	81.0	Ref		

Legend: RT: *Rumah Tangga*; DM: Diabetes mellitus; OR: Odds ratio; CI: Confidence interval; Ref: reference group

types of occupation, the group of farmers/fishermen/laborers had the lowest rate of cataract surgery. There was no difference in the proportions of cataract surgeries by gender and past history of DM.

The determinants associated with cataract surgery were obtained through multiple logistic regression analysis by entering several variables into a model. Variables meeting the preconditions for inclusion into the multivariate model were age, gender, education, type of area of residence, RT

per capita expenditure, occupation, region of residence, and past history of DM.

Table 2 shows a significant association between age, type of area of residence, region of residence, and monthly RT per capita expenditure and cataract surgery.

DISCUSSION

The present study showed a low cataract surgical coverage rate of 19.3%, which is similar

Table 2. Multivariate logistic regression analysis between age, type of area of residence, household expenditure, and region of residence and cataract surgery

Determinant	Cataract surgery (%)		OR Adjusted	95 % CI	p
	Yes	No			
Age group (years)					
40-49	14.0	86.0	0.64	0.49 - 0.82	0.0001
≥50	20.3	79.7	Ref		
Type of area of residence					
Rural	15.2	84.8	0.63	0.53 - 0.75	0.0001
Urban	23.2	76.8	Ref		
RT per capita expenditure					
Quintiles 1 - 3	16.9	83.1	0.72	0.61 - 0.85	0.0001
Quintiles 4 - 5	22.6	77.4	Ref		
Region of residence					
Sumatera	14.4	85.6	0.69	0.57 - 0.84	0.0001
East Indonesia	20.1	79.9	1.02	0.84 - 1.24	
Java Bali	21.1	78.9	Ref		

Legend: RT= *Rumah Tangga*; OR= Odds ratio; CI= Confidence interval; Ref= reference group

to the results of previous studies conducted in Tanzania,⁽¹⁰⁾ Ethiopia,⁽¹¹⁾ Malawi⁽¹²⁾ and South Africa.⁽¹³⁾ Even among urban respondents, the present study revealed that the proportion of respondents with previous cataract surgery was only 23.2%. There are several possible explanations for these study results. First, there may have been a tendency among medical personnel or ophthalmologists to refrain from performing cataract surgery before the cataract has become mature, resulting in extending the period of blindness of the respondents.⁽¹⁰⁾ Second, a program that uses visual acuity cutoffs (blind or severe visual impairment) to determine on whom to perform cataract surgery may exclude the majority of people who should receive cataract surgery.

In this study, age had a significantly positive association with cataract surgery, the rate of cataract surgery being proportional to age. This finding is in accord with the results of a study by Lavanya et al.⁽⁷⁾ where advanced age was a factor associated with cataract surgery. The explanation may be that there will be a higher number of mature cataracts in the older age

groups, which is consistent with reports in the literature indicating that among the approximately 40% of lens opacities in the age group of 55-64 years, 5% were found to be mature cataracts. Similarly, from 70% of lens opacities at ages 65-74 years, 18% of cataracts become mature, and in more than 90% of lens opacities at ages 79-84 years almost half were mature cataracts.⁽¹⁴⁾ It may be concluded that with advancing age, in addition to an increased percentage of cataracts, there is also an increased percentage of mature cataracts. In other words it may be stated that the higher percentage of mature cataracts in the older age groups causes the cataract patients to undergo cataract surgery in order to improve their visual acuity.

In the present study, from the results of bivariate as well as multivariate analysis, no association was found between gender and cataract surgery. These findings are at variance with those reported by Lewallen et al.⁽²⁾ suggesting that females in low and middle-income countries had a lower coverage of cataract surgery, when compared with males. The coverage of cataract surgery in males was 1.7-fold higher than

in females. Lavanya et al.⁽⁷⁾ reported a similar finding, i.e. that male gender was associated with cataract surgery. In addition, Nirmalan et al.⁽⁶⁾ also reported that although blindness due to cataract in females 50 years of age or older was significantly higher than that in males, the number of cataract surgeries in females was lower (adjusted OR 0.71, 95% CI: 0.57 - 0.87). It may be concluded from the results of various studies conducted in urban populations of Asia and South India and a meta-analysis on 21 population-based surveys conducted up to the year 2000, that the number of cataract surgeries in females was lower than in males.

In respect to region of residence, the present study differs from the literature and found that overall there was no significant difference in coverage of cataract surgery between males and females in the regions of Java-Bali, Sumatera, and East Indonesia, although the proportion of cataracts was higher in females. The strategies for increasing the cataract surgical coverage rate in females should receive due attention. The lower cataract surgical coverage rate in women as compared to men in many countries results in significantly higher numbers of cataract blindness and impaired vision due to cataract.^(15,16)

In the present study a significant association was found between type of area of residence of the respondents and cataract surgery, where the proportion of rural respondents with previous cataract surgery was lower than that of urban respondents. Results consistent with this finding were obtained in India, demonstrating a higher cataract surgical coverage rate in urban areas as compared to rural areas.⁽¹⁷⁾ These results may be explained from several aspects such as level of education, socioeconomic status, and access to healthcare facilities.

From the results of an analysis performed by Tana⁽¹⁸⁾ it was found that the proportion of respondents with a low level of education and

residing in rural areas was higher than that of respondents in urban areas. The level of education may possibly affect the knowledge and understanding of the respondents with regard to cataract, the importance of cataract surgery for treatment of cataract, and the success of cataract surgery in restoring vision.

Another possibility connected with cataract surgical coverage rate is ease of access to the relevant healthcare facilities for the respondents. Access to healthcare facilities capable of performing cataract surgery is not as simple for respondents in rural areas as it is for urban respondents. From the national results of RISKESDAS 2007, for rural RTs with access to health services outside a radius of 5 km the cataract surgical coverage rate was 8.9%, whilst at a distance of 1-5 km the rate was 50.9%. A total of 4% of rural RTs had to spend 1 hour to reach the health services.⁽⁴⁾ Thus distance to health services and travel time are still a problem for a proportion of RTs in Indonesia, including the respondents in the present study.

Still another possible explanation for the low cataract surgical coverage rate is socioeconomic status. Low socioeconomic status may affect the respondent's decision to undergo cataract surgery. A study in Myanmar showed that the most commonly reported barrier to cataract surgery was its cost. The impact of cost varies between different communities, but it is still one of the most commonly reported barriers to obtaining care.^(19,20) In Indonesia, however, due to the availability of governmental health insurance for the indigent and the multitude of free cataract surgical services offered in the community, the low socioeconomic status of the respondents may be expected to offer no impediments to the respondents in their decision for undergoing cataract surgery. However, there remains the question whether these free services are 100% without cost, for the surgery itself as

well as the surgical instruments used for the operations. This should be subject to further investigation in future studies.

In the present study there was no difference in cataract surgical coverage rates between respondents with and without DM, both in bivariate and multivariate associations. The results reported by investigators was that there is an association between DM and cataract surgery.⁽⁷⁾ DM is one of the factors associated with cataract, as it has been reported that cataract in patients with DM is 1.6 times higher than in patients without DM.⁽²¹⁾

The cataract surgical coverage rate in respondents with a low level of education was lower than in those with a high level of education. This may be because level of education of the respondents is probably associated with level of knowledge of diseases, particularly of cataract. The reports in the literature indicate that only 29.2% of the respondents had some knowledge of cataract, although 46.5% of them had heard of the term cataract.⁽²²⁾ The low level of knowledge of cataract resulted in the respondents being ignorant of the fact that their impaired vision was caused by cataract and that it was curable. In addition, lack of knowledge may impact on ignorance of the successful outcome of cataract surgery, which is consistent with literature reports on the existence of an association between educational level and cataract surgical coverage rate.⁽²³⁾

The association between RT per capita expenditure and cataract surgical coverage rate obtained in the present study was proportional. This may be explained as follows: low socioeconomic status of the respondents may be related to their low financial capacity for paying for cataract surgery. However, because of the availability of governmental health insurance for indigent community members, it is expected that this may eliminate these financial limitations.

Similarly, several studies have also found an association between lower socioeconomic status and cataract surgical coverage rate where access to ophthalmic services is limited,^(24,25) but even if these are available the uptake of surgery can still be low.^(26,27) Regarding the bivariate association between occupation and cataract surgical coverage rate it was found that respondents who were farmers/fishermen/laborers had the lowest cataract surgical coverage rate among all occupations extracted from the RISKESDAS 2007 data, especially in comparison with employees. This may be explained from the aspect of the different needs for visual acuity of the respondents in performing their job. The group of employees need good visual acuity at work, such that the need for optimal visual acuity tends to motivate the employee to seek treatment when suffering from visual disorders, including cataract. The group of farmers/fishermen/laborers perform their work in the open air and do not need to write or read for a living, thus their need for optimal vision is relatively less pronounced. Therefore, even though they may already have poor vision, they may be not aware of the fact, as it does not affect their work. Another possibility is that respondents who are farmers/fishermen/laborers reside more in rural areas rather than in urban areas, so that there is a lower possibility of their access to healthcare facilities capable of performing cataract surgery, unlike urban respondents. In addition, respondents from the group of farmers/fishermen/laborers have a lower per capita expenditure, which may affect their access to adequate treatment. The low level of education in farmers/fishermen/laborers may also influence their perception of the need for cataract treatment. Tana⁽¹⁸⁾ conducted a study on the role of occupation on cataract surgical coverage rate in Indonesian communities and found that among farmers/fishermen/laborers aged 30 years and older, 72.3% had a per capita

expenditure in the quintiles 1-3, 79.7% resided in rural areas, and 83.2% had a low educational level (lower than junior high school).

This was in contrast to the group of employees, who had the highest proportion of cataract surgery compared with all other occupations. Among employees aged 30 years and over, only 38.3% had a monthly RT per capita expenditure in the quintiles 1-3, 27.6% lived in rural areas, and 11.2% had a low educational level.

Besides the group of farmers/fishermen/laborers, the group of housewives also had a low rate of cataract surgery. On further scrutiny of individual characteristics (education, type of area of residence, access to health services, per capita expenditure), Tana et al.⁽²⁸⁾ reported that the proportion of housewives aged 30 years and over, according to RISKESDAS 2007 data was 99.5%; 62.6% had an RT per capita expenditure in the quintiles 1-3, half of them lived in rural areas, and 63.7% had a low level of education.

Regarding the association between region of residence and cataract surgery, it was found that the lowest rate of cataract surgery was in respondents residing in the Sumatera region, in comparison with the regions of Java-Bali and East Indonesia. When viewed from the aspect of cataract surgical coverage rate in all provinces of Indonesia, it was found that the lowest coverage rate was in the province of West Papua (5.2%) and the highest in the province of Southeast Sulawesi (31.5%).⁽⁴⁾

Still another fact that may explain the differences in cataract surgical coverage rate based on region is that from the aspect of type of area of residence (urban and rural), in the Sumatera region the rural area accounts for 64.1% and the urban area 35.9%. In contrast, in the region of Java-Bali only 39.6% of the area is rural, while the urban area amounts to 60.4%, and lastly in East Indonesia the rural area is 58.1% and the urban area 41.9%.⁽⁴⁾ The more

extensive rural area in the Sumatera region compared with other regions may possibly be a factor associated with the low rate of cataract surgery in that region.

CONCLUSIONS

This study has helped to determine the cataract surgical coverage rate and several of its determinant factors. It is suggested to implement a health program which could identify and address the barriers to cataract surgery among identified high-risk groups.

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