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Visual Acuity Improvement of Cataract Patients After Cataract Surgery at Sumbawa Hospital in 2018

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Abstract A cataract is the most common cause of vision impairment and blindness worldwide. The Rapid Assessment of Avoidable Blindness survey held in 2014 - 2016 showed that the prevalence of blindness in West Nusa Tenggara was the second highest in Indonesia. This prevalence was expected to be higher in rural areas due to cultural barriers, patient education, and accessibility to eye-care facilities. This study aims to evaluate visual acuity improvement after cataract surgery and observe the sight restoration rate. The participants of this study were cataract patients who underwent surgery at Sumbawa Hospital West Nusa Tenggara between 27 - 30 August 2018 in a social service program held by the Sanglah General Hospital team. Surgery was not performed on patients who did not desire surgery, in cases where the surgery would not improve visual function, and on patients who were known to be medically unfit for safe surgical intervention. Demographic data and visual acuity at admission and postoperative day one were recorded and analyzed. The output of this program was qualitatively measured by analyzing the SRR. A total of 86 patients were included in this study. Visual acuity postoperative day one showed improvement, and the blindness percentage dropped to 51.16%. The sight restoration rate observed in this study was 58.14%. Although the benefits of cost-effective cataract surgery are straightforward, challenges to executing the procedure remain high, such as unaffordability surgery costs and accessibility to eye-care facilities and infrastructures. Equitable growth in other fields can automatically increase healthcare services in rural areas and encourage healthcare workers to spread evenly.

1. INTRODUCTION

A cataract is known as the most common cause of vision impairment and blindness worldwide, with 94 million people suffering from it in 2014. The prevalence is estimated to be four times higher in low- and middle-income countries as population growth and ageing are expected to increase the risk of people acquiring it (Bourne et al., 2021). The Rapid Assessment of Avoidable Blindness (RAAB) survey held in Indonesia in 2014 – 2016 on those who were > 50 years old showed the prevalence of blindness in East Java was the highest at 4.4%, followed by West Nusa Tenggara at 4.0%. Around 27.000 people in West Nusa Tenggara had blindness (Kementerian Kesehatan Republik Indonesia, 2018; Rif'ati et al., 2020).

Cataract blindness is avoidable, and surgery is one of the most cost-effective healthcare interventions. Combining cataract extraction with intraocular lens insertion is highly effective, resulting in almost immediate visual rehabilitation (Bourne et al., 2021). Cataract Surgical Rates (CSR) and Cataract Surgical Coverage (CSC) are used as indicators of access to cataract services in a country (World Health Organization, 2013). The Roadmap of Visual Impairment Control Program in Indonesia stated that by

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2025 – 2030 they target the increase of CSR from 500 to 2000 – 3000 cataract surgeries per one million population per year and the reduction of avoidable visual impairment prevalence 25% of the prevalence in 2014 - 2016 (Kementerian Kesehatan Republik Indonesia, 2018).

Several factors determine CSR and CSC, including cultural barriers, patient education, and accessibility of ophthalmologists (Amritanand et al., 2018; Wang et al., 2016). The CSR in developing countries, such as Indonesia, tends to be lower than in developed countries and significantly lower in rural areas than urban areas. The main reasons for not receiving cataract surgery were unaffordable surgery costs and accessibility to eye-care infrastructure. Misconceptions about cataracts and treatment, fear of surgery, and lack of family support were some of the reasons for delaying cataract surgery (Tan et al., 2020).

Cataract screening is the most beneficial method for increasing CSR in rural areas. It is crucial to increase the surgical output and study the accessibility issues among cataract blind people and monitor Sight Restoration Rate (SRR), which would represent sight-restoring surgery in this group (Amritanand et al., 2018).

2. METHODS

This study was a descriptive study on 86 cataract patients who underwent surgeries at Sumbawa Hospital West Nusa Tenggara and was conducted from 27 to 30 August 2018 as a social service program organized by the Sanglah General Hospital team. All cataract patients who came during the service were included in this study. The surgeries were not performed on patients who did not desire them in cases where the surgery would not improve visual function and on patients who were known to be medically unfit for safe surgical intervention. Preoperatively, all patients were examined with slit lamps and underwent an axial ultrasound scan. Comorbidity screenings, in this case, were not done. Four surgeons performed unilateral cataract surgeries using manual small incision cataract surgery (SICS) or phacoemulsification technique. Postoperatively, patients were examined for complications and visual acuity (VA) improvements.

Demographic data, including age, type of cataract surgery, and preoperative and postoperative VA were recorded and analyzed using IBM SPSS 24. VA was categorized according to the World Health Organization (WHO) distance visual impairment. VA between 6/12 to 6/18 was classified as mild visual impairment, VA between 6/18 to 6/60 was classified as moderate visual impairment, VA between 3/60 to 6/60 was classified as severe visual impairment, and VA worse than 3/60 was classified as blind. Descriptive statistics were used to analyze data distributions and frequencies of categorical variables. A paired t-test with a 95% confidence interval (CI) was used to analyze the differences in preoperative and postoperative VA. A p-value < 0.05 is considered statistically significant. The output of this program was qualitatively analyzed by measuring the SRR with the following formula (Limburg, 1996) :

$$SRR = \frac{P(Post) - P(Pre)}{total\ catops/year} \times 100$$

SRR	:	Sight Restoration Rate
P (Post)	:	people blind (Post-op)
P (Pre)	:	people blind (Pre-op)
Total catops/year	:	total cataract operation per year

This study was consistent with the tenets of the Declaration of Helsinki and was approved by the ethics committee of Universitas Udayana.

3. RESULTS AND DISCUSSION

A total of 86 patients participated in this study. The male-to-female proportion was 1:1.86. Among these, 56 patients (65%) were 60 years old and older. Most of the participants were blind and had severe visual impairment. Thirty patients (34.88%) underwent phacoemulsification, and 56 (65.12%) underwent SICS (Table 1).

Table 1 . Characteristics of the patients

	N (%)	Mean (SD)
Age		
< 60 years old	30 (34.88)	62.88
≥ 60 years old	56 (65.12)	(9.88)
Type of surgery		
SICS	56 (65.12)	
Phacoemulsification	30 (34.88)	
Preoperative VA (logMAR)		
Severe visual impairment	7 (8.14)	2.27
Blind	79 (91.86)	(0.84)
Postoperative VA (logMAR)		
Mild visual impairment	12 (13.95)	1.57
Moderate visual impairment	20 (23.26)	(1.03)
Severe visual impairment	10 (11.63)	
Blind	44 (51.16)	

SD: standard deviation; SICS: small incision cataract surgery; VA: visual acuity; logMAR: logarithm of the minimum angle of resolution.

Table 2 . Visual outcomes

Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper	t	df	Sig. (2-tailed)
Pair 1	logMAR pre-postoperative	.70093	1.27081	.13704	.42846	.97339	5.115	85	.000

VA showed improvement during postoperative day one, with the blindness percentage dropping to 51.16%. For paired t-test analysis, the preoperative and postoperative VA was converted to logMAR (logarithm of the minimum angle of resolution) equivalents and were presented as means with standard deviation (SD). The analysis showed a significant improvement in postoperative VA with $p < 0.0001$. The SRR observed in this study was 58.14%. The visual outcomes are shown in Table 2.

A cataract is a degenerative process that is highly influenced by age and is the leading cause of visual impairment and blindness globally and in Indonesia. This statement is in line with our findings, where 65% of the cataract patients in Sumbawa are more than 60 years old. Considering the fact that Indonesia is a developing country and most people who live in rural areas have poor socioeconomic status, lack of knowledge and education, and difficult access to eye-care facilities, only a handful of people feel the urge to remove the disability caused by curable blindness.

According to the RAAB survey held in Indonesia in 2014 – 2016, the prevalence of blindness in East Java was the highest at 4.4%, followed by West Nusa Tenggara at 4.0%. Around 27.000 people in West Nusa Tenggara had blindness (Kementerian Kesehatan Republik Indonesia, 2018; Rif'ati et al., 2020). Unaffordability costs of surgery and accessibility to eye-care facilities and infrastructures remain the main reasons people do not seek a cure. Besides patients' reasons, the number of ophthalmologists and eye-care infrastructures are not evenly distributed throughout Indonesia. According to data from Perdami in 2018, only 16 ophthalmologists in West Nusa Tenggara Province and one ophthalmologist needed to treat 261.969 patients (Ismandari, 2018). This finding was not in line with the Global Action Plan where the ratio should be 1:250.000 patients (World Health Organization, 2013). Based on the latest data provided by InfoDATIN, the cataract surgical coverage in Indonesia is only 52.7% in patients with VA less than 3/60 (Ismandari, 2018).

Cataract also carries a considerable number socioeconomic burden. In the United States alone, there is estimated a total of USD 35.4 billion financial burdens caused by major adult visual disorders annually, which includes USD 16.2 billion in direct medical costs, USD 11.1 billion in other direct costs, and $8 billion in productivity losses (Rein et al., 2006). The loss of gross national income in 2020 in India caused by cataracts alone was estimated as high as INR 889 billion (USD 11.6 billion). Cumulative gross national income loss due to preventable and treatable causes in adults is INR 9,062 billion (USD 122 billion) and INR 3,311 billion (USD 45 billion) for children for 10 and 40 lost working years, respectively (Orbis, 2020). In China, a survey conducted in 2015 showed a substantial economic burden caused by visual impairment, and the average annual cost reached USD 6988 ± 10,834.3 per person (Guan et al., 2019). So far, the impact of cataract surgery on the economy in Indonesia has never been measured. However, in a 2020 observational study by Tommy Tri Atmaja, the yearly economic loss in Indonesia due to cataract disabilities was estimated to reach IDR 84.68 trillion (USD 5.84 billion) (Atmaja, 2020).

With visual improvements, patients will be able to provide economic relief for their families by returning to work and being productive, supporting Indonesia's economic wheel. Aside from recovering and preventing economic losses, cataract surgery will boost patients' quality of life. Life satisfaction, independence to do daily tasks, and feeling of safety and security will increase once patients' visual acuity is improved.

Although the benefits of cost-effective cataract surgery exceeded the loss of ignoring the disease, challenges remain. It is hard to get proper examinations and treatments in rural areas where doctors and medical facilities are limited. Without routine social service on cataract surgery held in Sumbawa, untreated blindness will remain high. Private sponsors are hard to get, and government supports are only sometimes available; this leads to stagnancy in regional development. Equitable growth in other fields, such as education, road paving, and property development, can automatically increase healthcare services in rural areas and encourage healthcare workers to spread evenly throughout Indonesia to find better wages.

With this study, Indonesia can grasp the importance of taking prompt action regarding cataracts and providing proper healthcare facilities in the provincial areas. Due to the limitation and lack of equipment and time, proper follow-up measurements were only partially done.

4. CONCLUSION

Cataract is the most common cause of vision impairment and blindness worldwide which is avoidable and curable by surgery. There were 86 patients included in this study. VA improved all of the patients to varying degrees. We did not search for further reasons behind the difference in improvements. SRR observed in this study was 58.14%. Unaffordability costs of surgery and accessibility to eye-care facilities and infrastructures were the main reasons people did not search for a cure. Equitable growth in other fields will increase healthcare services in rural areas and encourage healthcare workers to spread evenly throughout Indonesia. There are still a lot of limitations, routine schedules, and a more equipped team needed to be assigned for this program.

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CONFLICT OF INTERESTS

There is no conflict of interest in this study.

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