

## ABSTRACT

**Aim:** This study aimed to investigate the impact of the COVID-19 pandemic on the rate of cataract surgeries in the community and referral hospitals.

**Study Design:** Cross-sectional mixed-methods research.

**Duration and Settings of the Study:** Three months, Sanglah General Hospital, Denpasar, Bali, Indonesia.

**Methods:** The data for this study was obtained from a secondary source of cataract surgery data in Bali during the pandemic era. Data was also collected using a qualitative method through interviews with health practitioners and policymakers. Apart from that, a literature search was also carried out. The analysis of quantitative data was done using SPSS version 20. Thematic analysis was undertaken on the interview responses obtained from participants.

**Results:** The cataract surgical rate (CSR) was significantly lower in 2020 (CSR = 586) during the COVID-19 pandemic as compared to 2015 (CSR = 1,624) ( $p = 0.00$ ). Better screening systems, patient selection, lowering exposure time, and isolation were strategies for preoperative cataract patients. The use of povidone-iodine eye drops, smaller phaco tip sizes, and restricted surgery personnel were used for intraoperative strategies. Selective postoperative patients and telemedicine were also used to minimize exposure to COVID-19. In this period, priority was given to the safety of healthcare providers as well as patients.

**Conclusion:** There is no denying that a greater backlog of cataract surgeries has resulted from the COVID-19 pandemic. However, good cooperation between patients, healthcare providers, and policymakers was observed to face this challenge.

**Keywords:** Bali; Cataract surgery; Community; COVID-19; Referral Hospital

## INTRODUCTION

The most common eye disorders in developing countries are degenerative diseases such as cataracts. Cataract is the main contributor to global blindness in elderly people over 50 years old.<sup>1</sup> The latest RAAB data for 15 provinces in Indonesia for the period 2014-2016 provided that the prevalence of blindness in people over 50 years ranged from 1.7% to 4.4%.<sup>2</sup> The prevalence of blindness in East Java was the highest at 4.4%, followed by Nusa Tenggara Barat (NTB) at 4.0% and South Sumatra at 3.4%.<sup>3</sup> The average blindness prevalence in

Indonesia is still high, that is, 3.0%, while the ideal blindness rate according to the WHO is less than 0.5%.<sup>4</sup> The rate of blindness caused by cataracts in Indonesia is third in the world at 1.47%.<sup>5</sup> The prevalence of blindness in Bali itself is still at 2%, with cataracts being the first cause of blindness.<sup>6</sup>

Cataract surgery not only improves the patient's visual acuity but also improves the patient's quality of life (QOL), cognitive function, and depressive mental status.<sup>7-11</sup> The National Bureau of Economic Research concluded that cataract surgery also contributes to increasing people's life expectancy in general.<sup>12</sup> In the last decade, the demand for cataract surgery has increased progressively, mainly due to improved global health management, which has increased the life expectancy of the population as a whole. This leads to changes in the demographics of the

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population, where more and more people are getting old.

The total area of Bali is 5,780.06 km<sup>2</sup>. Administratively, the Province of Bali is divided into one municipality and 57 districts. Based on data from the Central Statistics Agency in 2020, the population of the province of Bali is 4,317,404 people, with a density of 747 people/km<sup>2</sup>. Based on age group, the population of productive age (1564 years) on the Island of the Gods reached 3,045 million people or 70.96% of the total population.

The number of ophthalmologists in Bali at the end of 2019, based on data from the Bali Branch of the Indonesian Ophthalmologists Association Perhimpunan Dokter Spesialis Mata Indonesia (PERDAMI), was 68 doctors spread across all districts and cities in the province of Bali. At the end of 2020, there were 73 ophthalmologists in Bali, spread across 43 government and private hospitals in all districts and cities. Two out of 43 hospitals are special eye hospitals, namely Bali Mandara Eye Hospital and Ramata Eye Hospital. Eye health services at the referral hospital are assisted by 18 skilled nurses and 12 trained refractionists. The number of patients in 2019 when compared to the year 2020 saw a drastic decrease in the number of visits, from 4564 patients to 1284 patients.<sup>13</sup>

In the era of the COVID-19 pandemic, cataract surgery was one of the operations that experienced prolonged delays. Several European countries experienced a 97% reduction in cataract operations during the COVID-19 pandemic.<sup>12</sup> The reduction in cataract surgery in Bali itself follows the considerations of the Indonesian Ophthalmologist Association, PERDAMI. Most cataract patients are over 65 years of age and older, so they are a group with a poor prognosis when

exposed to COVID-19. This article will discuss cataract surgery in the community and at referral hospitals during the COVID-19 pandemic from several perspectives. Cataract surgery during the COVID-19 pandemic will be discussed both in the preoperative and postoperative periods.

## METHODS

This mixed-methods research uses a quantitative and qualitative approach with a cross-sectional design. The data is collected from a secondary source obtained from cataract surgery data in Bali during the pandemic era. The data was collected from Perdami Bali data and analyzed using SPSS version 2020.

The scope of the research is within the jurisdiction of Perdami Bali, more specifically spread to Sanglah Hospital and Bali Mandara Hospital as the main sources of data. Data was collected from 2015 to 2020 to obtain a better picture of how COVID-19 made some changes to cataract services in Bali. For better understanding, the data was also collected by using a qualitative approach through interviews with health practitioners and policymakers like the chairman of Perdami Bali, ophthalmologists, polyclinics, and surgery room head nurses. Apart from that, a literature search was also carried out. Thematic analysis was undertaken on the interview responses obtained from participants.

## RESULTS

Based on the quantitative data and interviews with the participants, the following themes were developed:

- Cataract surgical rate (CSR) during the COVID-19 pandemic
- Policy about performing cataract surgery during the COVID-19 pandemic
- Protocol for cataract surgeries during the

#### COVID-19 pandemic

- Safety measures taken to prevent healthcare providers and patients from getting the COVID-19 infection
- Telemedicine during the COVID-19 pandemic

#### **Cataract surgical rate (CSR) during the COVID-19 pandemic.**

CSR itself is one indicator of eradicating blindness caused by cataracts. Findings from this study show that in 2015, CSR was 1,624, in 2016 it was 714, in 2017 it was 1,667, in 2018 it was 1,403, in 2019 it was 1,910, and in 2020 it was recorded at 586. CSR experienced a drastic decrease during the COVID-19 pandemic, that is, 69.32% as compared to the previous year. This figure will start to increase in 2021 with a better cataract surgical management system.

#### **Policy about performing cataract surgery during the COVID-19 pandemic.**

Based on an interview with the chairman of PERDAMI Bali, Dr. I Wayan Gede Jayanegara, SpM (K), in response to cataract surgery during the COVID-19 pandemic, PERDAMI sees cataract surgery as an elective operation. Cataract patients at risk of COVID-19 or suspected of having symptoms of COVID-19 will have their surgery postponed because cataract surgery is not an emergency operation. In a pandemic like this, the health of health service providers is a priority. The effect of this policy, of course, will be a decreased number of cataract operations. Responding to this, he said that this had been predicted and that the consequences of this policy had indeed been considered beforehand.

The cataract surgery service policy prioritizes the principle of safety first, although, on the one hand, we are also thinking about an increasingly high

backlog of cataracts. If the patient has carried out a COVID-19 laboratory examination and found that the results are negative, but the patient has symptoms or suspicions of COVID-19, it was recommended that the operation be postponed. The main thing is to maintain the safety of healthcare providers. Because if a healthcare provider gets infected with COVID-19, cataract services will be disrupted for a long time.

Meanwhile, Penanganan Gangguan Pinglihan Kebutaan (PGPK), which was held by the Bali Mandara Eye Hospital, based on interviews with Dr. Ni Made Suryanadi, SpM (K) is temporarily absent during the COVID-19 pandemic. Even though the number of cases of COVID-19 has decreased and is not yet stable, activities are still postponed for the time being. During the COVID-19 pandemic, operational activities at Rumah Sakit Mata Bali Mandara (RSMBM) were running according to protocols and government policy directions.

#### **Protocol for cataract surgeries during the COVID-19 pandemic.**

Cataract surgery activities in communities in Bali are mostly carried out by the John Fawcett Foundation (JFF). Based on an interview with Mr. I Gede Bingin, Chair of the JFF Indonesia Foundation, it was said that cataract surgery during the COVID-19 pandemic experienced many changes in terms of protocol. JFF Indonesia follows the policy directions and protocols given by the government and PERDAMI. From the point of view of the enthusiasm of the people themselves, there was no decrease in the public interest. However, the protocol required JFF to limit the number of visitors, both those who were screened and those who underwent surgery. Areas with higher risk were also avoided by JFF. Before the era of the COVID-19 pandemic, cataract

surgeries were usually carried out on the same day when the cataract patients were screened. However, this scheme was changed during COVID-19, when the patients' cataract screening and surgery days were separated to reduce crowds during the activities. In addition, with this policy, health service providers, especially eye specialists, will avoid the potential for higher exposure to COVID-19 because operators will only meet with patients who are about to be operated upon.

The pre-operative procedure itself was carried out by JFF according to government directives, starting with hand washing, COVID-19 screening interviews, and checking body temperature. While the patient was waiting, social distancing was to be carried out with a limited number of patients. Patients found or suspected of being positive were to be directed to isolate and report to their respective banjar. Patients were also advised to attend if they had at least two booster vaccines. To prepare patients for surgery, a rapid test and PCR swab were carried out if the results of the first rapid test were positive. Apart from that, JFF also uses telemedicine to screen patients. If the patient's complaint is felt to be inappropriate, the patient will be educated and directed for examination at the hospital only.

### **Safety measures were taken to prevent healthcare providers and patients from getting the COVID-19 infection.**

After interviewing Dr. Siska SpM (K) as an ophthalmologist in the Cataract and Refractive Surgery Division, it was found that cataract surgery was not forced to be done immediately during the COVID-19 era. Patients were explained about cataract surgery procedures during the COVID-19 pandemic era, which required longer preparation than pre-pandemic procedures.

During the interview with the head of the eye polyclinic at Sanglah Hospital, Ns. Yayin Kristinawati, S.Kep., it was said that the laboratory examination policy for Sanglah patients was a rapid test for cataract surgery patients with one-day care (ODC). Meanwhile, for cataract surgery with hospitalized patients, a PCR swab was to be carried out to reduce the risk of patients with COVID-19 becoming a COVID-19 cluster.

At Sanglah Hospital, COVID-19 screening interviews were conducted twice for safety in COVID-19 conditions. First, when the patient was about to enter the hospital area, and second, when he was entering the eye polyclinic. In addition, the patient was checked for body temperature. If the patient was suspected of having COVID-19, he was asked to postpone his admission to the hospital. Because cataract is not an emergency disease, the surgery may be postponed. In addition, efforts were made to expedite the processing of patients to reduce the number of crowds of patients waiting for their turn to be examined. Additional protection, such as protective slit lamp breath shields, was added for each polyclinic slit lamp. The disposable tools were widely used. Single-dose eye drops are given to several types of drugs, but not all drugs have single-dose packaging.

Another strategy for tackling COVID-19 was self-isolation for patients who were detected with COVID-19. The screening program carried out when patients visited to hospitals is aimed at the safety of patients and healthcare providers. This procedure is best done in the "filter" area. In this area, patients with a risk of infection (e.g. body temperature above 37.5 °C) were to be sent back home and instructed for self-isolation.<sup>14</sup> Interviewing Dr. Mas Putrawati Triningrat, SpM



(K), as the Head of the Ophthalmology Study Program at Sanglah Hospital, she said that patients with COVID-19 were to be reported to the K3RS section, where directions and guidance were given. In addition, to minimize the possibility of undetected exposure to COVID-19, a routine PCR COVID-19 swab examination was carried out for all staff and residents of Sanglah Hospital.

For patients with immunosuppression, it is better to examine them in an isolated place from other patients for optimal protection. Patients were advised to come alone unless a companion is urgently needed. Several routine preoperative procedures, such as blood tests, chest X-rays, and EKGs, were only performed in certain cases. Instrumental examination procedures such as biometry, topography, and specular were restricted to patients who were going to have surgery.

The number of visitors was also limited to avoid crowds. The cleaning of the operating room was carried out more strictly, and a special chlorhexidine solution was added as an addition to reducing the risk of infection. Meanwhile, the use of personal protective equipment (PPE) was also tightened, especially in the early days of the COVID-19 pandemic, using more complete PPE.

### Telemedicine during the COVID-19 pandemic

Even post-operative activities had been adapted according to the COVID-19 pandemic. Here, the patient was directed for control on the first postoperative day and after one month of surgery. Patients were educated to stay in control if there are complaints such as blurry eyes, pain, or sudden red eyes. Patients were directed to use the telemedicine system to help control this process. JFF itself hopes that the COVID-19 pandemic situation can end and hopes for good cooperation between related parties so that they can face the challenges that arise as a result of the COVID-19

pandemic.

## DISCUSSION

### Cataract surgical rate (CSR) during the COVID-19 pandemic

To determine the success and impact that have occurred as a result of the cataract program, indicators are needed to measure the success of cataract surgery. One of the indicators is CSR, which is used to measure the number of cataract surgeries performed per 1 million people per year. The CSR figure must be calculated by collecting data on the number of cataract surgeries carried out per year in a region or country and then dividing it by one million people (Ministry of Health, 2018). The CSR has been significantly reduced in Bali during the COVID-19 pandemic.

The value of CSR is closely related to the number of cataract incidents per year in a country. Incidence itself is closely related to the population pyramid of a country. The older the population pyramid of a country, the higher the incidence of cataracts. The incidence of cataracts must be lower than the CSR so that there is no backlog of cataracts.<sup>15</sup>



Figure. Cataract Backlog Image and CSR (Salvador et al., 2017)<sup>15</sup>

### Policy about performing cataract surgery during the COVID-19 pandemic

Several countries are trying to create a system that combines patient ocular and clinical data through a few simple questions as a consideration for performing cataract surgery. The most important question is how much a patient wants and is interested in performing cataract surgery.

Furthermore, age is one of the factors considered, and patients with a productive age have a higher priority for cataract surgery. Medical conditions that accompany the patient, such as diabetes, increased blood pressure, and heart problems, can cause a poor prognosis for the patient if the patient is exposed to COVID-19.<sup>16</sup>

### **Protocol for cataract surgeries during the COVID-19 pandemic**

The number of postoperative evaluations can be limited and is primarily reserved for patients with ocular complications or comorbidities. For cataract surgery as recommended by American Academy of Ophthalmology (AAO) and Royal College of Ophthalmologist, the first-day postoperative control may not be performed except for monocular patients. In a meta-analysis study conducted by Kessel, et al.<sup>17</sup> it was concluded that the difference in the benefits of postoperative control on the first day when compared to postoperative controls after 2 weeks did not show a significant difference in the patient's visual acuity. Based on these findings, it is recommended to delay postoperative control in low-risk patients. Patel et al.<sup>18</sup> recommend that the first day of postoperative control be carried out with telemedicine. Patients need direct control if they complain of pain, decreased visual acuity, or lots of eye secretions. An examination can be carried out using video assistance, which can help detect corneal edema, although it cannot detect descemet's folds or flaring in the anterior chamber.<sup>18</sup>

### **Safety measures taken to prevent healthcare providers and patients from getting the COVID-19 infection**

Protection for patients and CSR are important things, but the safety of healthcare providers needs more attention.<sup>19</sup> Problems often arise when

healthcare providers do not receive adequate PPE. Patients often force themselves to go to the hospital even though they already know they are positive for COVID-19. On the other hand, health institutions sometimes force surgery even though the patient's case is not an emergency.<sup>19</sup>

Cataract surgery services in their community, according to Dr. Ni Made Ari Suryathi, M. Biomed, SpM (K), should prioritize safety for both health care providers and patients. For the operation to run safely, both the patient and the operator, and all healthcare personnel involved on the day of the operation, should perform a PCR swab first. Then the entire team involved should also be vaccinated completely with a booster.

Pupillary dilation is usually needed in cataract surgery patients; the use of intracameral midriatic drugs can be used as an option to minimize contact with the conjunctiva and the patient's tears. Communication with patients during surgery also needs to be minimized to reduce the risk of transmitting COVID-19 through the air. Moreover, the operating staff in the OT was also limited to 1 operator and 2 nurses. Sometimes an additional anesthetist, assistant, or resident can be considered. In a pandemic like this, bilateral eye surgery on the same day can also be considered.<sup>20</sup> To minimize exposure to COVID-19, the operating room floor was mopped daily with dry mist after surgery is done.

The use of operating glasses and gloves and training on using and removing PPE needs to be standardized. It is recommended to use equipment that protects the mouth, nose, and eyes. The use of a higher level of PPE may be considered in patients who have not been screened for SARS-CoV-2. The choice of mask depends on the institutional protocol. The use of 3-D imaging tools during surgery can help minimize exposure to infection.

Besides that, the use of disposable surgical tools can also minimize the risk of virus transmission.<sup>21</sup>

### Telemedicine during the COVID-19 pandemic

The COVID-19 pandemic has had an impact on eye care services, including cataract surgeries in Bali. Eye check-ups require comprehensive examinations that further require close contact between the doctor and the patient, which increases the risk of spreading the virus through the air. Cataract services, using telemedicine modalities, can be performed for early detection of cataracts and postoperative control. Meanwhile, to minimize contact, cataract surgery can be carried out on the same day, but because most of the patients are patients with Badan Penyelenggara Jaminan Sosial (BPJS) referrals, there are obstacles to BPJS claims if the operation is carried out on the same day as the patient is referred.

### CONCLUSION

It is undeniable that the COVID-19 pandemic has caused a higher backlog of cataracts. Some policies that have been provided include postponing surgeries, reducing people in the surgery room, using good equipment, providing good circulation, cleanliness, and screening, as well as better preoperative and postoperative care. Good cooperation between patients, healthcare providers, and policymakers was observed to face this challenge.

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### Authors' Contributions:

**A:** Conceptualization and design of the study, drafting, review and final approval of the final manuscript and agrees to be accountable for all aspects of the work.

**NMAS:** Data acquisition, review and approval of the final manuscript and agrees to be accountable for all aspects of the work.

**NMS:** Data analysis, review and final approval of the final manuscript and agrees to be accountable for all aspects of the work.

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