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Retrospective Evaluation of Visual Acuity Improvement Before and After Cataract Surgery Among Patients at An-Nisaa' Hospital Blitar

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Abstract
Introduction: *Cataract is a major cause of blindness and visual impairment worldwide. Cataract surgery is the most effective treatment to restore vision and improve quality of life.* ***Objective:*** *This study described changes in visual acuity before and after cataract surgery among patients at An-Nisaa' Hospital Blitar in 2026.* ***Objective:*** *This study aimed to describe changes in visual acuity before and after cataract surgery among cataract patients at An-Nisaa' Hospital Blitar in 2026.* ***Method:*** *A descriptive quantitative study with a retrospective observational design used secondary medical record data from 56 cataract patients who underwent surgery between January and June 2026. Total sampling was applied, and data were analyzed using frequency and percentage distributions.* ***Result and Discussion:*** *Most patients were aged 56–65 years (41.1%), female (57.1%), had surgery on the right eye (44.6%), and had mature cataracts (44.6%). Before surgery, 75.0% had poor visual acuity. After surgery, 66.1% achieved good visual acuity, 30.4% moderate, and 3.6% poor.* ***Conclusion:*** *Cataract surgery markedly improved postoperative visual acuity, with most patients achieving good visual outcomes. These findings support cataract surgery as an effective intervention for restoring vision and enhancing visual function in cataract patients.*

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Introduction

Cataracts are a leading cause of visual impairment, affecting approximately 33% of the global population with vision loss. The vast majority of cataract-related blindness cases (up to 90%) occur in developing countries (Cantor et al., 2020). The World Health Organization (WHO) estimates that around 18 million people suffer from bilateral cataracts, a condition responsible for 48% of blindness cases worldwide (Organization, 2019). Data from the Ministry of Health indicates that cataracts are the primary cause of blindness among the population aged over 50 (81.2%). Screening results from the 2025-2026 Free Health Check (CKG) program confirm this urgency: out of 23.35 million people examined, 2.95 million were found to have eye disorders (Kementerian Kesehatan RI, 2026).

Cataracts characterized by clouding of the crystalline lens remain a leading cause of blindness and a major contributor to visual impairment globally. This condition represents a significant and growing public health burden, particularly among the elderly population and in areas with limited healthcare resources (World Health Organization, 2026). Although high-contrast visual acuity is the parameter most frequently used to assess visual impairment in cataract patients, it fails to fully capture the spectrum of visual functional deficits experienced by patients during daily activities (Vingopoulos et al., 2022).

Key components of visual function, such as color vision and contrast sensitivity (CS), are significantly affected by cataracts; they often correlate more closely with patients' subjective complaints and daily life difficulties than visual acuity measurements based solely on Snellen charts. Beyond reduced visual acuity, impairments in color discrimination and diminished contrast sensitivity have a significant impact on the ability to perform daily activities and on safety. Patients frequently report difficulties with reading, night driving, recognizing faces, navigating in dim or low-contrast environments, and detecting potential hazards. These conditions can compromise independence and increase the risk of accidents, particularly among the elderly. From a clinical perspective, these functional limitations also influence patient-reported outcomes, the timing of referrals for cataract surgery, and post-operative satisfaction levels (Alghamdi, 2026).

At the hospital level, effective eye health service management plays a pivotal role in bridging global epidemiological burdens with local clinical practices. Proper health service management ensures efficient patient triage, timely referral systems, optimized surgical scheduling, and routine outcome monitoring (Ramke et al., 2022). Observations at An-Nisaa' Hospital in Blitar indicate that most patients present with advanced cataracts at their first consultation, often delayed due to limited awareness or limited access to initial healthcare. The local patient population is predominantly older individuals, workers in low- to middle-income occupations, and rural populations with higher rates of advanced (mature) lens opacification. Understanding these local clinical characteristics and managing local eye care delivery is crucial to reducing surgical delays and achieving targeted postoperative visual outcomes.

According to World Health Organization (WHO) recommendations, successful cataract surgery should restore a patient's visual acuity to an optimal level. An optimal outcome is characterized by visual acuity improving to the 6/6–6/18 range, which is considered excellent. Meanwhile, an improvement to the <6/18–6/60 range is categorized as a moderate or reasonably good outcome. However, post-operative visual acuity worse than 6/60 (<6/60) is considered unsatisfactory or poor. Thus, the WHO provides clear guidelines on cataract surgery success standards, aiming to ensure that patients

undergoing the procedure experience significant improvements in their visual quality. Optimal outcomes not only restore visual acuity but also enhance the patient's ability to perform daily activities such as reading, driving, and working. Consequently, monitoring surgical outcomes and assessing post-operative visual acuity are crucial for determining the success and effectiveness of this medical intervention (Gautama & Setiohadji, 2025). For these reasons, the researcher is interested in investigating the changes in visual acuity before and after cataract surgery among patients at An-Nisaa' Hospital Blitar.

Method

This study was a quantitative descriptive study with a retrospective observational design aimed at describing visual acuity changes before and after cataract surgery (Aggarwal & Ranganathan, 2019). A descriptive design is the simplest observational design that allows the researcher to describe the distribution of variables without regard to causal hypotheses, while retrospective studies collect past exposure information through recorded information (Polit & Beck, 2022; Siedlecki, 2020). The study was conducted at An-Nisaa' Hospital Blitar in 2026, using secondary data from medical records of patients who underwent cataract surgery between January and June 2026.

The target population comprised all senile cataract patients operated on during the study period. Inclusion criteria were patients aged ≥35 years undergoing primary cataract surgery with complete pre- and post-operative medical records. Exclusion criteria included patients with pre-existing ocular comorbidities that severely limit visual recovery (such as advanced glaucoma, diabetic retinopathy, age-related macular degeneration, or corneal opacities), history of prior intraocular surgery, traumatic cataracts, or intraoperative/postoperative surgical complications (e.g., posterior capsule rupture, endophthalmitis). Total sampling was applied based on these criteria, resulting in a final sample size of 56 patients.

Surgical and Follow-Up Protocols: All surgical procedures were performed under topical or peribulbar local anesthesia by certified ophthalmologists using standard phacoemulsification technique with foldable intraocular lens (IOL) implantation into the capsular bag. Postoperative care included topical antibiotic-corticosteroid eye drops administered according to standard tapering protocols over 4 weeks. Patients were systematically followed up at day 1, week 1, and week 4 postoperatively. Preoperative visual acuity was evaluated during the initial pre-surgical assessment using a Snellen chart, while postoperative visual acuity used in this study was recorded at the 4-week follow-up visit to ensure refraction stabilization.

The population comprised all cataract patients operated in that period, with total sampling applied based on inclusion and exclusion criteria, yielding 56 patients. The study protocol was approved and patient confidentiality was maintained through anonymization of secondary data (Bhatt, 2024; Kaplan et al., 2022). Data were collected using a structured extraction sheet covering patient characteristics (age, sex, operated eye location, cataract stage) and clinical outcomes (preoperative and postoperative visual acuity). Clinical factors potentially influencing visual outcome, such as patient age, cataract maturity stage, and underlying systemic co-factors (e.g., controlled diabetes or hypertension), were systematically documented and accounted for during data extraction. Visual acuity was categorized per WHO standards as good (6/6 to 6/18), moderate (<6/18 to 6/60), and poor (<6/60). Data were analyzed by univariate descriptive analysis[4] presenting frequency distributions, percentages, and changes in visual acuity in tabular and narrative forms.

Result and Discussion

1. Result

The results of the study can be seen in Table 1 and Table 2. Table 1 illustrates patient characteristics; the study involved 56 cataract patients who underwent surgery at An-Nisaa' Hospital Blitar. Based on the age distribution, the majority of respondents were in the 56–65 years age group, comprising 23 patients (41.1%). The >65 years group was the second largest with 17 patients (30.4%), followed by the 46–55 years group with 10 patients (17.9%). Meanwhile, the 36–45 years group was the smallest, with 6 patients (10.7%). Based on sex, the majority of patients were female, totaling 32 patients (57.1%), while male patients amounted to 24 patients (42.9%). Based on the location of the operated eye, most surgical procedures were performed on the right eye (oculus dextra) in 25 patients (44.6%). Surgery on the left eye (oculus sinistra) was performed in 18 patients (32.1%), while patients who underwent surgery on both eyes (oculus dextra et sinistra) totaled 13 patients (23.2%). Based on cataract stage, the mature stage was the most commonly found, in 25 patients (44.6%). Subsequently, incipient and immature stages were each found in 14 patients (25.0%), while the hypermature stage was the least frequent, with 3 patients (5.4%).

Table 1
Characteristics of Cataract Patients at An-Nisaa' Hospital Blitar (N=56)

Variable	Frequency (N=56)	Percentage (%)
Age		
36-45 years	6	10.7
46-55 years	10	17.9
56-65 years	23	41.1
>65 years	17	30.4
Sex		
Male	24	42.9
Female	32	57.1
Operated Eye Location		
Oculus dextra (Right eye)	25	44.6
Oculus sinistra (Left eye)	18	32.1
Oculus dextra et sinistra (Both eyes)	13	23.2
Cataract Stage		
Incipient	14	25.0
Immature	14	25.0
Mature	25	44.6
Hypermature	3	5.4

Table 2
Distribution of Preoperative and Postoperative Visual Acuity Among Cataract Patients at An-Nisaa' Hospital Blitar (n=56)

Visual Acuity Outcome (n=56)	Preoperative n (%)	Postoperative n (%)
Poor (<6/60)	42 (75.0%)	2 (3.6%)
Moderate (<6/18 to 6/60)	14 (25.0%)	17 (30.4%)
Good (6/6 to 6/18)	0 (0%)	37 (66.1%)

Table 2 shows the distribution of preoperative and postoperative visual acuity among 56 cataract patients at An-Nisaa' Hospital Blitar. Before surgery (preoperative), most patients had poor visual acuity category, totaling 42 patients (75.0%), while 14 patients (25.0%) were in the moderate visual acuity category. No patients had good visual acuity before surgery (0%). After cataract surgery (postoperative), the distribution of

visual acuity showed a significant change. Most patients had good visual acuity category, totaling 37 patients (66.1%), followed by 17 patients (30.4%) with moderate visual acuity, and only 2 patients (3.6%) who remained in the poor visual acuity category.

Together, the findings presented in the aforementioned tables portray a cataract cohort typical of an aging population, predominantly female and characterized by advanced lens opacity, and demonstrate a pronounced functional recovery following surgical management. The preoperative visual status, which was largely dominated by severely impaired vision with an absence of favorable outcomes, was substantially reversed after surgery, shifting toward a predominance of good visual acuity with only a minimal residual proportion retaining poor vision. This overall pattern of improvement from markedly compromised to functionally restored vision highlights the clinical efficacy of cataract surgery in enhancing visual function and provides a substantive foundation for further interpretation in the discussion section.

2. Discussion

The findings of this study indicate that the majority of cataract patients who underwent surgery at An-Nisaa' Hospital Blitar in 2026 were aged 56–65 years. This is in line with a study conducted by Angelina and Manoe (2025), which stated that the majority of cataract patients were aged 56–65 years (37%). This occurs because as a person ages, lens proteins undergo non-enzymatic processes and genetic developments that can increase susceptibility to oxidation, changes in lens molecular arrangement, and increased light scattering. The human lens grows throughout life, causing the lens nucleus to be exposed to these influences for a long period and at risk of oxidative damage, which increases in the fourth decade of life. Consequently, lens transparency decreases and the lens nucleus becomes stiffer, causing difficulties in the eye's accommodative ability which can exacerbate cataract formation (Alkharki & Matyuschenko, 2024; Septiani, 2025; Vermeulen et al., 2025).

The results showed that the majority of patients were female. This is supported by Gautama and Setiohadji (2025), who reported that female cataract patients comprised 52 respondents or 59.77% of all participants. This finding aligns with Fernanda and Hayati (2020), who conducted research at the Eye Clinic of Meuraxa Hospital Banda Aceh, where cataract patients were also dominated by females with a proportion of 55.8%. The similarity between these studies indicates a consistent pattern that cataract incidence is more common in females across various research locations. The predominance of cataract cases in females is thought to be related to hormonal changes that occur with age, biological factors, and the influence of lifestyle and environmental exposure that can increase the risk of lens opacification. Therefore, women potentially have higher vulnerability to cataract development compared to men. These findings highlight the importance of further research to identify factors contributing to the high prevalence of cataracts in women. A more comprehensive understanding of these risk factors is expected to serve as a basis for developing more targeted prevention, early detection, and intervention strategies (Ang & Afshari, 2021; Fernanda & Hayati, 2020; Tirakunwichcha et al., 2026).

The results showed that patients predominantly underwent surgery on the right eye (oculus dextra). This finding differs from Gracella et al. (2020), who reported that senile cataracts were most commonly found in both eyes (bilateral). In cases of unilateral cataract, the unaffected eye still has a high risk of developing lens opacity later in line with disease progression. Generally, cataract formation results from gradual and

progressive denaturation of lens proteins in both eyes. Therefore, although cataracts may initially appear in one eye, most patients ultimately have the potential to develop bilateral cataracts. To date, there is no evidence indicating a tendency for the right or left eye to develop cataracts earlier than the other (Cheung & Nihalani, 2020; Putri, 2024; Spekreijse et al., 2020). The findings revealed that the mature cataract stage was the most prevalent. Based on the severity of senile cataracts divided into four stages incipient, immature, mature, and hypermature this differs from Putri (2024), who found that the immature cataract stage was the most common, with 28 patients (58.33%). This is consistent with other studies showing that cataract patients with immature stage reached 76%, while mature stage was only about 24%. In the mature stage, lens opacity has occurred entirely, causing drastic visual decline (Putri, 2024).

The distribution of visual acuity before and after surgery showed a shift in proportion from poor category dominance in the preoperative period to good category dominance in the postoperative period. This is supported by Putri (2024), where preoperative visual acuity was generally <3/60. Meanwhile, in a study conducted by Salsabila et al. (2021), patients with mature cataracts mostly had visual acuity below or equal to 3/60, indicating a level of blindness where the lens has become very cloudy and visual acuity is severely reduced, even reaching 1/300 or only hand movement perception. Improvement in visual acuity after cataract surgery occurs because the surgical procedure removes the cloudy crystalline lens and replaces it with a clear intraocular lens (IOL). In an eye with cataract, lens opacity causes light scattering and absorption of light entering the retina, thereby decreasing visual acuity, reducing contrast, and worsening visual quality. After the cloudy lens is extracted through phacoemulsification or cataract extraction and replaced with an IOL, the refractive media becomes clear again so that light can be optimally focused onto the retina. This condition improves image formation on the retina, enhancing visual acuity, contrast sensitivity, and overall visual quality. Therefore, most patients experience an increase in visual acuity category from poor before surgery to good after surgery. However, the degree of visual acuity improvement can vary among patients, influenced by factors such as cataract stage, presence of ocular comorbidities (e.g., diabetic retinopathy, glaucoma, or macular degeneration), intraoperative and postoperative complications, and patient compliance with postoperative care (Miller et al., 2022).

In the context of eye health service management, achieving high rates of visual restoration (66.1% achieving good visual acuity postoperatively) reflects efficient clinical operations and robust quality assurance mechanisms within the hospital (Van Vliet et al., 2011; Yoshizaki et al., 2021). Management strategies, such as implementing structured pre-surgical screening, utilizing standard phacoemulsification protocols, and maintaining strict 4-week post-operative follow-up appointments, ensure high success rates and early detection of postoperative non-clearing vision (Demir et al., 2018; Sommer & Blumenthal, 2019). Furthermore, hospital administrative policy should focus on expanding community outreach programs to detect cataracts at earlier stages (incipient/immature), reducing the proportion of mature/hypermature presentations and further enhancing surgical efficiency.

Conclusion

Based on the results of this study, it can be concluded that the characteristics of cataract patients who underwent surgery at An-Nisaa' Hospital Blitar in 2026 were predominantly in the 56–65 years age group, female, underwent surgery on the right eye (oculus dextra), and were mostly at the mature cataract stage. Before surgery, the majority of patients had poor visual acuity (75.0%), while after surgery, most experienced improvement to good visual acuity (66.1%), with a reduction in the proportion of poor visual acuity to 3.6%. These results demonstrate that cataract surgery provides a substantial improvement in patients' visual acuity, thereby enhancing visual function and supporting the quality of life of cataract patients. In addition, integrated eye health service management—spanning early community screening to standardized post-surgical follow-up—is essential to optimize clinical outcomes and maintain service quality in regional hospital settings.

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