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The Influence of Age on Visual Acuity in Postoperative Senile Cataract Patients Undergoing Phacoemulsification at Klinik Mata Dr. Imam

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ABSTRACT

Cataracts caused by aging are called senile cataracts. Phacoemulsification is the gold standard surgical method for cataract therapy. Postoperative visual acuity can be influenced by age. The objective of this study is to determine the characteristics of visual acuity and the influence of age on visual acuity in postoperative senile cataract patients undergoing phacoemulsification at Klinik Mata Dr. Imam. This study is retrospective research with a cross-sectional design. The data collected are secondary data from medical records, with a total of 106 respondents. The results of the univariate analysis showed that the majority of senile cataract patients undergoing phacoemulsification were in the elderly age group (55-65 years) with 42 cases (39.6%), male patients with 56 cases (52.8%), and 61 cases (57.5%) underwent surgery on the right eye. The best-corrected visual acuity in postoperative senile cataract patients undergoing phacoemulsification at Klinik Mata Dr. Imam was found on the 21st day. The largest proportion of patients achieving best-corrected visual acuity that meets the good standard set by WHO (6/6 - 6/18) was in the elderly age group (55-65 years) with 39 cases (41.5%), male patients with 50 cases (53.2%), and surgeries on the right eye with 52 cases (55.3%). Bivariate analysis was performed using the chi-square test and showed a significant influence between age and visual acuity in postoperative senile cataract patients undergoing phacoemulsification (p-value = 0.011). In conclusion, there is a significant influence of age on visual acuity in postoperative senile cataract patients undergoing phacoemulsification.

INTRODUCTION

Cataract is the leading cause of blindness, accounting for the highest percentage, reaching 94 million people worldwide[1]. The prevalence of cataracts increases with age, from 3.9% at ages 55-64 to 92.6% at ages 80 and above[2]. In Indonesia, the estimated annual incidence of cataracts is 0.1%. The population of Indonesia also tends to suffer from cataracts 15 years earlier than people in subtropical regions[3]. According to the 2013 Riskesdas report, the prevalence of cataract patients in the Special Region of Yogyakarta Province reached 2%[4].

In cases of senile cataracts, surgical intervention is an effective therapy that can be undertaken. Surgical methods that can be chosen include phacoemulsification, extracapsular cataract extraction, and intracapsular cataract extraction. Among all these surgical methods, phacoemulsification is considered the gold standard for cataract surgery in developed countries[5,6]. The success of cataract surgery can be measured using clinical indicators such as visual acuity or vision[7]. The World Health Organization (WHO) has established international standards for post-cataract surgery visual acuity, categorizing it into three levels: good (visual acuity 6/6 – 6/16), fair (visual acuity <6/18 – 6/60), and poor (visual acuity <6/60). Advanced age is one of the factors that can lead to surgical outcomes not achieving the desired level of success due to physiological anatomical changes[8].

In Indonesia, there are not many healthcare facilities that provide cataract surgery services using the phacoemulsification technique, including in the Special Region of Yogyakarta. Not all eye specialists in Indonesia have the competence to perform phacoemulsification, and the high cost of phacoemulsification equipment used is a contributing factor to the limited adoption of this technique. Klinik Mata Dr. Imam is the only eye clinic in Yogyakarta that offers phacoemulsification services. In a preliminary study conducted by researchers, it was also found that this clinic only began operations in 2021, so no research has been conducted there yet. Based on the background provided, the researcher is interested in determining the influence of age on visual acuity in patients with senile cataracts following phacoemulsification surgery at Klinik Mata Dr. Imam.

METHODS

This study is analytical descriptive research employing a cross-sectional design to investigate the influence of age on visual acuity in patients with senile cataracts who have undergone phacoemulsification surgery at Klinik Mata Dr. Imam. The population for this study includes all patients aged ≥45 years who have been diagnosed with senile cataracts and have undergone

surgery using the phacoemulsification method at Klinik Mata Dr. Imam during the period from January 1st to December 31st, 2021. The inclusion criteria for this study are patients aged ≥45 years, diagnosed with senile cataracts, undergone phacoemulsification surgery, and having complete medical records. The exclusion criteria for this study are patients with a history of diabetic retinopathy, other eye diseases, previous eye surgeries, and incomplete medical records. The sampling technique used is total sampling.

This study an analytical descriptive, utilizing secondary data sourced from medical records. The variables under investigation are age as the independent variable and visual acuity as the dependent variable. Data will be analyzed using Statistical Product and Service Solutions (SPSS) version 26. In the univariate analysis, a description of the frequency distribution (n) and percentage (%) for each variable will be obtained. In the bivariate analysis, statistical tests will be conducted using the chi-square method. The influence is considered significant if the p-value is <0.05.

RESULTS

Based on the research conducted by the researcher at Klinik Mata Dr. Imam, Table 1 shows that out of the 106 respondents who were sampled, there were patients categorized as middle-aged, totaling 6 patients (5.7%), elderly patients, totaling 42 patients (39.6%), young elderly patients, totaling 40 patients (37.7%), and old elderly patients, totaling 18 patients (17%).

Table 1. Frequency Distribution of Respondent Characteristics Based on Age Categories at Klinik Mata Dr. Imam 2021

Age	***n***	***%***
Middle-aged (45-54 years old)	6	5,7
Elderly (55-65 years old)	42	39,6
Young Elderly (66-74 years old)	40	37,7
Old Elderly (75-90 years old)	18	17,0
Total	106	100

Table 2 below demonstrates that out of the 106 respondents sampled, there were 56 male patients (52.8%) and 50 female patients (47.2%).

Table 2. Frequency Distribution of Respondent Characteristics Based on Gender Categories at Klinik Mata Dr. Imam 2021

Gender	***n***	***%***
Male	56	52,8
Female	50	47,2
Total	106	100

Table 3 indicates that out of the 106 respondents who were sampled, there were 61 patients who had undergone surgery on their right eye (57.7%) and 45 patients who had undergone surgery on their left eye (42.5%).

Table 3. Frequency Distribution of Respondent Characteristics Based on Operated Eye Categories at Klinik Mata Dr. Imam 2021

Operated Eye	***n***	***%***
OD (right eye)	61	57,5
OS (left eye)	45	42,5
Total	106	100

Table 4 shows that out of the 106 respondents sampled, there were patients with the following preoperative visual acuity categories: good visual acuity preoperatively for 11 patients (10.4%), fair visual acuity preoperatively for 30 patients (28.3%), and poor visual acuity preoperatively for 65 patients (61.3%).

Table 4. Frequency Distribution of Respondent Characteristics Based on Preoperative Visual Acuity Categories at Klinik Mata Dr. Imam 2021

Visual Acuity	***n***	***%***
Good (6/6 – 6/18)	11	10,4
Fair (<6/18 – 6/60)	30	28,3
Poor (<6/60)	65	61,3
Total	106	100

Table 5 indicates that out of the 106 respondents sampled, the postoperative visual acuity on the second day was categorized as good for 54 patients (50.9%), fair for 37 patients (34.9%),

and poor for 15 patients (14.2%). On the seventh day postoperatively, the visual acuity categories were good for 76 patients (71.7%), fair for 28 patients (26.4%), and poor for 2 patients (1.9%). On the 21st day postoperatively, the visual acuity categories were good for 94 patients (88.7%), fair for 12 patients (11.3%), and no patients were found with poor visual acuity.

Table 6 demonstrates *frequency distribution of characteristics of best corrected visual acuity in patients with senile cataracts on the 21st* day postoperative based on age, gender, and operated eye. From 106 respondents sampled, in the middle-aged category (45-54 years), 5 patients (5.3%) had good visual acuity (6/6 – 6/18), and 1 patient (8.3%) had fair visual acuity (<6/18 – 6/60). In the elderly category (55-65 years), 39 patients (41.5%) had good visual acuity (6/6 – 6/18), and 3 patients (25%) had fair visual acuity (<6/18 – 6/60). In the young elderly category (66-74 years), 38 patients (40.4%) had good visual acuity (6/6 – 6/18), and 2 patients (16.7%) had fair visual acuity (<6/18 – 6/60). In the old elderly category (75-90 years), 12 patients (12.8%) had good visual acuity (6/6 – 6/18), and 6 patients (50%) had fair visual acuity (<6/18 – 6/60). No patients in any age category had poor visual acuity (<6/60).

Table 5. Frequency Distribution of Characteristics of Visual Acuity in Patients with Senile Cataracts Postoperative Based on Time at Klinik Mata Dr. Imam 2021

Visual Acuity	***n***	***%***
D+2		
Good (6/6 – 6/18)	54	50,9
Fair (<6/18 – 6/60)	37	34,9
Poor (<6/60)	15	14,2
Total	106	100
D+7		
Good (6/6 – 6/18)	76	71,7
Fair (<6/18 – 6/60)	28	26,4
Poor (<6/60)	2	1,9
Total	106	100
D+21		
Good (6/6 – 6/18)	94	88,7
Fair (<6/18 – 6/60)	12	11,3
Total	106	100

Table 6. Frequency Distribution of Characteristics of Best Corrected Visual Acuity in Patients with Senile Cataracts on the 21st day Postoperative Based on Age, Gender, and Operated Eye at Klinik Mata Dr. Imam 2021

Characteristics	Visual Acuity				Total
	Good (6/6 – 6/18)		Fair (<6/18 – 6/60)		
	n	%	n	%	n
Age					
Middle-aged (45-54 years old)	5	5,3	1	8,3	6
Elderly (55-65 years old)	39	41,5	3	25	42
Young Elderly (66-74 years old)	38	40,4	2	16,7	40
Old Elderly (75-90 years old)	12	12,8	6	50	18
Total	94	100	12	100	106
Gender					
Male	50	53,2	6	50	56
Female	44	46,8	6	50	50
Total	94	100	12		106
Operated Eye					
Right Eye (OD)	52	55,3	9	75	61
Left Eye (OS)	42	44,7	3	25	45
Total	94	100	12	100	106

Table 7 indicates that there is an influence between age and the visual acuity of patients with senile cataracts after phacoemulsification surgery at Dr. Imam Eye Clinic in the year 2021. This is evidenced by the bivariate analysis conducted using the chi-square test, resulting in a p-value of 0.011. Since the p-value is less than the significance level of 0.05 (p-value < 0.05), the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted.

Table 7. The Influence of Age on Visual Acuity in Patients with Senile Cataracts Post Phacoemulsification Surgery at Klinik Mata Dr. Imam 2021

Age	Visual Acuity				Total	p value
	Good (6/6 – 6/18)		Fair (<6/18 – 6/60)			
	n	%	n	%	n	
Middle-aged (45-54 years old)	5	5,3	1	8,3	6	
Elderly (55-65 years old)	39	41,5	3	25	42	
Young Elderly (66-74 years old)	38	40,4	2	16,7	40	0,011
Old Elderly (75-90 years old)	12	12,8	6	50	18	
Total	94	100	12	100	106	

DISCUSSION

Characteristics of Patients with Senile Cataracts Post Phacoemulsification Surgery

In this study, it was found that the majority of patients with senile cataracts who underwent phacoemulsification surgery were predominantly in the elderly age category (55-65 years).The findings are consistent with the research conducted by Asmara (2019)at Sanglah Hospital, Denpasar, where out of 32 patients with senile cataracts who underwent surgery, the highest proportion was among patients aged 51-60 years, totaling 13 (40.6%) patients[9]. These results are also in line with the study by Puspita (2018) conducted at Siti Rahmah Islamic Hospital, where out of 80 patients with senile cataracts, the majority were in the age range of 50-69 years, with a total of 59 patients[10]. From these three studies, it can be inferred that as age increases, the risk of developing senile cataracts also increases. This is due to the degenerative process that leads to changes in the lens. These changes involve increased lens density and decreased elasticity, which can disrupt lens transparency, leading to blurred vision[11].

In this study, it was found that the majority of patients with senile cataracts who underwent phacoemulsification surgery were predominantly were male. These findings are similar to the research by Manggala (2021) conducted at Mangusada Regional Hospital, Badung, where out of 609 patients with senile cataracts, the majority were male patients, totaling 317 (52.1%)[12]. These results differ from the study by Tamansa (2016) conducted at Prof. Dr. R. D. Kandou Hospital, Manado, where out of 197 patients, 109 (55.4%) were female[13].Hormonal factors are believed to play a role in the occurrence of senile cataracts. Some studies suggest that the loss of estrogen hormone in women after menopause can influence cataract formation[14]. The longer life expectancy of women might also contribute to a higher number of women with cataracts compared to men. However, it's found that men are 1.39 times more likely to undergo cataract surgery than women. This could be due to factors such as family support and economic considerations[15].The differences in these research outcomes are likely attributed to variations in location, time, sample size, as well as differences in inclusion and exclusion criteria, which can influence the research results[16].

In this study, it was found that the majority of patients with senile cataracts who underwent phacoemulsification surgery were predominantly had the right eye operated on. These results are similar to the research conducted by Jaiswal (2021) in a hospital in East India, where the frequency distribution of operated eyes in patients with senile cataracts showed that the highest proportion was found in the right eye (63%)[17]. These findings differ from the study by Junejo (2022), which found that among 982 patients with senile cataracts, the highest proportion of operated eyes was in the left eye, totaling 499 (50.8%) patients[18].These differences might not be significant, as there is currently no research that clearly explains the role of the right eye or left eye in the occurrence of senile cataracts.

Characteristics of Visual Acuity in Patients with Senile Cataracts Post Phacoemulsification Surgery

The visual acuity in patients with senile cataracts post phacoemulsification on the second day (D+2) and seventh day (D+7) represents Un-Corrected Visual Acuity (UCVA), meaning visual acuity without glasses correction. From the results above, it cannot be concluded that the visual acuity meets the WHO's good vision standards. These findings are similar to the research by Hanis (2022), where during the first week after phacoemulsification surgery, no patients achieved good visual acuity (0%), 21 patients (91.3%) had fair visual acuity, and 2 patients (8.70%) had poor visual acuity[19]. The lack of good visual acuity in the first week might be due to the recovery phase, which is expected to improve over time.

The visual acuity in patients with senile cataracts post phacoemulsification on the 21st day (D+21) already meets the WHO's good vision standards. These results are similar to the research by Hanis (2022) at H. Abdul Manap Regional Hospital in Kota Jambi, where in the third week after phacoemulsification surgery, patients with senile cataracts were increasingly dominated by those with good visual acuity (60.87%) out of a total of 23 patients[19]. Early cataract surgery, trained operators, accurate biometry examinations, and advanced equipment availability contribute to achieving good visual acuity[20]. By D+21, patients are provided with glasses correction, known as Best-Corrected Visual Acuity (BCVA).

The Influence of Age on Visual Acuity in Patients with Senile Cataracts Post Phacoemulsification Surgery

This study revealed that there is a significant influence of age on visual acuity in patients with senile cataracts post phacoemulsification surgery (p-value = 0.011). These findings are consistent with the research by Aggarwal (2017), which involved 300 post-cataract surgery patients and demonstrated a relationship between age and postoperative visual acuity, showing a significant decline in visual acuity in the older age groups[21]. The study by Ayala (2015) also found that younger age groups (<60 years) had better postoperative visual acuity compared to older age groups[22]. There's research explaining that age has a significant impact on cataract surgery outcomes regardless of the effects of comorbidities or postoperative complications. In that research, individuals aged 90 and above were four times more likely to have poor visual acuity compared to those below 60 years old[23].

Poor visual acuity can be attributed to age-related changes such as macular degeneration, reduction in retinal nerve fiber layer thickness, increased lens density, decreased corneal

endothelial cell density, and increased risk of complications. These factors contribute to postoperative visual acuity not meeting the WHO's good vision standards (6/6 – 6/18). Lens changes in the elderly, where epithelial lens fibers continue to accumulate in the lens center, can lead to increased opacity and reduced elasticity. Reduced lens elasticity affects accommodation, resulting in decreased visual acuity[24].

These findings contrast with the research by Nurjanah (2019), which found no relationship between age and post-cataract surgery visual acuity, with a p-value of 1.000 ($p > 0.05$). This difference could be attributed to variations in cataract surgery methods. The Nurjanah study used Extracapsular Cataract Extraction (ECCE), while the current study employed phacoemulsification[25]. One study noted that ECCE had a higher prevalence of postoperative complications (48.5%) compared to phacoemulsification, it since the ECCE method involves larger incisions, which can lead to vitreous leakage. That's indicating that poor postoperative visual acuity in patients using the ECCE method might largely be influenced by postoperative complications rather than age[26].

CONCLUSION

In this study, it can be concluded that there is an influence of age on visual acuity in patients with senile cataracts post phacoemulsification surgery (p-value = 0.011). It is observed that patients with senile cataracts who underwent phacoemulsification surgery are more prevalent in the elderly age category (55-65 years), male gender, and surgery on the right eye. The best-corrected visual acuity in patients with senile cataracts post phacoemulsification surgery at Klinik Mata Dr. Imam was found to be at its best on the 21st day. The proportion of best-corrected visual acuity meeting the WHO standards for good vision (6/6 – 6/18) was highest in the elderly age category (55-65 years), male gender, and surgery on the right eye. However, the research findings may be influenced by the difference in sample sizes, which could explain the results.

According to theory, postoperative visual acuity tends to worsen with older age and improve with younger age. However, in this study, there were instances of middle-aged individuals having fair visual acuity and elderly individuals having good visual acuity. This might be due to various factors that are not fully understood in this study, warranting further research.

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