RESEARCH ARTICLE

pISSN: 0126-074X | eISSN: 2338-6223
https://doi.org/10.15395/mkb.v55n1.2935
Majalah Kedokteran Bandung. 2023;55(1):27–34

Majalah Kedokteran Bandung (MKB)

Received: August 2, 2022
Accepted: December 16, 2022
Available online: March 31, 2023

Impact of First Eye Cataract Surgery on Quality of Life

Mayasari Wahyu Kuntorini, Maya Primagustya Achmad, Aldiana Halim
Department of Ophthalmology, Faculty of Medicine, Universitas Padjadjaran, Bandung/National Eye Centre, Cicendo Eye Hospital, Bandung, Indonesia

Abstract

Cataracts are the second leading cause of visual impairment and the first cause of blindness, both globally and Indonesia. Cataracts do not only reduce vision but also the quality of life of the patients. Cataract surgery of at least one eye is expected to improve the patient's visual function and quality of life. This study aimed to assess the quality of life of patients with bilateral senile cataracts after the first eye surgery compared to people with normal vision. This was a cross-sectional study on 75 patients who underwent their first eye cataract surgery at the Cataract and Refractive Surgery Unit and 75 people with normal vision who visited the Refraction, Contact Lens, and Low Vision Unit of the National Eye Center of Cicendo Eye Hospital during the period of March–June 2020. The quality of life assessment was conducted through interviews using the National Eye Institute Visual Function Questionnaire-25. The non-inferiority test with a margin of 20% was performed. The mean age of the subjects was 63.49 years with no difference in the proportion of gender. Presenting visual acuity of binoculars after the first cataract surgery was 0.26 LogMAR and normal vision was 0.07 LogMAR. With a margin of 20%, the patient's quality of life after the first cataract surgery was not inferior to the normal vision subjects (d= -2.45% (95% CI -6.3% to 1.4%)). Hence, patients' quality of life after the first cataract surgery is not inferior to those with normal vision.

Keywords: Bilateral senile cataract, first eye cataract surgery, normal vision, quality of life

Introduction

Cataracts are the second leading cause of visual impairment and the first cause of blindness in the world. According to the International Agency for the Prevention of Blindness (IAPB), the proportion of blindness due to cataracts is around 45% in developing countries, including Indonesia. As many as 2.8% of the population aged > 50 years suffered from bilateral blindness in West Java, and 71.7% of them were caused by cataracts.[1–3]

This high prevalence of cataracts indicates the population's high disease burden. However, another factor that may be considered to measure the degree of burden is assessing cataracts' impact on daily life. The impact of cataracts is generally assessed objectively, such as by examining visual acuity, contrast sensitivity, and stereopsis. Previous objective examinations have yet to be able to represent the overall visual function assessment. In addition, the objective examination does not describe the true impact of visual impairment. Therefore, holistic and subjective visual function examinations from the patient's point of view should be considered. One such examination is an assessment of the quality of life.[4] Quality of life-related to vision is an individual's perception of his vision that impacts the ability to carry out activities, including social, emotional, and economic well-being. *National Eye Institute Visual Function Questionnaire-2*5 (NEI VFQ-25) is one of the questionnaires that is considered specific and efficient to assess the impact of visual impairment on quality of life.[5–7]

A severe burden of cataracts is disease progression causing blindness. Prevention of blindness due to cataracts is through surgery. However, a satisfactory outcome after the first cataract surgery does not necessarily increase the patient's desire to undergo cataract surgery for the second eye. This phenomenon is often found in several developing countries. Mahajan et al. proposed a study regarding barriers to cataract surgery for the second eye in rural India. These barriers include patients already

Corresponding Author:
Mayasari Wahyu Kuntorini
Department of Ophthalmology, Faculty of Medicine, Universitas Padjadjaran, Bandung/National Eye Centre, Cicendo Eye Hospital, Bandung, Indonesia
Email: maya.sari@unpad.ac.id

feeling that they can see with only one eye and the cost of surgery is relatively high. In contrast to developed countries, the barrier to cataract surgery for the second eye is a long surgery queue period.[7,8]

Through this study, researchers aimed to determine the quality of life of bilateral senile cataract patients after the first eye surgery, then compare them with the quality of life of people with normal vision.[6,7,9–12]

Methods

This study was a cross-sectional study. Ethical approval was obtained from the Health Research Ethics Committee, Faculty of Medicine, Universitas Padjadjaran, with protocol number 426/UN6.KEP/EC/2020.

Seventy-five case group subjects were taken from 199 medical records of bilateral senile cataract patients who had their first eye cataract surgery performed in June 2019–March 2020 at the Refractive Cataract Surgery Unit at National Cicendo Eye Hospital and who met the inclusion and exclusion criteria. While 75 control group subjects were taken from 724 medical records of normal vision patients in January 2019–March 2020 at the Refraction, Contact Lens, and Low Vision Units who met the inclusion and exclusion criteria. The matching process for gender and age was carried out on the control group subject to the case group subject.

The inclusion criteria for the case group in this study were: aged ≥50 years; no other ocular abnormalities other than cataract; had undergone first eye cataract surgery; preoperative binocular presenting visual acuity (PVA) <6/60; and one-month postoperative binocular PVA ≥6/18. The inclusion criteria for the control group were: aged ≥50 years; binocular PVA ≥6/12; with phakic eyes. Exclusion criteria in this study were: diagnosis of other ocular disorders that interfere with the visual axis; history of other intraocular surgery; intra and post operative complications; uncooperative patients; systemic disorders that were not controlled; could not be contacted via telephone; refused to participate; had a second eye cataract surgery performed elsewhere; and have passed away.

Data were obtained from medical record data and interview results from March-June 2020. The medical record data taken was PVA binoculars, then the data was converted into LogMAR notation. Experienced refractionist opticians conducted PVA measurements. Information obtained from interviews included age, gender, education level, occupation, income, use of glasses, systemic disorders, and quality of life through the Indonesian version of the NEI VFQ-25 questionnaire. The interview was conducted by a single general practitioner who had undergone training in the interviewing process. The interviewer was blinded from the study subjects throughout the data collection process.

The NEI VFQ-25 questionnaire consists of a base set of 25 vision-targeted questions representing 11 vision-related constructs, with an additional single-item general health rating question. This questionnaire generates the following vision-targeted subscales: global vision rating (1), difficulty with near vision activities (3), difficulty with distance vision activities (3), limitations in social functioning due to vision (2), role limitations due to vision (2), dependency on others due to vision (3), mental health symptoms due to vision (4), driving difficulties (3), limitations with peripheral (1) and color vision (1), and ocular pain (2). The VFQ-25 also contains a single general health rating question which is a robust predictor of future health and mortality in population-based studies.[5]

For each question, responses were presented in a Likert scale format in which patients were asked to rate the difficulty level of specific visual symptoms or activities. Scales were later calculated according to the methods described by the NEI-VFQ developers which range from 0 to 100, with 100 representing the best possible score and 0 representing the worst. Scores were then grouped and calculated in 12-sub scales and as well as a combined total score.[5]
The Indonesian adaptation of the NEI VFQ-25 questionnaire was developed according to international standards. The questionnaire was translated using the forward-backward translation method and conducted by two bilingual translators (English and Indonesian as the mother language) with a Cambridge English for Speakers of Other Languages certificate. Then the Indonesian version of the questionnaire was tested for validity and reliability before the research was conducted.

A validity and reliability test were conducted with a total of 30 samples from the Cataract Refractive Surgery Unit and Refraction, Contact Lens, and Low Vision Unit of the National Eye Center Cicendo Eye Hospital. Validity assesses how well a measure adequately represents the domains or constructs of interest. In this study, validity was assessed using Pearson Product

Moment correlation which found all questions of the Indonesian adaptation of the NEI VFQ-25 questionnaire to be valid (value of count r 0.61 was greater than r table 0.361 at a significance level of 5%). Reliability assesses the internal consistency of the questionnaire. To assess reliability, we calculated Cronbach alpha and found internal consistency for the Indonesian adaptation of NEI VFQ-25 of 0.961, indicating the questionnaire to be reliable (r>0.7).[13]

The data was processed computerized using Microsoft Office Excel 2016 and analyzed using the Statistical Package for the Social Sciences version 24.0. For numerical data, the p-value was tested by unpaired T-test if the data were normally distributed and the Mann-Whitney test if the data were not normally distributed. For categorical data, the p-value was calculated based on the Chi-Square test and Kolmogorov Smirnov and Exact Fisher tests if the Chi-Square requirements were not met. Statistical analysis was also performed by non-inferiority test using a margin of 20%. The results obtained were displayed in the form of tables and diagrams.

Results

The research was conducted from March to June 2020 at National Cicendo Eye Hospital. This study compared the quality of life of the case group to the control group of 150 study subjects.

The mean age of subjects in the case group was 63.49 years and most of them were in the range of 61–75 years (56.0%). The gender proportion was the same between men and women. The majority of the case group subjects had a low level of education (52.0%), not working/housewife (45.3%), low income (70.7%), married status (81.3%), not living alone (92.0%), not using glasses (81.3%), and had systemic disorders (56.0%) (Table 1).

Subjects in the control group had the characteristics of age (mean 63.55 years) and gender did not differ from the case group. Although with different proportions, the control group subjects were also dominated by low education level (36.0%), not working/housewife (33.3%), low income (49.3%), married status (72.0%), and not living alone (97.3%). The difference with the case group was that the control group subjects used glasses more (81.3%) and had no systemic abnormalities (73.3%) (Table 1).

Characteristics of income, use of glasses, and systemic disorders were statistically significant between the case group and the control group (p>0.05). Furthermore, bivariate and multivariate analyses were carried out on the sociodemographic characteristics data with the results that the two research groups were not homogeneous.

The mean binocular PVA measured preoperatively of the first eye was 1.23 LogMAR, and postoperatively of the first eye was 0.26 LogMAR in the case group. Meanwhile, the mean binocular PVA in the control group was 0.07 LogMAR. The results of the statistical test showed that there was a significant difference between the binocular PVA in the case group and the binocular PVA in the control group (p<0.05) (Table 2).

The mean and standard deviation of the quality of life for the control and case groups

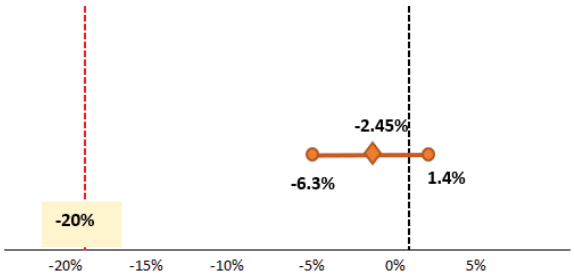

Figure Non-Inferiority Test Diagram: Combined Quality of Life

The non-inferiority test in this study used a margin of 20% with a 95% confidence interval (CI). The non-inferiority test refers to the difference in the mean quality of life (delta/d) in the case group to the control group. The non-inferiority test chart shows the results of d = - 2.45% (95% CI -6.3% to 1.4%) with a margin of 20%

Table 1 Sociodemographic Characteristics Relationship between Case and Control Group

Variable	Group		P value
	Cases (n=75)	Control (n=75)	
Age (years)			0.993
50–55	20 (26.7%)	20 (26.7%)	
56–60	9 (12.0%)	9 (12.0%)	
61–65	13 (17.3%)	13 (17.3%)	
66–70	14 (18.7%)	14 (18.7%)	
71–75	15 (20.0%)	15 (20.0%)	
76–80	3 (4.0%)	3 (4.0%)	
>80 Median	1 (1.3%)	1 (1.3%)	
Range (min-max)	6.49 ± 8.341 50–81	63.55 ± 8.683 51–82	
Gender			1.000
Men	37 (49.3%)	37(49.3%)	
Women	38 (50.7%)	38(50.7%)	
Education			0.110
No school	7 (9.3%)	5 (6.7%)	
Low (Elementary school/JHS)	39 (5.0%)	27 (36.0%)	
Middle (SHS)	16 (21.3%)	19 (25.3%)	
High (University)	13 (17.3%)	24 (32.0%)	
Occupation			0.653
No job/housewife	34 (45.3%)	25 (3.3%)	
Retired	13 (17.3%)	11 (14.7%)	
Farmer/fisherman/labor	10 (13.3%)	6 (8.0%)	
Entrepreneur	10 (13.3%)	9 (12.0%)	
Employee	6 (8.0%)	23 (30.7%)	
Others	2 (2.7%)	1 (1.3%)	
Income			0.021*
Low (< IDR 1,500.000)	53(70.7%)	37 (49.3%)	
Medium (IDR 1.500,000–2,500,000)	6 (8.0%)	6 (8.0%)	
High (IDR 2,500,000–3,500,000)	7 (9.3%)	8 (10.7%)	
Very high (>IDR 3,500,000)	9 (12.0%)	24 (32.0%)	
Marital status			0.900
Married	61 (81.3%)	54 (72.0%)	
Widower/widow	13 (17.3%)	21 (28.0%)	
Not married	1 (1.3%)	0 (0.0%)	
Living alone			0.276
Yes	6 (8.0%)	2 (2.7%)	
No	69 (92.0%)	73 (97.3%)	

Table 1 (Continued)

Variable	Group		P value
	Cases	Control	
Use of glasses			0.0001*
Yes	14 (18.7%)	61 (81.3%)	
No	61 (81.3%)	14 (18.7%)	
Systemic disorder			0.002*
Nothing	33 (44.0%)	55 (73.3%)	
Diabetes mellitus	9 (12.0%)	4 (5.3%)	
Hypertension	24 (32.0%)	14 (18.7%)	
Diabetes mellitus and hypertension	9 (12.0%)	2 (2.7%)	

Note: For numerical data, the p-value was tested by unpaired T-test if the data were normally distributed and the Mann-Whitney test if the data were not normally distributed. For categorical data, the p-value was calculated based on the Chi-Square test and Kolmogorov Smirnov and Exact Fisher tests if the Chi-Square requirements were not met. The sign (*) indicates the p-value <0.05, which means that it is significantly different or statistically significant. Abbreviation: JHS (Junior High School), SHS (Senior High School)

Table 2 Binocular Presenting Visual Acuity Relationship between Case and Control Group

Variable	Group		P value
	Cases (n=75)	Control (n=75)	
binocular PVA** (LogMAR)			0.0001*
Mean ± Std	0.26±0.187	0.07±0.108	
Range	0.0–0.5	0.0–0.3	

The unpaired T-test was used if the data were normally distributed and the Mann-Whitney test if the data were not normally distributed. The sign (*) indicates the p-value <0.05, which means that it is significantly different or statistically significant. (**) Post-operative PVA for cases group. Abbreviation: PVA (Presenting Visual Acuity)

Table 3 Differences in Mean Quality of Life between Control and Case Group

Subscale	Control group (mean ± SD)	Case group (mean ± SD)	Mean difference (%)	Lower limit. upper limit (%)*
General health	50.33 ± 15.097	60.00 ± 27.262	-9.67	-16.79. -2.54
Vision health	76.80 ± 12.230	77.60 ± 13.934	-0.08	-5.04. 3.44
Discomfort	90.83 ±14.866	89.83 ± 14.917	1.00	-3.81. 5.81
Near vision	95.83 ± 8.745	91.28 ± 14.174	4.56	0.75. 8.36
Far vision	99.00 ± 3.865	95.50 ± 8.846	3.50	1.29. 5.71
Social function	99.50 ± 3.210	98.50 ± 6.485	1.00	-0.66. 2.66
Mental health	97.75 ± 4.191	94.83 ± 10.345	2.92	0.36. 5.47
Role limitations	98.83 ± 5.106	97.00 ± 11.036	1.80	-0.95. 4.62
Dependency	100.00	97.11 ± 10.655	2.89	0.44. 5.34
Color vision	99.33 ± 4.055	97.67 ± 9.348	1.67	0.67. 4.00
Peripheral vision	100.00	98.67 ± 6.991	1.33	-0.28. 2.94
Combined	94.84 ± 2.562	92.56 ± 7.509	-2.45	-6.30. 1.40

* CI 95%

were 94.84±2.562 and 92.56±7.509, respectively (Table 3). If reviewed based on the subscale, the mean and standard deviation of the quality of life in general health, vision health, eye discomfort, near vision, far vision, social function, mental health, role limitations, dependence on others, color vision, and peripheral vision in the control group were 50.33±15.097, 76.80±12.230, 90.83 ±14,866, 95.83±8,745, 99.00±3,865, 99.50± 3,210, 97.75±4.191, 98.83±5.106, 100,00, 99.33± 4,055, 100,00, while the case groups were 60.00 ±27.262, 77.60±13.934, 89.83±14.917, 91.28 ±14.174, 95.50±8.846, 98.50±6.485, 94.83 ±10.345, 97.00±11.036, 97.11±10.655, 97.67± 9.348, 98.67 ± 6.991. The driving subscale was not analyzed further due to many missing values.

The non-inferiority test in this study used a margin of 20% with a 95% confidence interval (CI). The non-inferiority test refers to the difference between the mean quality of life (delta/d) in the case and control groups. The non-inferiority test chart shows the results of d= -2.45% (95% CI -6.3% to 1.4%) with a margin of 20% (Figure 1).

Based on 95% CI, the lower and upper limits of the mean quality of life were obtained in percentages. None of the lower limit percentages were lower than -20%, meaning that the combined quality of life and per subscale of the case group was not inferior to that of the control group (Table 3).

Discussion

This study compared the quality of life-related to patients' vision after the first eye cataract surgery with the quality of life of people with normal vision. Previous studies have only focused on improving the quality of life of cataract patients after cataract surgery. Only Tiihonen et al. reported quality of life before and after cataract surgery, then compared with the normal population in Finland. However, Tiihonen et al. assessed health-related quality of life using a 15-Dimension questionnaire. The items measured were more general, so the results obtained were minor improvements in quality of life.[6,7,9–12,14] In the current study, we assessed the quality of life using the Indonesian adaptation of the NEI VFQ-25 questionnaire.

The NEI VFQ-25 questionnaire, which was the main instrument in this study, has power over the items being assessed. The assessment measured not only difficulty in daily activities but also the effect of visual impairment on social functioning, mental health, role limitations, and dependency on others. Through this questionnaire, we expected that the magnitude of cataract surgery benefits could be assessed subjectively as the information was obtained directly from the patients.[5–7]

To et al. mentioned that confounding factors in post-cataract surgery quality of life studies included age, gender, education, income, marital status, drug use, use of glasses, and comorbidities. The current study found that the characteristics of income, use of glasses, and systemic disorders significantly differed between subjects and subjects with normal vision after their first eye cataract surgery.[7]

In this study, post-cataract surgery subjects were primarily low-income (70.7%). A person's economic status can affect health information acquisition, mainly information about cataracts and cataract surgery. A low economic status will hinder one's priority of eye health until vision is significantly impaired. In addition, low economic status can be a barrier to undergoing cataract surgery due to its high costs, as reported by Ratnaningsih et al. several subscales of quality of life can be influenced by economic status, including general health, visual health, social functioning, mental health, role limitations, and dependence on others.[15,16] Not all patients after cataract surgery obtain optimal visual acuity, even though the preparation for surgery was carried out appropriately. Some patients still need refractive correction. Furthermore, the loss of accommodation in the operated eye and the intraoperatively implanted mono-focal lens causes most patients to have difficulty performing activities that require good vision.[4]

The majority of subjects after cataract surgery in this study did not use glasses (81.3%). Prescription glasses, either bifocal, progressive, or reading glasses, are usually only given after the second eye cataract surgery at the Cataract and Refractive Surgery Unit at National Cicendo Eye Hospital with the consideration that the time of the second eye surgery is not more than three months. Chen added that there was pseudo-accommodation one year after cataract surgery, which caused some patients to be still able to see at close range.[17]

Systemic disorders are difficult to avoid in elderly individuals. The decline in organ function occurs due to the aging process. Many subjects after cataract surgery in this study had systemic disorders (56.0%). To et al. and Fraser et al. reported that 60.8% and 79.8% of their study subjects also had comorbidities. The impact of

comorbidities presence on research±al health subscale. However, this study used uncontrolled systemic disorders as an exclusion criterion to minimize this impact.[6,7]

Cataract surgery in the elderly aims to restore visual function so that they have independence in daily activities and work, affecting their social and mental status. Several previous observational and experimental studies have shown that cataract surgery in the first eye significantly improves visual function and the quality of life of sufferers.[6,7]

The mean postoperative binocular PVA of the first eye cataract in this study was 0.26 LogMAR, from 1.23 LogMAR preoperatively. The PVA results were classified as good because most patients were free from visual disturbances based on World Health Organization standards. Compared to other studies, the PVA before and after this study's first eye cataract surgery was lower. An Australian study reported a preoperative binocular acuity was 0.23 LogMAR and postoperative was 0.05 LogMAR. In comparison, a study in Vietnam reported a preoperative binocular acuity was 0.58 LogMAR, and postoperative of the first eye was 0.16 LogMAR. Both studies included tests for contrast sensitivity and stereopsis. The results obtained were an increase in contrast sensitivity and stereopsis were directly proportional to an increase in quality of life but not with an increase in visual acuity.[6,7]

Quality of life is a multidisciplinary and multidimensional concept. Quality of life refers to physical, mental, social, and functional well-being. The positive impact of recovering visual function is improving a person's quality of life. The combined mean quality of life of subjects after this study's first eye cataract surgery was 92.56, and for subjects with normal vision was 94.84. Furthermore, a non-inferiority test was carried out with a margin of 20% and a CI of 95%. The results obtained were d = -2.45% (95% CI -6.3% to 1.4%), which suggests that the quality of life of the subject after the first eye cataract surgery was not inferior to the quality of life of normal vision subjects in this study.[18.19]

The quality-of-life value in this study was obtained with the condition of the two research groups' subjects inhomogeneous from the characteristics of income, use of glasses, systemic disorders, and binocular PVA. However, patients' quality of life after cataract surgery in the first eye was inferior to that of people with normal vision. In that case, these inhomogeneous characteristics could be a confounding factor.

There have been no studies similar to this study so the results in this study cannot be compared with other studies. Vietnam, Australia, and China reported a combined mean quality of life after cataract surgery of the first eye was 88.02, 88.51, and 89.36, respectively. Individual perceptions in responding to each question on the questionnaire could be different, similar to the level of satisfaction with the quality of vision they had. [6,7]

The quality of life of each patient subscale after the first eye cataract surgery showed results equal to people with normal vision in this study. Although using different statistical tests, To et al. reported that all quality of life subscales increased significantly pre- and post-first eye cataract surgery, even with CI >99%. This proves that cataract surgery has benefits not only in improving daily activities but also has broad social and mental health benefits.[7]

The COVID-19 pandemic caused several limitations to this study. These limitations include retrospective study, quality of life assessment which was only performed postoperatively, and evaluation of current clinical conditions was not carried out. Another limitation of this study was the lack of data on post-operative PVA day-1, day-7, and day-30 to detect intraoperative complications that may affect post-operative PVA. Furthermore, ocular computed tomography (OCT) and funduscopic tests were not conducted, which could be used to detect macular abnormalities that may affect post-operative PVA. In addition, this study was unable to differentiate whether postoperative PVA results were due to surgery alone or underlying disease.

In conclusion, this study found that patients' quality of life after cataract surgery in the first eye was not inferior to that of people with normal vision. Researchers suggest that further research can be carried out prospectively and assess the quality of life before cataract surgery to obtain an overview of the quality-of-life improvement of cataract patients who have surgery.

References

1. International Agency for the Prevention of blindness. vision atlas evidence series: the causes of vision loss [Internet]. 2021 [cited 2022 Aug 1]. Available from: https://www.iapb.org/learn/resources/causes-of-vision-loss/.
2. Steinmetz JD, Bourne RRA, Briant PS,

Flaxman SR, Taylor HRB, Jonas JB, et al. Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to vision 2020: the right to sight: an analysis for the global burden of disease study. Lancet Glob Heal. 2021;9(2):e144–60.
3. Syumarti, Rini M, Ratnaningsih N, Halim A, Limburgh H. Prevalence and causes of blindness in people age 50 years and above. the intervention category and action required reducing blindness in West Java Province Indonesia. J Ophthalmol Clin Res. 2017;1(1):1–4.
4. American Academy of Ophthalmology. Lens and Cataract. In: Jick SL, editor. Basic and clinical science course 2016-2017. American Academy of Ophthalmology; 2016.
5. National Eye Institute. visual function questionnaire-25 [Internet]. 2000 [cited 2019 Nov 2]. Available from: https://www.nei.nih.gov/learn- about-eye-health/resources-for- health-educators/outreach- materials/visual-function-questionnaire-25.
6. Fraser ML. Meuleners LB, Lee AH, Ng JQ, Morlet N. Vision. Quality of life and depressive symptoms after first eye cataract surgery. Psychogeriatrics. 2013;13(4):237–43.
7. To KG, Meuleners LB, Fraser ML, Do D Van. Duong D Van, Huynh V-AN, et al. The impact of cataract surgery on vision-related quality of life for bilateral cataract patients in Ho Chi Minh City. Vietnam: a prospective study. Health Qual Life Outcomes. 2014;12(1):16.
8. Mahajan S, Misra S. Barriers to the second eye cataract surgery amongst the rural population of Western Maharashtra. India. Ophthalmol Res An Int J. 2016;5(3):1–7.
9. Amedo AO, Koomson NY, Pascal TM, Kumah D Ben, Nana J, Ocansey A, et al. Quality of life of cataract patients before and after surgery-evidence from four rural communities in Ghana. Res Artic Mathews J Ophthalmol. 2016;1:1–7.
10. Abdullahi S, Alhassan M, Babalola O. The impact of cataract surgery on subjective visual functions and quality of life in patients with cataract in Northwestern Nigeria. Niger J Ophthalmol. 2016;24(2):57.
11. Finger RP, Kupitz DG, Fenwick E, Balasubramaniam B, Ramani R V, Holz FG, et al. The Impact of successful cataract surgery on quality of life, household income and social status in South India. PLoS One. 2012;7(8):e44268.
12. Tu changsen, Ni J, Xu X, Mima Z. The impact of cataract surgery on vision-related quality of life for cataract patients in China: a Prospective Study. Eye. 2015;29(12):1545–54.
13. Sugiyono. Metode penelitian kuantitatif. Kualitatif dan R&D. Bandung: Alfabeta; 2017.
14. Porela-Tiihonen S, Roine RP, Sintonen H, Kaarniranta K, Kokki M, Kokki H. Health-related quality of life after cataract surgery with the phacoemulsification technique and intraocular lens implantation. Acta Ophthalmol. 2016;94(1):21–5.
15. Lisnawati A, Fatmawati NK, Aminyoto M. Perbedaan kualitas hidup pasien usia lanjut sebelum dan setelah operasi katarak. Med Heal Sci J. 2020;4(1):63–8.
16. Ratnaningsih N, Rini M, Halim A. Barriers for cataract surgical services in West Java Province of Indonesia. Ophthalmol Indones. 2016;42(1):63–8.
17. Chen M. Accommodation in pseudophakic eyes. Taiwan J Ophthalmol. 2012;2(4):117–21.
18. Post M. Definitions of quality of life: what has happened and how to move on. Top Spinal Cord Inj Rehabil. 2014;20(3):167–80.
19. Macaya F, Ryan N, Salinas P, Pocock SJ. Challenges in the design and interpretation of noninferiority trials insights from recent stent trials. J Am Coll Cardiol. 2017;70(7):894–903.