

THE ANALYSIS STUDY OF MANAGEMENT OF CATARACT IN THE ADULT EYE: A CASE REPORT AND COMPREHENSIVE SYSTEMATIC REVIEW

***¹Mahda Faisal Waber**

¹Ashari Pemalang Regional General Hospital, Indonesia

Corresponding Author:
mahdafw@gmail.com

ABSTRACT

Background: Cataracts significantly impact vision, mental well-being, quality of life, and increase mortality rates and economic burdens. Age-related cataracts, the most prevalent form, gradually evolve over time due to cumulative cellular changes within the lens. The aim of this study is to evaluate the risk factors, management strategies, and prognosis in patients with senile cataract by analyzing a case report of a 73-year-old male patient with senile cataract and conducting a systematic review of literatures on the last 10 years.

Methods: The study adhered to PRISMA 2020 standards, examining English literature from 2014 to 2024. It excluded editorials, reviews from the same journal, and submissions without a DOI. PubMed, SagePub, SpringerLink, and Google Scholar were utilized as literature sources.

Case Management: A 73-year-old male with controlled hypertension presented with worsening blurry vision, primarily in the left eye, diagnosed as immature senile cataract and presbyopia. Treatment includes lifestyle modifications and planned ECCE with phacoemulsification and IOL implantation, with a good prognosis.

Result and Discussion: Initially retrieving 500 articles from online databases (PubMed, SagePub, SpringerLink and Google Scholar) eight relevant papers were selected after three rounds of screening for full-text analysis. The literatures showed that age and hypertension in this case might be the contributing risk factors in senile cataract development.

Conclusion: Cataract management requires a comprehensive understanding of risk factors, personalized treatment approaches, and evidence-based interventions. By addressing modifiable risk factors, adopting appropriate surgical techniques, and providing adequate patient education and support, clinicians can optimize outcomes and improve the overall quality of life for patients with senile cataracts.

Keyword: *Cataract, senile cataract, risk factors, cataract surgery*

INTRODUCTION

Cataract is the leading cause of visual impairment globally, affecting over 13 million individuals with blindness. In Western countries, the prevalence of cataract and related vision loss is expected to rise due to population aging and lifestyle changes.¹ Cataract poses significant health challenges in aging populations, impacting vision, mental well-being, and quality of life while also increasing mortality rates and economic burdens.²

Cataracts are characterized by the clouding of the eye's lens, resulting in vision impairment. WHO estimates suggest that approximately 95 million individuals were visually impaired due to cataracts in 2014. Studies show that the prevalence of cataracts increases significantly with age, ranging from 3.9% in individuals aged 55-64 to 92.6% in those aged 80 and above.³ Over the past two decades, the prevalence of cataracts has decreased due to advancements in surgical techniques and increased access to surgery. Nonetheless, cataracts remain a leading cause of blindness in middle and low-income countries, accounting for 50% of blindness, compared to only 5% in developed nations.⁴

Age-related cataracts, the most prevalent form, gradually evolve over time due to cumulative cellular changes within the lens. Protein denaturation, oxidative stress, altered metabolic pathways, and the accumulation of cellular debris contribute to lens opacification, impairing visual function. As individuals age, the risk of developing cataracts increases, highlighting the progressive nature of this age-related ocular disorder.^{5,6} Lifestyle choices, notably smoking, exert a significant influence on cataract formation through oxidative stress.⁷

The evolution of surgical techniques has progressed from intracapsular cataract extraction (ICCE) to extracapsular cataract extraction (ECCE) and now to phacoemulsification (PCS), which is the mainstream method in developed countries. However, in developing countries, small incision cataract surgery (SICS) is gaining popularity due to its lower cost and simplicity.⁸

The aim of this study is to evaluate the risk factors, management strategies, and prognosis in patients with senile cataract by analyzing a case report of a 73-year-old male patient with senile cataract and conducting a systematic review of current literature. This study seeks to identify key factors influencing cataract development, compare the efficacy of different surgical interventions, and determine overall outcomes and quality of life post-treatment.

METHODS

PROTOCOL

The author carefully followed the rules laid out in the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020. This was done to make sure the study met all its standards. The selection of this methodological approach was specifically aimed at ensuring the precision and reliability of the conclusions drawn from the investigation.

CRITERIA FOR ELIGIBILITY

This systematic review investigate key factors influencing cataract development, compare the efficacy of different surgical interventions, and determine overall outcomes and quality of life post-treatment based on literatures of the last 10 years. This study meticulously analyzed data on literatures to provide insights and enhance patient treatment strategies. The primary objective of this paper is to highlight the collective significance of the identified key points.

Inclusion criteria for this study entail: 1) Papers must be in English, and 2) Papers must have been published between 2014 and 2024. Exclusion criteria comprise: 1) Editorials; 2) Submissions without a DOI; 3) Previously published review articles; and 4) Duplicate entries in journals.

SEARCH STRATEGY

The keywords used for this research are cataract, senile cataract, risk factors, cataract surgery. The Boolean MeSH keywords inputted on databases for this research are: *("cataract"[MeSH Terms] OR "cataract"[All Fields] OR "cataracts"[All Fields] OR "cataractic"[All Fields] OR "cataractous"[All Fields] OR ("senile"[All Fields] OR "seniles"[All Fields] OR "senility"[All Fields]) AND ("cataract"[MeSH Terms] OR "cataract"[All Fields])) AND ("risk factors"[MeSH Terms] OR "risk"[All Fields] AND "factors"[All Fields]) OR "risk factors"[All Fields] AND ("cataract extraction"[MeSH Terms] OR ("cataract"[All Fields] AND "surgery"[All Fields]) OR "cataract surgery"[All Fields]) AND (y_10[Filter]).*

DATA RETRIEVAL

The authors assessed the studies by reviewing their abstracts and titles to determine their eligibility, selecting relevant ones based on their adherence to the inclusion criteria, which aligned with the article's objectives. A consistent trend observed across multiple studies led to a conclusive result. The chosen submissions had to meet the eligibility criteria of being in English and a full-text.

This systematic review exclusively incorporated literature that met all predefined inclusion criteria and directly pertained to the investigated topic. Studies failing to meet these criteria were systematically excluded, and their findings were not considered. Subsequent analysis examined various details uncovered during the research process, including titles, authors, publication dates, locations, study methodologies, and parameters.

QUALITY ASSESSMENT AND DATA SYNTHESIS

Each author independently evaluated the research presented in the title and abstract of the publication to determine which ones merited further exploration. The subsequent stage involved assessing all articles that met the predefined criteria for inclusion in the review. Decisions on including articles in the review were based on the findings uncovered during this evaluation process.

CASE MANAGEMENT

A 73-year-old male patient presented to RSPAD Gatot Soebroto with complaints of blurry vision in his left eye for the past year, which has worsened in the last month. The patient also reported some blurriness in his right eye, though it is less severe. He described his vision as foggy and denied any redness or pain in his eyes. The patient uses reading glasses with a prescription of +2.75. He has become more sensitive to light. The patient has a history of controlled hypertension since age 50 and denies having diabetes mellitus.

Upon physical examination, his right eye (OD) had a visual acuity of 0.3 with overall lens opacity and a positive shadow test, and his left eye (OS) had a visual acuity of 1/60 with similar findings. Fundoscopy was normal in the right eye, but the left eye could not be adequately assessed due to lens opacity. The diagnosis was immature senile cataract and presbyopia in both eyes, with a differential diagnosis of hypertensive retinopathy. Ocular examination are shown in Figure 1.

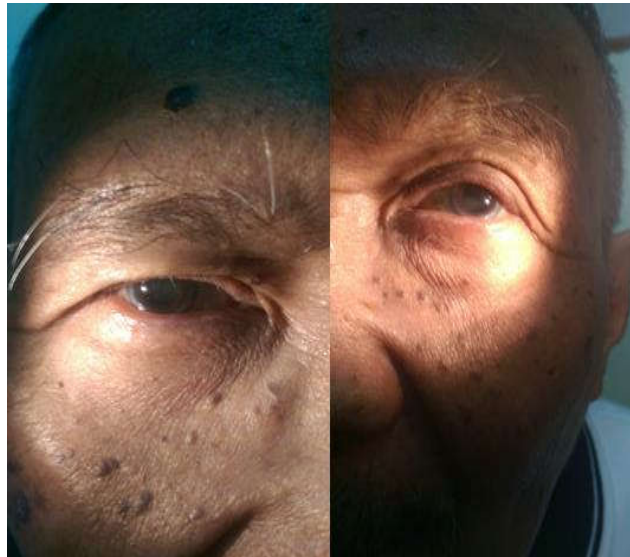


Figure 1. Ocular examination of the left eye and right eye

Treatment plan was done with non medication interventions and surgical intervention. Non-medication interventions include educating the patient about cataracts and recommending lifestyle modifications such as reducing risk factors, maintaining a healthy diet, and regular exercise. Surgical intervention includes planning for Extracapsular Cataract Extraction (ECCE) with phacoemulsification and intraocular lens (IOL) implantation for the left eye. The patient will be prescribed glasses post-operatively, with a recommendation to wait one month after surgery for re-evaluation of visual acuity and to ensure the most effective correction.

The prognosis is good for overall health (*ad vitam*), function (*ad fungsionam*), and recovery (*ad sanationam*). Further tests such as biometry for surgical preparation, blood tests for surgical safety, blood glucose to check for diabetes, and an EKG for cardiac evaluation are recommended. Non-medication management also includes advising the patient to quit smoking to reduce cardiovascular risks and slow the progression of cataracts.

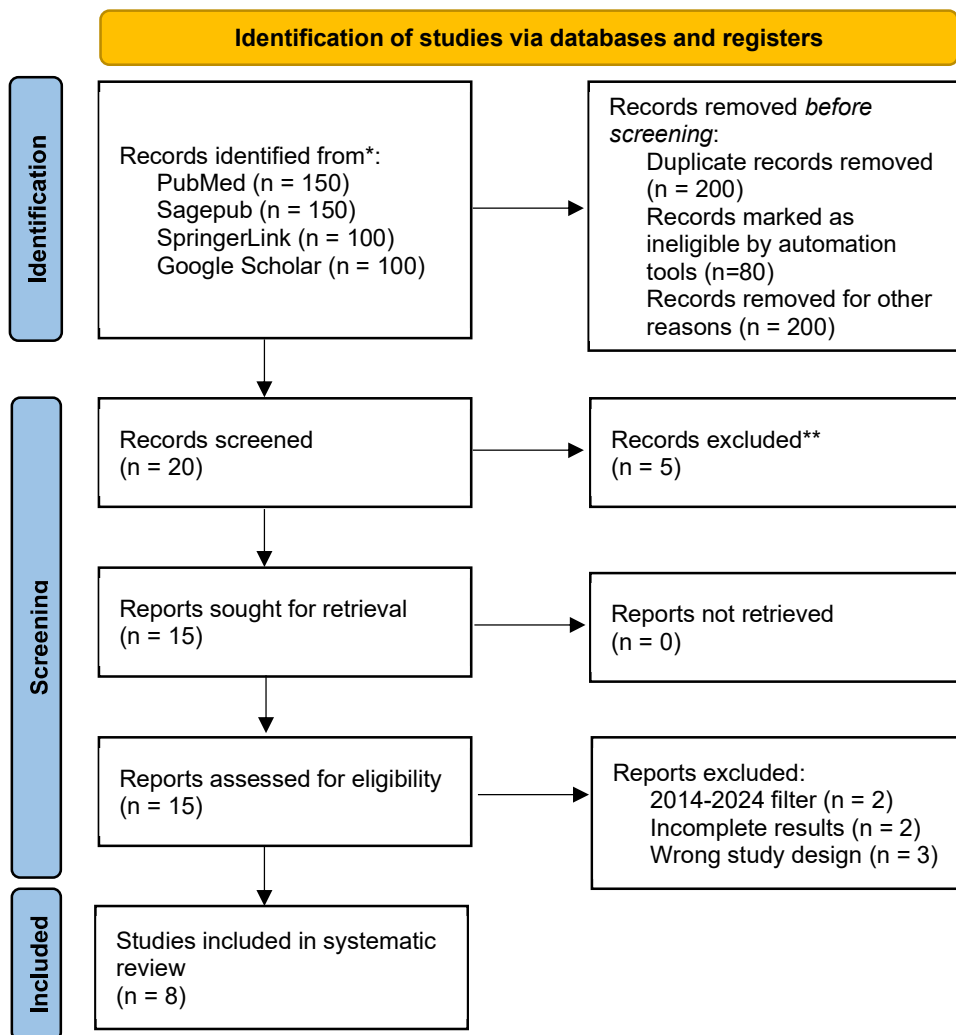


Figure 1. Article search flowchart

RESULT

The initial number of articles retrieved from online databases (PubMed, SagePub, SpringerLink, and Google Scholar) is 500 articles. After conducting three levels of screening, eight articles that directly relate to the current systematic review have been chosen for further assessment through full-text reading and analysis. Table 1 presents the selected literature included in this analysis.

He, et al.⁹ (2020) showed that phacoemulsification enhances short-term visual function and quality of life in patients with senile cataracts. However, advanced age, poor preoperative visual acuity, history of glaucoma, postoperative corneal edema, fundus lesions, and prolonged surgery time are risk factors for poorer visual outcomes.

Table 1. The literature included in this study

No.	Author	Origin	Method	Sample	Result
1.	He, et al. ⁹ (2020)	Nanchong, China	Retrospective cohort study	102 patients	Postoperative scores for subjective vision, peripheral visual field, visual adaptation, stereo vision, and total visual function were significantly higher at both 3 days and 3 months compared to preoperative scores (P<0.05). Additionally, postoperative self-care ability, mobility, psychological states, social ability, and total quality of life scores improved significantly

					at both time points ($P < 0.05$). Independent risk factors for reduced visual function post-phacoemulsification included age (≥ 80), preoperative corrected visual acuity (< 0.1), history of glaucoma, postoperative corneal edema, fundus lesions, and longer phacoemulsification time ($P < 0.05$). Visual function indices were positively correlated with quality of life ($P < 0.05$).
2.	Akpolat, et al. ¹⁰ (2022)	Istanbul, Turkey	Prospective study	85 patients	Both mean BCVA and NEI-VFQ-25 composite scores significantly improved postoperatively ($p < 0.001$ and $p = 0.001$, respectively). All NEI-VFQ-25 subscale scores showed significant postoperative increases except for general health ($p = 0.235$) and driving ($p = 0.226$). Postoperative NEI-VFQ-25 composite scores increased significantly across all demographic subgroups ($p < 0.05$). Preoperatively, patients with poorer BCVA, bilateral surgery, and lower education status had lower NEI-VFQ-25 composite scores compared to those with better BCVA, unilateral surgery, and higher education status ($p = 0.026$, $p = 0.016$, and $p = 0.032$, respectively). FIM scores remained similar preoperatively and postoperatively across all subgroup analyses ($p > 0.05$).
3.	Garg, et al. ⁷ (2020)	Lucknow, India	Case control study	240 patients	Statistically significant differences were found between the two groups regarding smoking ($p = 0.007$), sun exposure ($p = 0.001$), and serum cholesterol levels ($p < 0.001$). Smokers, individuals with longer sun exposure, and those with higher serum cholesterol were positively associated with cataract development. No significant associations were observed with BMI ($p = 0.384$) or blood pressure ($p > 0.05$).
4.	Kohli, et al. ¹¹ (2019)	Chandigarh, India	Prospective study	50 patients	Both signs and symptoms of dry eye worsened immediately post-operation, followed by a recovery trend by the sixth week. A decrease in GCD was also observed. Risk factors for worsening dry eye status included age, duration of exposure to

					<p>microscope light, and effective phacoemulsification time. Diabetic status, socio-economic status, and site of incision did not affect dry eye status.</p>
5.	Shah, et al. ¹² (2015)	Texas, USA	Randomized observational study	108 patients	<p>In the multifocal group (n = 108) versus the monofocal group (n = 100), significantly more patients achieved uncorrected distance and near acuity of 0.1 logMAR or better (45.7% vs 2.1%; P < .0001) and spectacle independence (73.3% vs 25.3%; P < .0001) at 6 months. The percentage of patients achieving uncorrected distance visual acuity of 20/40 or better at 6 months was 92% in the multifocal group and 97% in the monofocal group. NEI Refractive Error and Quality of Life scores were significantly better for dependence on correction in the multifocal group (P < .0001) and for glare in the monofocal group (P = .0157); other domain scores were similar between groups. No significant trends in study device-related adverse events were observed.</p>
6.	Mohanty, et al. ¹³ (2015)	Tirupati, India	Retrospective analysis study	207 patients	<p>Out of the 207 cases, 188 were classified into Group 3, indicating moderate risk (3-5 points), and 19 were in Group 4, indicating high risk (6 points or more). Among the Group 3 patients, there were 8 intraoperative complications, representing 0.042% of this group. Remarkably, no intraoperative complications were reported in the high-risk Group 4. In terms of visual outcomes, a significant majority of patients, 184 (88.88%), achieved a final best corrected visual acuity (BCVA) of 6/12 or better. Additionally, 166 patients (80.19%) had a final refraction of less than 2.0 diopters of astigmatism.</p>
7.	Laxmiprasad, et al. ¹⁴ (2017)	Telangana, India	Prospective study	100 patients	<p>In conventional ECCE, the most common surgically induced astigmatism was with-the-rule (WTR) in 73.4% of cases on the first day, with a mean of 2.79 D±1.3. By six weeks post-op, 70% of cases had a mean astigmatism of 2.1 D±1.28, and 64% had a mean of 1.86 D±1.14. In the MSICS group, against-the-rule (ATR) astigmatism was more</p>

					<p>common, with 83.67% of cases on the first day, with a mean of 1.5 D±0.72. By six weeks post-op, 88% of cases had a mean of 1.27 D±0.81. The study found that MSICS induced less astigmatism initially compared to ECCE, but after six weeks, the difference was not significant.</p> <p>Additionally, early visual recovery was better in the MSICS group.</p>
8.	Mylona, et al. ¹⁵ (2019)	Thessaloniki, Greece	Retrospective study	812 patients	<p>Results revealed a significant difference between the types of cataract and individual risk factors ($p < 0.001$). Arterial hypertension was the most prevalent risk factor, with rates ranging from 43.8% in patients with subcapsular cataracts to 27.6% in patients with mixed-type cataracts. The study also found a significant difference in the total number of risk factors per cataract type ($p < 0.001$).</p> <p>Nearly all patients with subcapsular cataracts (98.4%) had at least one risk factor, while this percentage was 90.5% for mixed-type cataracts, 85.7% for cortical cataracts, and 78.6% for nuclear cataracts.</p>

Akpolat, et al.¹⁰ (2022) phacoemulsification surgery significantly improves vision-related quality of life (VR-QOL) in patients with cataracts. The National Eye Institute Visual Functioning Questionnaire (NEI-VFQ-25) is a valid and reliable tool for measuring visual function post-ocular surgery.

Garg, et al.⁷ (2020) studied the risk factors of senile cataract. Smoking, increased sun exposure, and higher cholesterol levels are modifiable risk factors for senile cataracts. Managing these factors could help delay the onset and progression of cataracts.

Kohli, et al.¹¹ (2019) showed that phacoemulsification causes a temporary deterioration in dry eye status. Patients should be informed about the transient nature of this condition. Surgical incisions can be made at the site of high corneal curvature to counteract astigmatism without inducing dry eye. Minimizing light exposure and ultrasound energy during surgery is recommended.

Shah, et al.¹² (2015) showed that the use of IOL shewe good clinical outcomes, both in monofocal and multifocal. ore patients receiving multifocal IOLs achieved better uncorrected visual acuity at a range of distances and spectacle independence compared to those with monofocal IOLs. Monofocal IOLs were associated with better patient-reported scores for glare, while overall patient satisfaction scores were significantly better in the multifocal group.

Mohanty, et al.¹³ (2015) suggested that phacoemulsification, manual small incision cataract surgery (MSICS), and ECCE each have their importance and should be chosen based on the specific risk factors associated with the cataract.

Laxmiprasad, et al.¹⁴ (2017) concluded that MSICS demonstrated definitive advantages over conventional ECCE, including better early visual rehabilitation, minimal surgically induced astigmatism, absence of suture-related complications, and reduced surgical time.

Mylona, et al.¹⁵ (2019) concluded that diabetes mellitus had a lower incidence as a single risk factor compared to hypertension. This highlights the importance of early detection of hypertension, a condition that often progresses unnoticed

for many years. Early identification and management of hypertension could potentially reduce the risk of developing cataracts and other cardiovascular complications.

DISCUSSION

Cataracts are a leading cause of visual impairment worldwide, particularly in the elderly population. Understanding the risk factors associated with cataract development is crucial for early detection, timely intervention, and optimal management. Our case report highlights the presentation, management, and prognosis of senile cataract in a 73-year-old male patient, while the systematic review provides valuable insights into the broader landscape of cataract management based on current literature.

The systematic review identified several key risk factors associated with cataract development, including age, preoperative visual acuity, and comorbidities such as glaucoma and hypertension.^{9,10,15} Consistent with previous findings, our case report patient presented with age-related cataract, emphasizing the age-related nature of this condition and the importance of regular ophthalmic screenings in the elderly population.

Furthermore, modifiable risk factors such as smoking, sun exposure, and elevated serum cholesterol levels were found to be positively associated with cataract development.⁷ Although our patient denied a history of diabetes mellitus, controlled hypertension since age 50 was noted, highlighting the significance of systemic conditions in cataract pathogenesis.¹⁵

Lifestyle choices, notably smoking, exert a significant influence on cataract formation through oxidative stress. Exposure to cigarette smoke accelerates lens ageing, exacerbating cellular damage and predisposing individuals to various cataract subtypes. Disruptions in lipid metabolism, observed in conditions like Smith-Lemli-Opitz syndrome, further disrupt lens homeostasis, fostering cholesterol accumulation within lens cells and heightening cataract susceptibility.⁷

Traumatic injuries to the eye or underlying inflammatory conditions exacerbate cataract risk by compromising lens integrity and triggering aberrant cellular responses. Moreover, systemic diseases such as diabetes, hypertension, and metabolic syndrome significantly impact cataract pathogenesis. Chronic hyperglycemia in diabetes, for instance, instigates multiple pathways, including the polyol pathway and oxidative stress, fostering lens opacification and visual impairment.¹⁶

Hypertension, characterized by elevated blood pressure levels, emerges as another formidable risk factor for cataracts, particularly posterior subcapsular cataracts. Metabolic syndrome, encompassing a cluster of cardiovascular risk factors like obesity and dyslipidemia, exacerbates cataract vulnerability, particularly the posterior subcapsular variant. Renal impairment, including chronic kidney disease and end-stage renal disease, amplifies cataract risk, correlating with the severity of renal dysfunction.¹⁷

In our case report, a multidimensional approach to cataract management was adopted, encompassing both non-medication interventions and surgical intervention. Non-medication interventions focused on patient education, lifestyle modifications, and regular follow-up, aiming to empower the patient and optimize postoperative outcomes. Surgical intervention, specifically Extracapsular Cataract Extraction (ECCE) with phacoemulsification and intraocular lens (IOL) implantation, was chosen based on the severity of cataract opacity and visual impairment.

The introduction of premium intraocular lenses (IOLs) has transformed cataract surgery from vision restoration to vision improvement, leading to the era of refractive cataract surgery (RCS). Multifocal and toric IOLs have shown significant advantages over monofocal IOLs, providing improved distance and near vision with reduced dependence on spectacles. Extended depth-of-focus (EDOF) IOLs offer a compromise between monofocal and multifocal IOLs, enhancing intermediate distance vision and contrast sensitivity.^{18,19}

The systematic review highlighted the efficacy of phacoemulsification surgery in improving visual function and quality of life for patients with senile cataracts.⁹ Additionally, emerging techniques such as multifocal intraocular lenses (IOLs) were found to provide superior visual acuity and spectacle independence compared to traditional monofocal IOLs.¹² However, careful consideration of individual patient characteristics and risk profiles is essential in selecting the most appropriate surgical approach.

Postoperative management practices following cataract surgery exhibit considerable variability across institutions and countries. While approximately 36% of patients are discharged shortly after surgery, the majority are observed for at least an hour post-surgery. Social activity restrictions lasting 5 days are common in 51% of cases. Key practices include blood testing and ECG for about half of the patients, continuation of antiplatelet drugs, and preoperative antibiotic prophylaxis. Prophylactic measures for endophthalmitis such as povidone iodine and intra-cameral cefuroxime are widely used.²⁰

The prognosis for patients undergoing cataract surgery is generally favorable, with significant improvements in visual acuity and quality of life postoperatively. Our case report patient is expected to experience a significant enhancement in visual

function and overall quality of life following surgical intervention. Regular follow-up appointments and adherence to postoperative care guidelines are essential to monitor disease progression and ensure optimal outcomes.

CONCLUSION

Cataract management requires a comprehensive understanding of risk factors, personalized treatment approaches, and evidence-based interventions. By addressing modifiable risk factors, adopting appropriate surgical techniques, and providing adequate patient education and support, clinicians can optimize outcomes and improve the overall quality of life for patients with senile cataracts. Further research efforts and collaborative endeavors are warranted to refine existing treatment modalities and enhance outcomes in cataract management.

REFERENCES

- [1] Hashemi M, Heshmat-ghahdarjani K, Zarean E, Baktash F, Mortazavi ZS. Evaluation of the effect of high-dose folic acid on endothelial dysfunction in pre-eclamptic patients: A randomized clinical trial. *J Res Med Sci.* 2016;21(1):114. doi:10.4103/1735-1995.193505
- [2] Cicinelli MV, Buchan JC, Nicholson M, Varadaraj V, Khanna RC. Cataracts. *The Lancet.* 2023;401(10374):377-389. doi:10.1016/S0140-6736(22)01839-6
- [3] Purola PKM, Nättinen JE, Ojamo MUI, et al. Prevalence and 11-Year Incidence of Cataract and Cataract Surgery and the Effects of Socio-Demographic and Lifestyle Factors. *Clin Ophthalmol.* 2022;16(null):1183-1195. doi:10.2147/OPHTH.S355191
- [4] Deng R, Zhu Z, Han X, et al. Evaluation of Systemic Medications Associated With Surgically Treated Cataract Among US Adults. *Am J Ophthalmol.* 2023;249:126-136. doi:10.1016/j.ajo.2023.01.005
- [5] Hugosson M, Ekström C. Prevalence and risk factors for age-related cataract in Sweden. *Ups J Med Sci.* 2020;125(4):311-315. doi:10.1080/03009734.2020.1802375
- [6] Tan AG, Tham YC, Chee ML, et al. Incidence, progression and risk factors of age-related cataract in Malays: The Singapore Malay Eye Study. *Clin Experiment Ophthalmol.* 2020;48(5):580-592. doi:10.1111/ceo.13757
- [7] Garg P, Mullick R, Nigam B, Raj P. Risk factors associated with development of senile cataract. *Ophthalmol J.* 2020;5(0):17-24. doi:10.5603/OJ.2020.0005
- [8] Chen X, Xu J, Chen X, Yao K. Cataract: Advances in surgery and whether surgery remains the only treatment in future. *Adv Ophthalmol Pract Res.* 2021;1(1):100008. doi:10.1016/j.aopr.2021.100008
- [9] He L, Cui Y, Tang X, et al. Changes in visual function and quality of life in patients with senile cataract following phacoemulsification. *Ann Palliat Med.* 2020;9(6):3802809-3803809. doi:10.21037/apm-20-1709
- [10] Akpolat C, Demir M, Cevher S, Ozturk SZ, Yesiltas S. The impact of phacoemulsification surgery on vision-related quality of life in senile cataract patients. *Ther Adv Ophthalmol.* 2022;14:25158414211063293. doi:10.1177/25158414211063293
- [11] Kohli P, Arya SK, Raj A, Handa U. Changes in ocular surface status after phacoemulsification in patients with senile cataract. *Int Ophthalmol.* 2019;39(6):1345-1353. doi:10.1007/s10792-018-0953-8
- [12] Shah S, Peris -Martinez Cristina, Reinhard T, Vinciguerra P. Visual Outcomes After Cataract Surgery: Multifocal Versus Monofocal Intraocular Lenses. *J Refract Surg.* 2015;31(10):658-666. doi:10.3928/1081597X-20150611-01
- [13] Mohanty P, Prasan VV, Vivekanand U. Conventional extracapsular cataract extraction and its importance in the present day ophthalmic practice. *Oman J Ophthalmol.* 2015;8(3):175. doi:10.4103/0974-620X.169906
- [14] Laxmiprasad G, Shori C, Shori R, Alli A. Comparative study between conventional extra capsular cataract extraction versus manual small incision cataract surgery. *Int J Res Med Sci.* 2017;5(3):996. doi:10.18203/2320-6012.ijrms20170650
- [15] Mylona I, Dermenoudi M, Ziakas N, Tsinopoulos I. Hypertension is the Prominent Risk Factor in Cataract Patients. *Medicina (Mex).* 2019;55(8):430. doi:10.3390/medicina55080430
- [16] Drinkwater JJ, Davis WA, Davis TME. A systematic review of risk factors for cataract in type 2 diabetes. *Diabetes Metab Res Rev.* 2019;35(1):e3073. doi:10.1002/dmrr.3073
- [17] Trott M, Smith L, Veronese N, et al. Eye disease and mortality, cognition, disease, and modifiable risk factors: an umbrella review of meta-analyses of observational studies. *Eye.* 2022;36(2):369-378. doi:10.1038/s41433-021-01684-x
- [18] Marcos S, Martinez-Enriquez E, Vinas M, et al. Simulating Outcomes of Cataract Surgery: Important Advances in Ophthalmology. *Annu Rev Biomed Eng.* 2021;23(Volume 23, 2021):277-306. doi:10.1146/annurev-bioeng-082420-035827
- [19] Grzybowski A, Kanclerz P. Recent Developments in Cataract Surgery. In: Grzybowski A, ed. *Current Concepts in Ophthalmology.* Springer International Publishing; 2020:55-97. doi:10.1007/978-3-030-25389-9_3
- [20] Rossi T, Romano MR, Iannetta D, et al. Cataract surgery practice patterns worldwide: a survey. *BMJ Open Ophthalmol.* 2021;6(1):e000464. doi:10.1136/bmjophth-2020-000464