Section: Ophthalmology

Original Research Article

A COMPARATIVE STUDY ON VISUAL OUTCOME AFTER CATARACT SURGERY AMONG HIV AND NON-HIV PATIENTS AT TERTIARY CARE HOSPITAL, NIZAMABAD

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Abstract

Background: Cataract is a leading cause of visual impairment globally, and its prevalence is notably higher in HIV-infected individuals due to immune-related ocular complications and antiretroviral therapy side effects. This study aimed to compare visual outcomes after cataract surgery in HIV-positive and HIV-negative patients. **Materials and Methods:** A prospective, comparative study was conducted on 100 patients (50 HIV-positive and 50 HIV-negative) undergoing manual small incision cataract surgery at a tertiary care hospital. Data were collected on demographic profiles, pre-existing ocular conditions, baseline and postoperative visual acuity, intraoperative and postoperative complications. Statistical analysis was performed using Chi-square and t-tests; $p \leq 0.05$ was considered significant. **Result:** HIV-positive patients were significantly younger (mean age 54.6 ± 9.97 years) compared to HIV-negative patients (60.5 ± 9.96 years) ($p = 0.023$). Gender distribution was also significant ($p = 0.043$). Pre-existing ocular manifestations such as CMV retinitis and toxoplasmosis were more frequent in the HIV-positive group, though not statistically significant. Baseline visual acuity was significantly worse in HIV-positive patients ($p = 0.008$). Postoperative visual outcomes at day 1, 1 week, and 1 month showed substantial improvement in both groups, with no significant intergroup differences ($p > 0.05$). Intraoperative and postoperative complication rates were slightly higher in the HIV-positive group but not statistically significant. Among HIV-positive patients, 32% had CD4 counts <200 cells/mm³. **Conclusion:** Cataract surgery provides comparable and effective visual rehabilitation in both HIV-positive and HIV-negative patients. HIV status alone should not be considered a limiting factor for surgical intervention.

INTRODUCTION

Cataract remains the leading cause of avoidable blindness worldwide, particularly affecting individuals in low- and middle-income countries where access to surgical care is limited.[1] While aging is the most recognized risk factor, cataract formation can also be accelerated by systemic illnesses, chronic inflammation, and prolonged exposure to medications.[2,3] Among these contributing factors, Human Immunodeficiency Virus (HIV) infection has emerged as a significant comorbidity. Due to immunosuppression and the long-term effects of antiretroviral therapy (ART), HIV-positive individuals are at increased risk of developing early-onset cataracts and other ocular conditions.[1,4]

The introduction of Highly Active Antiretroviral Therapy (HAART) has markedly improved the survival and quality of life of individuals living with HIV. However, extended life expectancy has been accompanied by the rise of chronic complications, including age-related ocular disorders such as

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cataract.[5] In addition, ocular opportunistic infections—such as cytomegalovirus (CMV) retinitis—and immune recovery uveitis (IRU) are prevalent among this population, which may complicate both the presentation and postoperative outcomes of cataract surgery.[6,7]

Although there is a growing need for cataract intervention among HIV-infected individuals, comparative data on surgical outcomes in HIV-positive versus HIV-negative patients remain limited. Some studies report a higher incidence of postoperative inflammation and complications, such as uveitis and cystoid macular edema, in HIV-positive patients.[5,7] Conversely, recent findings suggest that with proper preoperative assessment and surgical care, HIV-positive patients can achieve visual outcomes comparable to those of HIV-negative individuals.[1,4,6]

This study aims to evaluate and compare the visual outcomes and perioperative complications of cataract surgery among HIV-positive and HIV-negative patients. The findings intend to provide insight into optimizing ophthalmic care and surgical decision-making for this special population.

MATERIALS AND METHODS

Study Design and Setting: This was a prospective, comparative, hospital-based study conducted in the Department of Ophthalmology at Government General Hospital, Nizamabad, Telangana, India. The study duration was 18 months, from September 2022 to March 2024.

Study Population: The study included adult patients diagnosed with cataract, both HIV-positive and HIV-negative, attending the ophthalmology outpatient department. A total of 100 patients were enrolled and divided equally into two groups: 50 HIV-positive and 50 HIV-negative individuals.

Inclusion Criteria

- Patients aged ≥18 years diagnosed with cataract.
- HIV-positive patients (confirmed by serological testing).
- HIV-negative patients (control group).
- Willingness to undergo cataract surgery and provide informed consent.

Exclusion Criteria

- Pediatric patients.
- Patients with congenital ocular anomalies.
- History of ocular trauma or diabetes mellitus.
- Patients on systemic corticosteroids.
- Unwillingness to participate or undergo surgery.

Ethical Considerations: Ethical clearance was obtained from the Institutional Ethics Committee of Government Medical college and General Hospital, Nizamabad. Written informed consent was obtained from all participants prior to inclusion in the study.

Surgical Intervention: All participants underwent Manual Small Incision Cataract Surgery (MSICS) with intraocular lens (IOL) implantation under local anesthesia. Standard preoperative and postoperative protocols were followed.

Data Collection: Data were collected using a pretested structured proforma. The following parameters were recorded:

Demographics: Age, sex, HIV status, CD4 count (for HIV-positive patients).

Ophthalmic Evaluation:

Preoperative visual acuity (Snellen chart).

Slit lamp examination of anterior segment.

Posterior segment examination using 90D lens, direct and indirect ophthalmoscopy.

Intraocular pressure measurement (Schiotz tonometer).

A-scan biometry for IOL power calculation.

B-scan ultrasonography when media opacity limited fundus view.

Follow-Up and Outcome Assessment

Visual acuity was assessed at baseline, and postoperatively on day 1, at 1 week, and 1 month. Postoperative complications such as anterior uveitis, exudative membrane formation, and any intraoperative events were documented.

Statistical Analysis: Data were analyzed using IBM SPSS Statistics version 20.0. Descriptive statistics were used to summarize demographic and clinical variables. Categorical data were compared using Chi-square test, while continuous variables were analyzed using independent t-tests. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 100 patients undergoing cataract surgery were included in the study, comprising 50 HIV-positive and 50 HIV-negative individuals. The outcomes were analyzed with respect to demographic profiles, pre-existing ocular conditions, and visual outcomes postoperatively.

Demographic Characteristics: A statistically significant difference in age distribution was noted between the two groups. HIV-positive patients were younger, with a mean age of 54.6 ± 9.97 years, compared to 60.5 ± 9.96 years among HIV-negative participants ($p = 0.023$) [Table 1]. Gender distribution also differed significantly, with a higher proportion of males in the HIV-positive group (68%) compared to the HIV-negative group (48%) ($p = 0.043$) [Table 2]. There was no significant difference in laterality of cataract involvement between the groups ($p = 0.840$) [Table 3].

Pre-Existing Ocular Manifestations: Pre-existing ocular conditions were more frequently reported in HIV-positive patients than in HIV-negative individuals. These included CMV retinitis (6%), toxoplasmosis (8%), and Herpes Zoster Ophthalmicus (6%). However, none of these differences were statistically significant ($p > 0.05$ for all conditions) [Table 4].

Baseline Visual Acuity: At baseline, HIV-positive patients presented with significantly poorer visual

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acuity compared to their HIV-negative counterparts (p = 0.008). For instance, 20% of HIV-positive participants had only perception of light (PL) compared to 6% among HIV-negative patients. Additionally, a larger proportion of HIV-negative individuals had relatively better preoperative vision (e.g., 5/60 or better) [Table 5].

Postoperative Visual Outcomes: On postoperative day 1, most participants showed improved vision. However, there was no statistically significant difference between the groups (p = 0.932). The majority of patients in both groups had visual acuity ranging between 6/9 and 6/36 [Table 6].

At one week postoperatively, continued visual improvement was observed. In the HIV-positive group, 10% achieved 6/6 visual acuity compared to 16% in the HIV-negative group, though the difference was not significant (p = 0.845) [Table 7].

After one month, both groups demonstrated comparable visual outcomes, with 14% of HIV-positive and 16% of HIV-negative participants attaining 6/6 vision. A visual acuity of 6/12 or better was achieved by 74% of HIV-positive and 76% of HIV-negative participants (p = 0.908) [Table 8]. These findings indicate that cataract surgery led to substantial and similar visual recovery in both cohorts.

Intraoperative and Postoperative Complications

Intraoperative complications were slightly more common in the HIV-positive group (14%) than in the HIV-negative group (8%), although this difference was not statistically significant (p = 0.338) [Table 9]. Postoperative complications such as moderate uveitis (8% vs. 2%) and exudative membrane (4% vs. 2%) were also more frequently noted among HIV-positive patients; however, these differences did not reach statistical significance (p = 0.673) [Table 10].

CD4 Count Distribution in HIV-Positive Patients

Among HIV-positive participants, 32% had CD4 cell counts below 200 cells/mm³, indicating advanced immunosuppression [Table 11]. Visual outcome data stratified by CD4 count were not statistically analyzed separately in this study.

Table 1: Age Distribution of Study Participants.

Age Group (Years)	HIV Positive (n=50)	HIV Negative (n=50)	p-value
≤ 40	10 (20%)	3 (6%)	0.023
41–60	23 (46%)	18 (36%)	
> 60	17 (34%)	29 (58%)	
Mean ± SD	54.6 ± 9.97	60.5 ± 9.96	

Table 2: Gender Distribution of Study Participants

Gender	HIV Positive (n=50)	HIV Negative (n=50)	p-value
Male	34 (68%)	24 (48%)	
Female	16 (32%)	26 (52%)	0.043

Table 3: Laterality of Cataract Among Study Participants

Eye Affected	HIV Positive (n=50)	HIV Negative (n=50)	p-value
Right	27 (54%)	28 (56%)	0.840
Left	23 (46%)	22 (44%)	

Table 4: Pre-Existing Ocular Manifestations

Ocular Condition	HIV Positive (n=50)	HIV Negative (n=50)	p-value
Molluscum contagiosum	2 (4%)	1 (2%)	0.557
Herpes Zoster Ophthalmicus	3 (6%)	1 (2%)	0.309
Keratoconjunctivitis sicca	3 (6%)	2 (4%)	0.646
Herpes Simplex Keratitis	2 (4%)	3 (6%)	0.646
CMV Retinitis	3 (6%)	0 (0%)	0.078
Tubercular Retinitis	2 (4%)	1 (2%)	0.557
Toxoplasmosis	4 (8%)	2 (4%)	0.399

Table 5: Baseline Visual Acuity Distribution

Visual Acuity	HIV Positive (n=50)	HIV Negative (n=50)	p-value
PL	10 (20%)	3 (6%)	0.008
HM	5 (10%)	2 (4%)	
CFCF	3 (6%)	3 (6%)	
1/60	6 (12%)	1 (2%)	
2/60	7 (14%)	2 (4%)	
3/60	5 (10%)	4 (8%)	
4/60	4 (8%)	8 (16%)	
5/60	3 (6%)	13 (26%)	
6/60	4 (8%)	11 (22%)	
6/36	3 (6%)	3 (6%)	

Table 6: Visual Acuity Distribution on Day 1 Post-Op

Visual Acuity	HIV Positive (n=50)	HIV Negative (n=50)	p-value
6/9	5 (10%)	7 (14%)	0.932

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6/12	8 (16%)	9 (18%)	
6/18	17 (34%)	19 (38%)	
6/24	12 (24%)	9 (18%)	
6/36	6 (12%)	4 (8%)	
6/60	2 (4%)	1 (2%)	

Table 7: Visual Acuity Distributionat 1 Week Post-Op

Visual Acuity	HIV Positive (n=50)	HIV Negative (n=50)	p-value
6/6	5 (10%)	8 (16%)	0.845
6/9	10 (20%)	13 (26%)	
6/12	15 (30%)	14 (28%)	
6/18	12 (24%)	10 (20%)	
6/24	6 (12%)	4 (8%)	
6/36	2 (4%)	1 (2%)	

Table 8: Visual Acuity Distribution at 1 Month Post-Op

Visual Acuity	HIV Positive (n=50)	HIV Negative (n=50)	p-value
6/6	7 (14%)	8 (16%)	0.908
6/9	12 (24%)	14 (28%)	
6/12	18 (36%)	16 (32%)	
6/18	8 (16%)	9 (18%)	
6/24	4 (8%)	3 (6%)	
6/36	1 (2%)	0 (0%)	

Table 9: Intraoperative Complications

Complication	HIV Positive (n=50)	HIV Negative (n=50)	p-value
Yes	7 (14%)	4 (8%)	0.338
No	43 (86%)	46 (92%)	

Table 10: Postoperative Complications

Complication Type	HIV Positive (n=50)	HIV Negative (n=50)	p-value
Exudative Membrane	2 (4%)	1 (2%)	0.673
Moderate Uveitis	4 (8%)	1 (2%)	

Table 11: CD4 Cell Count Distribution Among HIV Patients

CD4 Count (cells/mm³)	HIV Positive (n=50)
<200	16 (32%)
≥200	34 (68%)

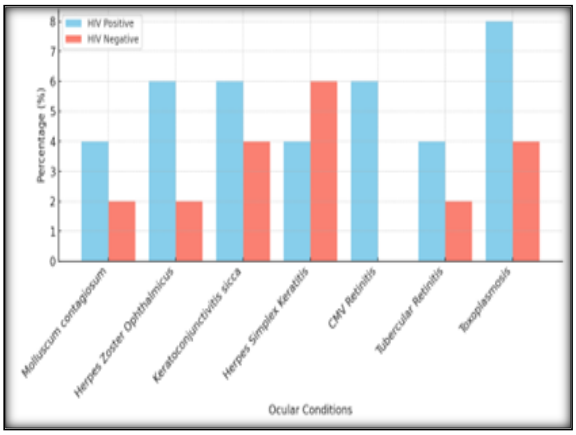

Figure 1: Pre-Existing Ocular Manifestations in HIV Positive vs HIV Negative Patients

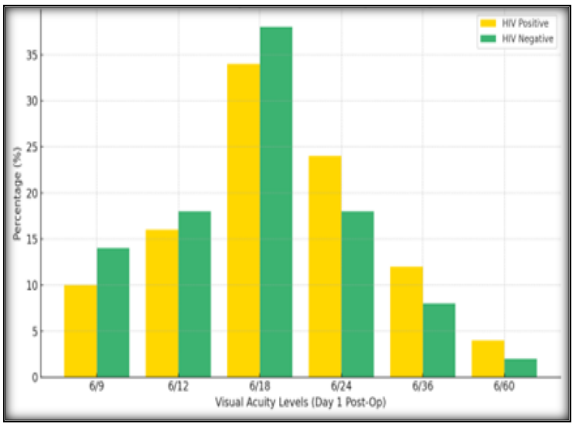

Figure 2: Visual Acuity Distribution on Day 1 Post-Op

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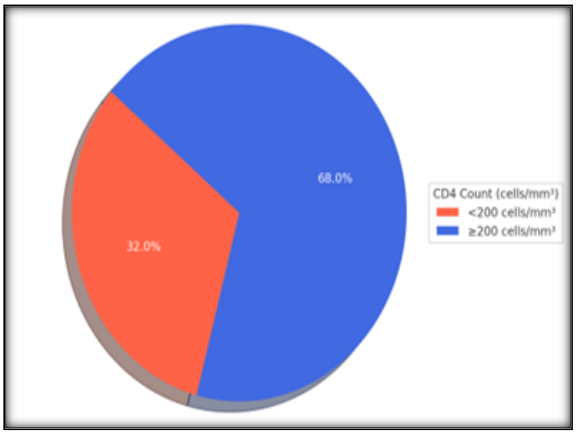

Figure 3: CD4 Cell Count Distribution Among HIV Patients

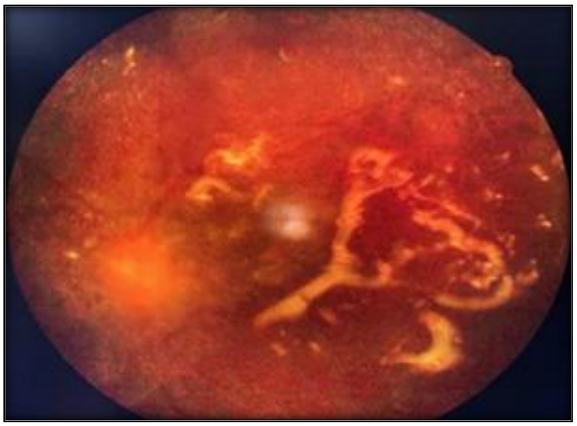

Figure 4: CMV involving Vitreous and Retina

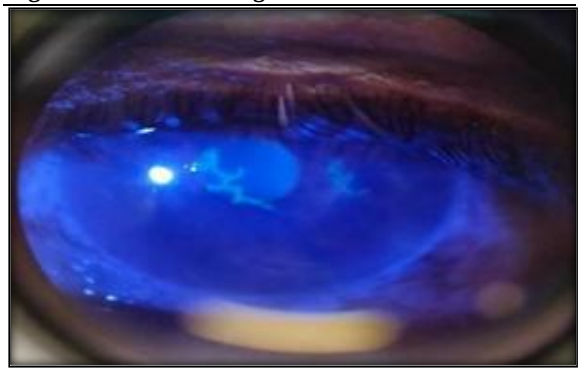

Figure 5: Herpes Simplex Keratitis

Figure 6: Herpes Zoster Ophthalmicus

Figure 7: Toxoplasmosis

DISCUSSION

This study aimed to evaluate and compare visual outcomes and surgical complications following cataract surgery among HIV-positive and HIV-negative patients. The findings revealed that although baseline visual acuity was significantly worse among HIV-positive individuals, postoperative visual outcomes improved markedly and were comparable between both groups at all follow-up intervals.

Demographic and Clinical Characteristics

The HIV-positive cohort was significantly younger than the HIV-negative group, with a mean age of 54.6 years versus 60.5 years, respectively ($p = 0.023$). This observation aligns with previous studies suggesting earlier cataract development in HIV-infected individuals, potentially due to chronic systemic inflammation, oxidative stress, or adverse effects of long-term antiretroviral therapy.[9] The significant gender disparity ($p = 0.043$), with more males in the HIV-positive group, also reflects epidemiological patterns of HIV prevalence in many regions, particularly in developing countries.[9,13]

Pre-Existing Ocular Manifestations

Although differences in the prevalence of ocular manifestations such as CMV retinitis, Herpes Zoster Ophthalmicus, and toxoplasmosis were not statistically significant, they were observed more frequently in HIV-positive patients. These findings are consistent with literature highlighting the increased risk of opportunistic ocular infections in immunocompromised individuals, even in the HAART era.[8,12,13]

Visual Outcomes

Baseline visual acuity was significantly poorer in HIV-positive patients ($p = 0.008$), likely due to delayed presentation, pre-existing ocular infections, or immune-related pathology. Nevertheless, cataract surgery led to substantial visual improvement in both groups, with no statistically significant differences at day 1 ($p = 0.932$), week 1 ($p = 0.845$), or one month postoperatively ($p = 0.908$). These findings support prior research indicating that HIV-positive

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individuals can achieve favorable surgical outcomes when managed with appropriate pre- and postoperative care.[10,12,13]

Notably, 74% of HIV-positive and 76% of HIV-negative patients achieved a visual acuity of 6/12 or better at one month, underscoring the overall effectiveness of cataract surgery irrespective of HIV status. Similar high rates of visual recovery have been documented in long-term observational studies across both high- and low-resource settings.[11,14]

Surgical Complications: Intraoperative complications were slightly more frequent in HIV-positive patients (14%) compared to HIV-negative patients (8%), although not statistically significant (p = 0.338). Postoperative complications such as moderate uveitis and exudative membrane formation were also observed more frequently in the HIV-positive group (p = 0.673). This trend suggests a higher likelihood of postoperative inflammation in immunocompromised individuals, potentially related to immune recovery uveitis or underlying viral retinitis.[8,12] Despite this, the overall surgical safety and tolerance remained high in both groups.

CD4 Count and Immunological Status

Approximately one-third (32%) of HIV-positive patients had CD4 counts below 200 cells/mm³, indicating advanced immunosuppression. Although this study did not stratify surgical outcomes based on CD4 count, previous research has reported an association between lower CD4 levels and increased risk of ocular complications, particularly in the presence of active opportunistic infections.[8,13] Future studies should explore this relationship in greater depth to refine surgical risk stratification in HIV-positive populations.

Limitations

The study was limited by its single-center design and relatively short follow-up period. Longer-term outcomes and stratified analysis by CD4 count or ART regimen could offer deeper insights. Additionally, the exclusion of diabetic and pediatric patients may limit generalizability.

Clinical Implications

The findings highlight that with appropriate preoperative assessment, surgical planning, and postoperative care, HIV status should not preclude patients from receiving cataract surgery. Routine ophthalmic screening and early referral remain essential, particularly for individuals with known HIV infection and low CD4 counts.

CONCLUSION

This study demonstrates that cataract surgery significantly improves visual acuity in both HIV-positive and HIV-negative patients, with no statistically significant difference in postoperative outcomes between the groups. Although HIV-positive individuals presented with poorer baseline vision and slightly higher rates of ocular comorbidities and complications, visual recovery following surgery was comparable. These findings affirm that HIV status alone should not deter timely cataract intervention. With appropriate preoperative evaluation and postoperative care, cataract surgery is safe and effective in HIV-infected individuals, thereby enhancing their visual function and overall quality of life.

REFERENCES

1. Amaral DC, Cheidde L, Ferreira BFA, Cheidde L, Júnior PPL, Menezes I, et al. Cataract in HIV Patients: A Systematic Review and Meta-Analysis. Cureus. 2024 Oct 25;16(10):e72370. doi: 10.7759/cureus.72370. PMID: 39588421; PMCID: PMC11586242.
2. Markos CM, Tamrat LT, Asferaw MA. Outcomes and Associated Factors of Cataract Surgery Among Adults Attending a Tertiary Hospital in Addis Ababa, Ethiopia. Patient Relat Outcome Meas. 2020 Dec 9;11:231-239. doi: 10.2147/PROM.S280049. PMID: 33328775; PMCID: PMC7734045.
3. Khanna RC, Rathi VM, Guizie E, Singh G, Nishant K, Sandhu S, Varda R, Das AV, Rao GN. Factors associated with visual outcomes after cataract surgery: A cross-sectional or retrospective study in Liberia. PLoS One. 2020 May 18;15(5):e0233118. doi: 10.1371/journal.pone.0233118. PMID: 32421741; PMCID: PMC7233528.
4. Warad C, Tenagi A, Satarasi P, Goyal D, Mendpara R, Harakuni U, Bubanale SC, K S S, B K B, Wani V. Visual Outcome Following Manual Small Incision Cataract Surgery at a Tertiary Center in South India. Cureus. 2021 Dec 25;13(12):e20687. doi: 10.7759/cureus.20687. PMID: 35106227; PMCID: PMC8786263.
5. Accorinti M, Cecere M, Scala A, Pirraglia MP. Cataract Surgery in HIV Seropositive Patients: Long-Term Follow-Up. Ocul Immunol Inflamm. 2019;27(3):435-446. doi: 10.1080/09273948.2017.1416149. Epub 2018 Jan 15. PMID: 29333896.
6. Wu LZ, Orlowski TM, Karunatilake M, Lee S, Mondal P, Kogilwaimath S, Bursztyn LLCD. Prognostic effect of HIV on visual acuity in ocular syphilis: a systematic review. Eye (Lond). 2023 Oct;37(15):3271-3281. doi: 10.1038/s41433-023-02504-0. Epub 2023 Mar 21. PMID: 36944709; PMCID: PMC10564912.
7. Sudharshan S, Nair SN, Curi A, Banker A, Kempen JH. Human immunodeficiency virus and intraocular inflammation in the era of highly active antiretroviral therapy – An update. Indian J Ophthalmol. 2020;68(9):1787–1798. doi:10.4103/ijo.IJO_1248_20
8. Harvey MM, Dear N, Esber A, Iroezindu M, Bahemana E, Kibuuka H, et al AFRICOS Study Team. Ophthalmic Disease Prevalence and Incidence among People Living with Human Immunodeficiency Virus in the AFRICOS Study. Ophthalmology. 2021 Jul;128(7):1104-1107. doi: 10.1016/j.ophtha.2020.12.008. Epub 2020 Dec 11. PMID: 33316345; PMCID: PMC8192584.
9. Fang R, Yu YF, Li EJ, Lv NX, Liu ZC, Zhou HG, et al. Global, regional, national burden and gender disparity of cataract: findings from the global burden of disease study 2019. BMC Public Health. 2022 Nov 12;22(1):2068. doi: 10.1186/s12889-022-14491-0. PMID: 36369026; PMCID: PMC9652134.
10. Miller DC, Patnaik JL, Palestine AG, Lynch AM, Christopher KL. Cataract Surgery Outcomes in Human Immunodeficiency Virus Positive Patients at a Tertiary Care Academic Medical Center in the United States. Ophthalmic Epidemiol. 2021 Oct;28(5):400-407. doi: 10.1080/09286586.2020.1866021. Epub 2020 Dec 28. PMID: 33369513.
11. Ahsan S, Memon MS, Bukhari S, Mahmood T, Fahim MF, Haseeb U, et al. Visual outcomes of cataract surgery: An observational study of ten years from a tertiary eye care hospital in Pakistan. Pak J Med Sci. 2021 Nov-Dec;37(7):1775-1781. doi: 10.12669/pjms.37.7.4428. PMID: 34912394; PMCID: PMC8613022.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

12. Chew GWM, Teoh SCB, Agrawal R. Analysis and Outcomes of Cataract Surgery in Patients with Acquired Immunodeficiency Syndrome. Ocul Immunol Inflamm. 2017 Aug;25(4):535-539. doi: 10.3109/09273948.2016.1158281. Epub 2016 Apr 15. PMID: 27082491.
13. Sankarananthan R, Prasad S, Shekhar M, Narendran S, Balakrishnan L, Rathinam SR. Outcomes of cataract surgery in patients with Human Immunodeficiency Virus infection in a developing country. Int Ophthalmol. 2023 May;43(5):1601-1609. doi: 10.1007/s10792-022-02559-0. Epub 2022 Oct 23. PMID: 36273361.
14. Junejo MS, Rebecca, Shaikh FF, Siyal N. Visual outcome of cataract surgery in a tertiary care teaching hospital. Pak J Med Sci. 2022 Mar-Apr;38(4Part-II):900-903. doi: 10.12669/pjms.38.4.5163. PMID: 35634638; PMCID: PMC9121925.

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