

## VISUAL OUTCOME AFTER CATARACT SURGERY- FROM LITERATURE

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Article Received on 21/01/2024

Article Revised on 11/02/2024

Article Accepted on 01/03/2024

**ABSTRACT**

Blindness and visual impairment are major public health issues globally, including in India. Cataract is the leading cause of blindness, followed by glaucoma, diabetic retinopathy, refractive errors, trachoma, and childhood blindness. The financial burden of vision impairment is significant, with an estimated annual global cost of productivity losses of US\$ 411 billion. Most blind individuals (82%) and those with visual impairment (65%) are over the age of 50. Uncorrected refractive errors and cataract are the main causes of visual impairment. Alarmingly, 2.2 billion people worldwide suffer from vision impairment, and in almost half of these cases, the impairment could have been prevented. The World Health Organization (WHO) is working with Member States and partners to eliminate avoidable causes of blindness through national comprehensive eye care programs under the VISION 2020 initiative. Progress has been made, with the prevalence of blindness decreasing to 32 million by 2010. In 2013, the WHO set a goal to reduce avoidable blindness by 25% by 2019. However, studies have shown that poor visual outcomes after cataract surgery remain a major problem. Factors contributing to this issue include other eye diseases, surgical complications, inadequate correction, and long-term complications. Addressing these challenges is crucial to ensure better visual outcomes and utilization of cataract surgical services.

**KEYWORD:** Cataract, SICS, Phacoemulsification, Visual Outcome, Surgery.**INTRODUCTION**

In the literature, several studies have indicated that poor visual outcomes following cataract surgery are a major problem. This can be due to concurrent sight-impairing eye diseases, surgical complications, inadequate optical correction, or long-term complications (Matta et al., 2016). Poor visual acuity following surgery will affect the demand and uptake of cataract surgical services (Mitra et al., 2000). The most important factor in motivating a person to utilize cataract surgical services is the visual outcome of past-operated persons in the community.

Blindness and visual impairment remain a public health problem in many countries of the world and India is one. The main cause of blindness is cataract, followed by glaucoma, diabetic retinopathy, refractive errors, trachoma, and childhood blindness (WHO). Vision impairment poses an enormous global financial burden with the annual global costs of productivity losses associated with vision impairment estimated to be US\$ 411 billion (WHO). Recent global data indicate that 82% of blind people and 65% of those with visual impairment are over the age of 50. The major causes of visual impairment are uncorrected refractive errors (43%) and cataract (33%) (WHO). Globally, at least 2.2 billion

people have a near or distance vision impairment. In at least 1 billion – or almost half – of these cases, vision impairment could have been prevented or has yet to be addressed. To overcome this issue, WHO is working closely with Member States and partners to eliminate avoidable causes of blindness by developing and implementing the national comprehensive eye care under the global initiative of VISION 2020 (WHO). The analysis by the Vision Loss Expert Group showed that by 2010, very significant progress was being made and the prevalence of blindness had dropped down to 32 million. Of even more significance was the 42% drop in the age-specific prevalence, showing that if we did what we know to do, we would make a big difference. The WHO developed a Global Action Plan in 2013 with a global target of reducing avoidable blindness by 25% by the year 2019 (WHO).

Globally, the leading causes of vision impairment in adult is age related cataract or Senile cataract (65%). There is substantial variation in the causes between and within countries according to the availability of eye care services, their affordability, and the eye care literacy of the population. The proportion of vision impairment attributable to cataract is higher in low- and middle-income countries than high-income countries. In high

income countries, diseases such as glaucoma and age-related macular degeneration are more common. In India Cataract is the principal cause of adult blindness (66.2%), severe visual impairment (80.7%), and moderate visual impairment (70.2%). Cataract prevalence increases with age. As the world's population ages, cataract-induced visual dysfunction and blindness is on increase. Cataract is a significant global problem of 21st century (National Programme for Control of Blindness & Visual Impairment, Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India, New Delhi, 2019).

Decreased transparency and increased cloudiness of lens is known as cataract. Cataract is the leading cause of reversible visual impairment and blindness globally. Treatment of cataract essentially consists of its surgical removal. However, certain non-surgical measures may be of help till surgery is taken up. Common surgical technique used for treatment of cataract is Intracapsular Cataract Extraction (ICCE) and Extracapsular Cataract extraction (ECCE). With various modifications and advances made over the period, technological advances in Cataract Surgery Procedures in past decade have improved, resulting in a transition from the traditional Intra-Capsular Cataract Extraction to Small Incision Cataract Surgery and Phacoemulsification with Intra Ocular Lens (IOL) Implantation. Every surgical technique has its own set of advantages and limitations, and the outcome of cataract surgery depends on the selection of appropriate technique. Each technique is selected according to the case encountered, the setting, as well as the surgeon's skill and comfort level (Matta et al 2016). As reported in literature, despite all these technological advances, in Low- and Middle-Income Countries (LMICs), the Clinical Outcomes of Cataract Surgeries is poor with scores ranging 11.4% to 44%. Most of these study settings were rural or a mix of urban and rural population and very few were urban. India, owing to the large size of the country, with huge regional variations in terms of coverage and outcomes, requires regional and national policies and programs to provide community specific of eye care services to improve the outcomes of cataract surgeries (Matta et al 2016).

#### VISUAL OUTCOME- FROM LITERATURE

The outcome of cataract surgery depends on many factors, including preoperative ocular status, quality of surgery, and the postoperative correction of refractive error (Zaczek *et al.*, 1999). Good patient selection is an important determining factor of the final visual outcome (Zaczek *et al.*, 1999). Preoperative patient evaluation allows the surgeon to select the appropriate technique on an individual case basis.

*Hennig A et al.*, in their study, reported an uncorrected good visual acuity ( $\geq 6/18$ ) in 76.8% of cases at discharge, which declined to 70.5% at 6- weeks and 64.9% at 1-year follow-up. The best corrected good visual acuity ( $\geq 6/18$ ) was found in 96.2% at six weeks

and 95.9% of cases at 1- year. Poor visual outcome ( $< 6/60$ ) occurred in less than 2% of cases (Hennig A 2003).

*Khan M T et al.* reported an uncorrected good visual acuity ( $\geq 6/18$ ) in 64% of cases at discharge and in 66.3% of cases at six weeks. The best corrected good visual acuity ( $\geq 6/18$ ) in 80.6% of cases at 6- weeks follow-up (Khan M T et al. 2010).

*Zaman M et al.* reported an uncorrected good visual acuity ( $\geq 6/18$ ) in 62.51% of cases on the first postoperative day and in 93.40% of cases at 6-week follow-up (Zaman M 2009).

*Venkatesh R et al.* has reported uncorrected good visual acuity ( $\geq 6/18$ ) in 78.4% of cases and best corrected good visual acuity ( $\geq 6/18$ ) in 97.1% of cases on the 40th postoperative day (Venkatesh R 2009).

*Gogate P M et al.*, in a randomized controlled study, compared the efficacy of manual small incision cataract surgery with conventional ECCE. At the 6-week follow-up in the MSICS group, 47.9% of cases had an uncorrected visual good acuity ( $\geq 6/18$ ) compared to 37.3% of cases in the ECCE group. Best corrected visual acuity in the MSICS group was good ( $\geq 6/18$ ) in 89.8% of cases compared to 86.7% in the ECCE group., 1.1% of cases in the ECCE group, and 1.7% of cases in the MSICS group had poor ( $< 6/60$ ) (Gogate PM, 2003).

In a Cochrane review (<http://www.thecochranelibrary.com>) of surgical interventions for age-related cataract Meta-analysis of two studies, Pune Study and George 2005, was done to compare MSICS with ECCE. These studies have shown a significantly better uncorrected visual acuity ( $\geq 6/18$ ) and surgically induced astigmatism in the MSICS group (47.9%) versus the ECCE group (37.3%), but no difference in BSCVA between the two groups. This study assessed the effectiveness of MSICS in patients with phagocytic glaucoma.

In 87.9% of instances, *Venkatesh R et al.* reported an uncorrected excellent visual acuity (6/18). This research is significant since phagocytic glaucoma is frequent in impoverished nations like India (Venkatesh R 2007).

*Ruit S et al.* study reported an uncorrected good visual acuity ( $\geq 6/18$ ) in 89% of cases in the MSICS group and in 85% of cases in the phaco group at six months follow-up. The best corrected good visual acuity ( $\geq 6/18$ ) was reported in 98% of cases in both the MSICS and the phaco group. The two groups showed no statistically significant difference in UCVA or BCVA at 6-month follow-up (Ruit S 2007).

*Venkatesh R et al.* found an uncorrected good visual acuity ( $\geq 6/18$ ) in 82.0% of cases in the MSICS group and

87.6% of cases in the phacoemulsification group at six weeks follow-up (Venkatesh R 2011).

**Singh S K *et al.*** study compared the uncorrected visual acuity between MSICS and phacoemulsification on the first postoperative day. The study showed an uncorrected good visual acuity ( $\geq 6/18$ ) in 77.7% of cases in the MSICS group and 68% of cases in the phaco group (Singh S K 2009). They Opt that better vision on the first postoperative day with MSICS can be correlated with the greater increase in corneal thickness in the phacoemulsification. There is no statistically significant difference between visual outcomes at six weeks of follow-up (**Venkatesh R 2011**).

In a Cochrane review of surgical interventions for age-related cataracts Meta -an analysis of the two studies Gogate, 2005 and George, 2005 was done. This study reported that the phaco group has a significantly improved proportion of patients with an uncorrected good visual acuity ( $\geq 6/18$ ) in 81.1% of cases compared to the MSICS group. But there was no difference in the BSVA (<http://www.thecochranelibrary.com>).

In a study conducted in Maharashtra in 2011, out of 819, 50% of patients had VA in the fair vision range of  $<6/18-6/60$ , and 52% showed a VF in the range of 76-100. Of the 32 satisfied patients, most were in the age group 70-79 years (**Domple, 2011**).

Surgical factors are often responsible for sub-optimal visual outcomes; some, like induced astigmatism and vitreous loss, can be modified with training; actively encouraging follow-up visits can allow treatment of residual refractive errors and capsular opacification. In the study done by Kumar *et al.* in 2012, out of 644 patients (644 eyes), 266 (41.3%) eyes had a successful outcome (presenting visual acuity 6/18 or better after surgery). The likelihood of a positive outcome was substantially correlated with living in a city, having an intraocular lens, and not having any ocular comorbidities or posterior capsule opacification. Uncorrected refractive errors and posterior capsule opacification were two curable reasons that contributed to borderline and subpar results. There were frequent intraoperative issues that pulled up the pupil (**Kumar, 2012**).

A study conducted in central India by **Chanchlani *et al.* in 2014** reports that 412 eyes underwent cataract surgery with posterior chamber intraocular lens implantation. The maximum number of patients were in the age group of 60-69 years, 180 (43.6%) patients., Among these patients, 240 were males (58.2 %), and 172 were females (41.7 %). Small incision cataract surgery (SICS) with intraocular lens implant was the commonest surgical method (80%) used. After four weeks, postoperative best corrected visual acuity of eye 6/18 in 89.8% of cases. The commonest refractive error was Myopia against the rule of astigmatism, seen in 172 out of 300 patients. (Chanchlani, 2014).

In a 2015 study by **Hosamani *et al.*** conducted in south India, the majority of patients, 83.39%, had postoperative best corrected visual acuity (BCVA) between 6/6 and 6/18, 13.42% between 6/18 and 6/60, and 3.19% had BCVA. (2015) (Hosamani).

A study was done in Maharashtra in 2016 by **Rupali D Maheshgauri *et al.***; they operated on 500 cases, of which 71.60% were female and were 28.40% male, and in the base hospital, 58.40% male and 41.60% female were operated on. Postoperative visual acuity of 6/6 in the base hospital was 90.4%, and in camp was 69.2%. The postoperative-complication rate and patient satisfaction in the base hospital were 9.6% and 83%, respectively. In the camp, 30% and 58.6%, respectively (Rupali D Maheshgauri, 2016).

In 2016, **Srinivas Marmamula** carried out extensive research in South India. Seven thousand three hundred seventy-eight people in all (94.6%) were looked at. Of these, 1228 eyes belonging to 870 people had cataract surgery. The average age of the surgical patients was 63.7 years (SD: 10.7). In total, 56.3% of those who underwent cataract surgery were women, 76% were illiterate, and 42% required eyeglasses following the procedure. 14.7% of the operated eyes had blindness, while 12.2% of the operated eyes still had MVI. Compared to respondents from rural areas, a considerably higher percentage of urban subjects achieved positive results ( $p = 0.01$ ). According to Srinivas Marmamula (2016), posterior segment disease (34.3%) and uncorrected refractive error (58.7% and 58.7%, respectively) were the main causes of blindness and MVI, respectively.

**Marmamula *et al.*** conducted a study in 2016 in south India; most subjects were in the age group of 46-60 years (65%). Eighty-seven were females (72.5%), and 49 were illiterate (40.8%). Among these subjects, 83 were homemakers (69.2%), and 96 (80%) underwent surgery in an institution (picked up through camp). 10.8% had complications immediately after surgery, and 50% of study subjects had a history of chronic diseases, such as DM, HTN, or both. Visual acuity measured as good vision (6/6-6/18) 54.2%, borderline vision ( $<6/18-6/60$ ) 33.3%, and poor vision ( $<6/60$ -unable to appreciate hand movements) 12.5%. 12.5% of the post-cataract surgery (IOL) subjects had poor vision. 30% of the subjects who had cataract surgery (IOL) surgery more than five years ago have poor vision (Srinivas Marmamula, 2016).

In 2016, **Matta *et al.*** conducted a study in south India and discovered that 61.8% of patients had good post-cataract surgery visual outcomes, while 91.7% of patients had good outcomes based on best-corrected visual acuity (BCVA). Those with less than 6/60 were just 2.9% and 1.6%, respectively, based on PVA and BCVA. Poor visual outcomes were found to be significantly more common in patients under the age of 70 (OR 4.63; 95% CI 1.61, 13.30), in female patients

(OR 1.58; 95% CI 1.04, 2.41), in patients with preoperative comorbidities (OR 4.68; 95% CI 2.90, 7.57), in patients with intraoperative complications (OR 8.01; 95% CI 2.91, 22.04), in patients with eyes that underwent no IOL or anterior chamber-IOL.

A study in West Bengal in 2017 by *Islam et al.* reports postoperative unaided visual acuity 6/12 (Snellen's chart) or better by the sixth week in 176 (77.19%) cases. Best-corrected visual acuity of 6/12 to 6/9 and even better by the sixth week was found in 213 (93.42%) cases, and the remaining 15 (6.61%) cases had low vision  $\leq$  6/18 (Islam, 2017).

A community-based, cross-sectional study was conducted in 15 randomly selected clusters (urban slums) of Raipur from June 2012 to March 2013 by *Tiwari et al. 2019*. Of the 870 participants, 203 (329 eyes) had undergone cataract surgery. Among all operated eyes, the visual outcome was good (VA  $\geq$ 6/18) in 84.5%, borderline (VA  $<$ 6/18 and  $\geq$ 6/60) in 12.5%, and poor (VA  $<$ 6/60) in 3% of eyes with available correction. Visual outcome of cataract surgery was significantly associated with age at the time of surgery, literacy, type of surgery, place of surgery, and time since surgery (*Tiwari et al., 2019*).

In a study, *Rajkumari Vidyarani Devi et al.* Post-surgery BCVA was 6/6 in 63.9%, and visual acuity between 6/12 to 6/18 in 28.8% of cases, 6/24 to 6/36 in 6.8%, and  $<$ 6/60 in 0.5% of cases. In their opinion, SICS remains the procedure of choice for cataract surgery in remote areas with limited facilities. Multiple outreach camp is needed to reduce visual handicap and improve the quality of life in this region (Rajkumari Vidyarani Devi, 2020).

*Ward 2021* conducted a prospective longitudinal interventional study in a tertiary hospital in Karnataka, India, over a period of nine months. A total of 103 (98.1%) patients had good vision, i.e., visual acuity of 6/6 - 6/18, followed by two (1.9%) who had moderate vision, i.e., visual acuity of  $<$ 6/18 - 3/60, and none were blind or with visual acuity of  $<$ 3/60. According to the study, MSICS with posterior chamber intraocular lens implantation can result in an excellent visual outcome with a low complication rate (Warad, 2021).

*Priyadharshini 2021*, Tamilnadu, reported uncorrected PVA were 64.6% poor vision. Long-term subjective visual outcome was reported to be good in the postoperative period in 62.2% of cases. During the long-term follow-up, it was revealed that most of the operated cases had near-normal or poor vision. Vision can be improved by the simple correction of refractive error.

*Marmamula 2021*, conducted a study in Hyderabad in which 1215 eyes of 703 individuals had cataract surgery. The mean age of these participants was 77.5 years 66.8% were women, 29.9% reported diabetes, and 61% reported

hypertension. 33.4%; of eyes had VI after cataract surgery, 31.8% Posterior capsular opacification (n=129) 24.1% uncorrected refractive error. The prevalence of good outcomes was 66.6%. On applying multivariable analysis, younger age, self-reported hypertension, independent mobility, surgery in a non-government (as opposed to private) hospital, and undergoing paid surgery were associated with good outcomes (Marmamula, 2021).

## CONCLUSION

Cataract surgery is affordable technique that can be used safely and can be dispensed at a large scale in developing countries. Literatures proves that MSICS and Phacoemulsification both can be used as an effective and affordable treatment option. SICS can be used especially in sections of the country that lack advanced resources. It is an excellent tool to eliminate preventable blindness due to cataract.

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