Original Article

Quality of Life in Pediatric Patients After Cataract Surgery

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ABSTRACT

Purpose: To assess the quality of life in pediatric patients who have undergone cataract surgery and identify clinical and demographic variables that influence visual recovery and QoL outcomes.

Study Design: Descriptive observational.

Place and Duration of Study: Jinnah Postgraduate Medical Center, Karachi. From March 2021 to March 2023.

Methods: A total of 230 pediatric patients who had undergone cataract surgery between the ages of 6 months and 12 years were enrolled from a tertiary eye care center. To evaluate the impact of surgery on children's quality of life, two validated instruments were used. The Pediatric Quality of Life Inventory (PedsQL) was employed to assess general health-related quality of life across physical, emotional, social, and school-related domains.

Results: The mean post-operative best-corrected visual acuity (BCVA) improved from 1.20 ± 0.34 to 0.48 ± 0.29 logMAR ($p < 0.001$). Over 68% of children achieved a BCVA of 0.5 logMAR or better. The mean total PedsQL score was 74.6 ± 12.5, with highest scores in physical functioning (81.2 ± 10.3). Children who underwent bilateral surgery, intraocular lens (IOL) implantation, and good compliance to amblyopia therapy reported higher QoL scores. Significant correlations were found between better visual outcomes and improved QoL ($r = -0.61$, $p < 0.001$).

Conclusion: Cataract surgery significantly improves both visual function and quality of life in children, especially when performed early and supported by proper rehabilitation. Clinical success should be evaluated not only by visual acuity but also through QoL outcomes.

Keywords: Pediatric cataract, Visual acuity, Quality of Life, Amblyopia.

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INTRODUCTION

Childhood cataract exists as one of the main reasons for pediatric visual impairment and blindness throughout the world. Such conditions may disrupt normal visual pathway development in children who receive delayed or no diagnosis and treatment. The causes of pediatric cataract differ from those in adult patients because children may develop cataract because of birth defects or during developmental stages. They need prompt surgical treatment to prevent amblyopia. The surgical progress has resulted in better visual outcomes but keeping only visual recovery does not lead to total functional success.[1] The quality of life after pediatric cataract surgery entails numerous factors. Measurement combines visual function with emotional well-being as well as social interactions and educational performance and family dynamics.[2] Quality of life assessment for children requires challenge when they need to undergo surgery in their first years of life. Young children normally lack the ability to describe their experiences correctly, so caregivers take on the task of reporting results. Validated and age-appropriate assessment methods which measure objective and subjective indicators of post-operative well-being should be utilized.[3]

The surgical procedure is just the start of a prolonged visual restorative process in cataract management. The post-operative care requires patients to use optical correction tools such as glasses or contact lens together with amblyopia treatment methods and scheduled followup appointments to check for glaucoma and posterior capsule opacification.[4] This requires a particular protocol by caregivers together with consistent access to follow-up medical appointments. The absence of proper healthcare infrastructure combined with financial barriers and insufficient awareness in many developing nations creates obstacles for long-term visual care which ends up affecting child visual outcomes as well as life quality.[5] The combination of undetected or inadequately handled visual impairment creates obstacles for children to build friendships with others and maintain educational and recreational involvement.[6] Children facing stigma and bullying experiences then develop anxiety, depression along with declining academic motivation. Proper surgical intervention combined with rehabilitation support leads children to demonstrate major enhancements in their cognitive development as well as academic achievement and improved social capabilities. The leads to better emotional health.[7]

The parents whose children have cataracts commonly experience severe emotional suffering and financial stress together with intense worry about their child's future development. Health and wellness of children and their families will improve when professionals dedicate services toward caregiver support through counseling paired with social programs combined with educational initiatives.[8] Children in various regions often delay their treatment until their dense cataracts have led to permanent damage to visual development. The length of time before intervention damages complete functional output and reduces life quality gains that timely access to treatment would have brought.[9] Early detection and affordable medical care for children due to vision issues need to be supported by government policy while community-based awareness programs and better referral networks also help. Other equally important factors stem from psychology and social aspects. The lack of proper vision correction causes children to experience problems in social interaction, school participation and self-confidence development. Children often encounter social stigma alongside being excluded or bullied toward displaying symptoms of depression alongside anxiety and limited academic drive.[10] The treatment successes enhance their feeling of autonomy and generate positive effects on their mental wellness.[11]

The purpose of this study was to assess the quality of life in children who have undergone cataract surgery and identify clinical and demographic variables that influence visual recovery and QoL outcomes.

METHODS

This descriptive, cross-sectional study was conducted from March 2021 to March 2023 in Jinnah Postgraduate Medical Center, Karachi. The study was approved by the Institutional review board/Ethical review board **(No.F.2-81/2020-GENL/49902/JPMC)**. A total of 230 patients, aged between 6 months and 12 years, diagnosed with congenital or developmental cataract (unilateral or bilateral), who had undergone cataract extraction with or without intraocular lens (IOL) implantation and had a minimum postoperative follow-up of six months at the time of evaluation, were included in the study. Eligibility criteria also required a stable ocular condition with no ongoing surgical complications, as well as the availability of a primary caregiver willing to participate in quality of life (QoL) assessments. Children were excluded from the study if they had traumatic cataracts, co-existing ocular anomalies such as microphthalmia, persistent fetal vasculature (PFV), aniridia, or retinal dystrophies, or if they had systemic neurodevelopmental disorders (e.g., cerebral palsy, autism) that could impair communication or cognitive functioning. Additional exclusion criteria included incomplete medical records or follow-up data, and refusal of consent by caregivers or inability to complete the required quality of life (QoL) assessments.

Participants were selected using consecutive sampling from patients attending regular follow-up appointments. Relevant clinical data were extracted from medical records, including surgical details, visual outcomes, and compliance with follow-up care and amblyopia therapy. Standardized QoL assessment tools were administered, with translations provided for non-English-speaking participants to ensure comprehension and reliability. To evaluate the impact of surgery on children's quality of life, two validated instruments were used. The Pediatric Quality of Life Inventory (PedsQL) was employed to assess general

health-related quality of life across physical, emotional, social, and school-related domains. The Cardiff Visual Ability Questionnaire for Children (CVAQC) was used to measure vision-specific functioning. These tools are suitable for use across different age groups and are commonly applied in pediatric ophthalmic studies. For children under seven years of age, caregiver-reported responses were prioritized, while older children aged 7–12 years were encouraged to provide self-reports alongside caregiver input. Key clinical variables included the child's age at surgery, gender, laterality of the cataract, type of surgical procedure, whether an intraocular lens was implanted, and pre- and post-operative BCVA. Other post-operative parameters such as complications, adherence to amblyopia therapy, and compliance with scheduled follow-up visits were also noted. Visual acuity assessments were conducted using age-appropriate methods such as Cardiff Acuity Cards, Lea Symbols, or Snellen charts depending on the child's developmental and cognitive level.

Data was analyzed using SPSS v27. Descriptive statistics were used to summarize demographic, clinical, and QoL data. Continuous variables, such as age and QoL scores, were presented as means and standard deviations, while categorical variables were reported as frequencies and percentages. Group comparisons were performed using independent t-tests. A p-value of less than 0.05 was considered statistically significant.

RESULTS

There were 230 children with 122 males (53.0%) and 108 females (47.0%). The mean age at the time of surgery was 3.6 ± 2.1 years, while the mean age at assessment was 5.2 ± 2.5 years. Bilateral cataracts were more common, observed in 145 children (63.0%), compared to 85 cases (37.0%) of unilateral cataracts. IOL implantation was performed in most patients (77.4%), while 22.6% remained aphakic and were managed with alternative optical correction.

The mean BCVA improved from 1.20 ± 0.34 logMAR pre-operatively to 0.48 ± 0.29 logMAR after surgery, with 158 children (68.7%) achieving a BCVA of 0.5 logMAR or better. The mean overall Pediatric Quality of Life Inventory (PedsQL) score was 74.6 ± 12.5, with the highest domain scores in physical (81.2 ± 10.3) and social functioning (77.5 ± 12.8). Details are shown in Table 1.

Table 1: *Visual Acuity and Quality of Life Scores.*

Parameter	Value
Pre-operative BCVA (logMAR)	1.20 ± 0.34
Post-operative BCVA (logMAR)	0.48 ± 0.29
Patients with post-op BCVA ≤ 0.5	158 (68.7%)
Overall PedsQL score	74.6 ± 12.5
Physical functioning	81.2 ± 10.3
Social functioning	77.5 ± 12.8
Emotional functioning	72.4 ± 14.2
School functioning	67.3 ± 15.7
Cardiff Visual Ability Questionnaire for Children (CVAQC) score	84.1 ± 10.8

Children with bilateral cataracts had better mean BCVA (0.42 ± 0.26 logMAR) and higher PedsQL scores (76.9 ± 11.2) compared to those with unilateral cataracts (0.56 ± 0.31 logMAR, 71.0 ± 13.4). Table 2 shows mean BCVA and mean PedQL score and effect of compliance with amblyopia therapy.

Table 2: *Subgroup Analysis for BCVA and mean PedQL score.*

Group	Mean BCVA (logMAR)	Mean PedsQL Score
Bilateral cataract	0.42 ± 0.26	76.9 ± 11.2
Unilateral cataract	0.56 ± 0.31	71.0 ± 13.4
IOL implantation	0.46 ± 0.28	75.3 ± 12.1
Aphakia	0.52 ± 0.30	72.1 ± 13.3
Amblyopia therapy (compliant)	0.41 ± 0.25	76.4 ± 11.8
Amblyopia therapy (non-compliant)	0.67 ± 0.31	70.2 ± 14.0

The post operative complications are depicted in Table 3.

Table 3: *Post-operative Complications.*

Parameter	Value: n (%)
Posterior capsule opacification (PCO)	38 (16.5%)
Glaucoma	12 (5.2%)
Strabismus	18 (7.8%)
Nystagmus	9 (3.9%)
No complications	153 (66.5%)

Children under 3 years had the lowest mean PedsQL (69.8 ± 13.1) and CVAQC (79.3 ± 11.0) scores, while those aged 10–12 years showed the highest scores, with PedsQL at 78.9 ± 10.2 and CVAQC at 87.6 ± 8.8. Intermediate age groups (3–6 and 7–9 years) demonstrated a gradual improvement across both measures (Table 4).

Table 4: *QoL Scores by Age Group.*

Parameter	Mean PedsQL Score	Mean CVAQC Score
<3	69.8 ± 13.1	79.3 ± 11.0
3–6	73.2 ± 12.3	82.7 ± 10.2
7–9	76.5 ± 11.5	85.4 ± 9.6
10–12	78.9 ± 10.2	87.6 ± 8.8

Correlation analysis revealed a strong negative association between post-operative BCVA and PedsQL scores ($r = -0.61$, $p < 0.001$), indicating that better visual acuity was significantly linked to improved quality of life. A similar relationship was observed between BCVA and CVAQC scores ($r = -0.58$, $p < 0.001$), showing that improved vision also enhanced functional visual ability. Additionally, a moderate negative correlation was found between age at surgery and post-operative BCVA ($r = -0.42$, $p = 0.002$), suggesting earlier surgical intervention led to better visual outcomes (Table 5).

Table 5: *Correlation Analysis.*

Parameter	Correlation Coefficient (r)	p-value
Post-op BCVA vs PedsQL	-0.61	<0.001
Post-op BCVA vs CVAQC	-0.58	<0.001
Age at Surgery vs Post-op BCVA	-0.42	0.002

DISCUSSION

The research evaluated QoL in pediatric patients after cataract surgery as well as determining significant post-operative visual and functional outcomes. The research outcome shows that timely performed cataract surgeries lead to major advancements in patients' vision along with their life quality. Early detection of childhood cataracts requires consistent post-operative care together with proper follow-up which demonstrates their importance in cataract management among children. The surgical intervention proved effective because BCVA results showed a substantial improvement after surgery. After the surgery two-thirds of children achieved vision quality comparable to 0.5 logMAR which represents useful vision for daily tasks. The research findings are consistent with previous analytic studies which demonstrate improved visual results after early cataract extraction.[12]

Children experience improved quality of life according to both Pediatric Quality of Life Inventory (PedsQL) and Cardiff Visual Ability Questionnaire for Children (CVAQC). Surgical rehabilitation allows patients to achieve their best outcomes in physical and social domains thus improving their mobility and social relations. However, school functioning scores remained reduced according to one study which indicates that visual obstacles adversely affect academic performance mainly in younger students or those with uncorrected refractive problems.[13] The Quality-of-Life scores obtained from children who had cataracts in both eyes exceeded those from children who had cataracts in only one eye. The symmetrical visual input after bilateral surgery enables better depth perception along with balanced sensory response.[14] Literature also shows that individuals treated with IOL demonstrated slightly better quality of life measurements than children kept without IOL.[15]

The degree to which patients followed amblyopia therapy proved vital for achieving successful visual results and quality of life improvements. It has been reported that postoperative rehabilitation through occlusion therapy combined with pharmacological penalization results in children achieving better BCVA scores and higher QoL scores.[16] Patients require proper educational programs and precise follow-up to improve quality of life. Children undergoing cataract surgery before three years of age typically scored lower on quality-of-life assessments since their visual development was delayed and they showed restricted cooperation. Older children are shown to perform better with respect to QoL measures and visual functional tests.[17]

Recent studies have explored the psychosocial outcomes and functional improvements following pediatric eye surgeries, particularly cataract procedures. For instance, Kalua et al, reported on a study in Northern Malawi highlighting that children who underwent cataract surgery experienced enhanced mobility, improved interactions with peers, and strengthened parent-child engagement. These changes contributed significantly to better participation in daily activities and overall quality of life.[18]Abd El-Hakeem et al, demonstrated how perioperative nursing care affects children's recovery process after cataract procedures while improving caregiver satisfaction levels which benefits their quality of life.[19]

Calculating IOL power in pediatric patients is also a challenge which can affect the QoL. Rathod et al, demonstrated how precise medical calculations for IOL result in enhanced visual results and indirectly improve reported QoL scores.[20] The study confirms

that early intervention with proper IOL implantation along with comprehensive postoperative care are essential elements to enhance vision quality and personal wellness of pediatric patients. Good vision following cataract surgery creates stronger QoL scores. This study also highlights the importance of describing successful outcomes in terms of both clinical and patient-centered perspectives.

The limitations of this study include its cross-sectional design which does not include the changes that occur in later years of life. Subjective bias might affect the research data due to the need for caregiver-reported data for children who are too young to self-report. Longitudinal research involving larger populations and mixed research methods should investigate how QoL changes over time for this population.

CONCLUSION

Cataract surgery in children significantly improves both visual function and overall quality of life when performed early and accompanied by appropriate post-operative care. The study findings emphasize that visual outcomes alone do not capture the full impact of intervention; rather, psychosocial well-being, school performance, and daily functioning must also be considered as integral outcomes of pediatric cataract management.

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Patient's Consent: Researchers followed the guidelines set forth in the Declaration of Helsinki.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board **(No.F.2-81/2020-GENL/49902/JPMC)**.

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Mehboob Dad; Consultant Ophthalmologist: *Statistical Analysis, Manuscript Editing.*

Farhat Khan; Postgraduate Trainee: *Data Acquisition, Data Analysis.*

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