



## Original Research Article

## Epidemiology of pediatric cataracts – A 5 year retrospective study

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## ABSTRACT

**Purpose:** To determine the epidemiology, diagnosis and management of pediatric cataracts and to identify preventable factors and improve the visual prognosis in these patients.

**Materials and Methods:** A retrospective study was conducted after reviewing the details of 87 patients of pediatric cataract aged between 3 months and 15 years who underwent cataract surgery in our institute from January 2014 to December 2018. A team of ophthalmologists and pediatricians attached to the center examined all the patients preoperatively. The type of cataract was determined using slit lamp biomicroscopy or operating microscope.

**Results:** Congenital cataracts were 71.26% and acquired cataracts were 27.9%. Congenital cataract includes idiopathic (77.41%), hereditary (12.90%), associated with syndromes (8.06%) and rubella (1.61%). In congenital cataract group, 41 patients had bilateral cataract and 21 had unilateral cataract. In acquired cataract group, 23 had unilateral and 2 had bilateral cataract. Traumatic cataract was most common in boys in the age group of 11-15 years and most common cause of trauma was wooden stick injury (45%). All patients underwent surgery and were left either aphakic (planned for secondary IOL implantation) or pseudophakic and had post operative visual rehabilitation.

**Conclusion:** Early diagnosis and treatment of pediatric cataracts in a high percentage of cases is the key for good visual outcome. Given the high proportion of idiopathic pediatric cataracts, prevention of the disease remains a challenge worldwide.

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## 1. Introduction

One among the priority eye diseases of the disease control strategy of the “VISION 2020” initiative is childhood blindness.<sup>1</sup> Major cause of childhood blindness is pediatric cataract. 7.4%–15.3% of childhood blindness are due to cataract in developing countries like India.<sup>2,3</sup> Half of childhood cataracts in India are known to be idiopathic.<sup>4</sup>

Amblyopia is the main cause of vision loss in congenital or childhood cataracts. The fuzziness of the retinal image in one or both eyes during this critical period gives rise to irreversible amblyopia.

To date, there is limited public awareness regarding this condition especially in developing communities as well as limited published literature describing the epidemiological

aspects of pediatric cataract in our region.

Thus, we conducted the current study to shed light on the chief epidemiological facts of pediatric cataract in our locality, for early diagnosis and treatment and to improve the visual outcome in children by implementation of programs of primary prevention.

## 2. Materials and Methods

The retrospective study adhered to the tenets of Declaration of Helsinki. The records of 87 pediatric cataract cases admitted in our tertiary care hospital during 5-year period(2014-2018) of diagnosis and follow-up were reviewed. Ethical clearance was taken from Institutional Ethical Committee.

Slit lamp biomicroscopy was done to determine the type of cataract after full dilation of pupils. Atropine eye

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ointment 1% was used for pupil dilation for the age group of 1–5 years, and cyclopentolate 1% for children above 5 years of age. Fundus examination was done with indirect ophthalmoscope and intraocular pressure, axial length, keratometry and vertical- horizontal corneal diameter were measured. Uncooperative patients were examined under general anaesthesia.

Blood glucose, serology and complete hemogram were done in all patients. TORCH screening was done in children < 1 year of age and whose mothers revealed a history of illness accompanied by rash during pregnancy. History of patients was collected by reviewing the records.

Following clinical variables were analysed according to their etiology: patient's gender, age at diagnosis, presenting symptoms, morphology, laterality, family history of cataract, presence of other ocular and systemic abnormalities, follow-up time and treatment. Age at surgery, unilateral or bilateral and placement of IOL were also assessed.

Statistical analysis was done using SPSS software version 20. Absolute (n) and relative frequencies (%) were used to describe categorical variables and mean  $\pm$  standard deviation for continuous variables. The analysis of the association between categorical variables was done by Chi-square independence test and if more than 20% of the cells in the contingency table had expected frequencies below five, Fisher's exact test was used. A P value of <0.05 was considered statistically significant.

### 3. Results

Total of 87 patients with pediatric cataract operated were reviewed during the defined period. In the etiological group analysis, 62(71.26%) were congenital cataracts, 25 (28.73%) were acquired. In the congenital cataracts, 48 (77.41%) were idiopathic, 8 (12.90%) hereditary, 1(1.61%) associated with rubella and 5 (8.06%) associated to syndromes. In acquired cataracts, 23(92.00%) were traumatic and 2 (8%) were complicated cataracts secondary to retroviral disease (Table 1).

Age at presentation, sex and laterality in both etiological groups have been summarized in Table 2.

Most common symptom was diminution of vision (61.29%) as majority presented in the age group between 1-5 years, followed by leucocoria (20.96%). In the acquired cataracts group, it was diminution of vision following trauma. In 86%(75) preoperative visual acuity was between perception of light and counting fingers till 3 metres. In four children visual acuity could not be recorded due to non co-operation.

Consanguineous marriage was seen in 7(8.04%) children. While no statistical difference was noted with respect to consanguinity and etiology of cataracts.

Among the morphology of congenital cataracts, 26 (41.93%) were total, 22(35.47%) were lamellar/zonular,

10 (16.12%) were nuclear and other morphologies are summarized in Table 3. And in traumatic cataracts, 20(80%) were total, 2(8%) subcapsular and 1(4%) rosette cataract. In acquired metabolic cataracts, 1 (4%) presented with total cataract and 1 (4%) with posterior subcapsular cataract with bread crumb appearance. The results were statistically significant.

Other ocular abnormalities associated with congenital cataract were nystagmus 17 (27.41%), strabismus 8 (12.90%), microcornea 4 (6.45%) and others 3 (4.83%) including microphthalmia, iris coloboma with retinohoroidal coloboma and tilted disc. In traumatic cataracts one(4%) presented with exotropia. (P- 0.014 <0.05)

Time of presentation and mode of injury in acquired traumatic cataracts has been summarized in Table 4. Traumatic cataract was most commonly seen in boys of 11–15 years.

In congenital cataracts, 39 (62.90%) cases underwent unilateral surgery while 23(37.09%) cases underwent bilateral surgery. In acquired cataracts all cases underwent unilateral surgery. [P=0.001]. In total, 64 patients (73.56%) had primary intraocular lens (IOL) implantation and 23 patients remained aphakic.

**Table 1:** Etiology of pediatric cataracts

<b>Etiology</b>	<b>Total n (%)</b>
<b>Congenital</b>	<b>62(71.26)</b>
Idiopathic	48(77)
Hereditary	8(12.90)
Associated to syndromes	5(8.06)
Associated to intrauterine infections	1(1.61)
<b>Acquired</b>	<b>25(28.73)</b>
Traumatic	23(92)
Secondary to systemic disease	2(8)

### 4. Discussion

Worldwide, there are an estimated 1.5 million visually impaired children, mostly due to causes that are preventable.<sup>12</sup> Cataracts are amongst the leading treatable causes of blindness in children.

Visual impairment from cataracts in children has become a public health concern and affects psychomotor development and quality of life of children.

The main aim of 'Vision 2020' initiative jointly developed by the World Health Organization (WHO) and the International Agency for Blindness Prevention (IABP) is the elimination of avoidable blindness by the year 2020.<sup>13</sup>

The present study aims at the evaluation of clinical and epidemiological characteristics of pediatric cataracts diagnosed in our hospital over the past 5 years.

Etiological analysis done by various studies and its comparison with our study has been summarized in Table 5.

**Table 2:** Summary of results

Variable	Congenital n (%)	Acquired n (%)	P value
<b>Age</b>			
<1 year	6(9.67)	0	0.00
1-5 yrs	28(45.16)	1(4)	
6-10 yrs	15(24.19)	8(32)	
11-15 yrs	13(20.96)	16(64)	
<b>Sex</b>			
Male	27(43.54)	16(64)	0.10
Female	35(56.45)	9(36)	
<b>Consanguineous marriage</b>			
Yes	7(11.29)	0	0.10
No	55(88.70)	25(100)	
<b>Laterality</b>			
Unilateral	21(33.87)	23(92)	0.00
Bilateral	41(66.12)	2(8)	
<b>Surgery</b>			
Unilateral	39(62.90)	25(100)	0.00
Bilateral	23 (37.09)	0	
<b>IOL implantation</b>			
Aphakic	20 (32)	3 (12)	0.06
Pseudophakic	42(67.74)	22(88)	

**Table 3:** Morphology of pediatric cataracts

Morphology	Congenital n (%)	Acquired n (%)	P value=0.00 (<0.05)
Nuclear	10 (16.12)	0	
Lamellar / Zonular	22(35.47)	0	
Total	26(41.93)	21(84)	
Subcapsular	1(1.61)	2(8)	
Polar	1(1.61)	0	
Sutural	1(1.61)	0	
Blue Dot	1(1.61)	0	
Rosette	0	1(4)	
Bread crumb appearance	0	1(4)	
	62 (100)	25(100)	

**Table 4:** Time of presentation and mode of injury in traumatic cataracts

Time of presentation	N (%)
< 1 week	10 (43.47)
<1 month	5(21.73)
1 – 6 months	5(21.73)
7-12 months	1(4.43)
> 1 year	2(8.69)
<b>Mode of injury</b>	
Wooden stick	10(45)
Thorn	8(36)
Stone	3(13.63)
Mobile blast	1 (4.54)

**Table 5:** Etiological analysis done by various studies

Eckstein, et al. <sup>5</sup> (South India)	25% were due to hereditary, 15% were due to congenital rubella syndrome, and 51% were idiopathic.
Angra <sup>6</sup> (North India)	14% were hereditary, and 21% were due to rubella and 31% were idiopathic. <sup>7</sup>
While Jain et al. <sup>8</sup>	20% were hereditary, 9% were due to metabolic diseases, 5% had cataract associated with known syndrome and 46.05% idiopathic.
Kaid Johar et al (West India) <sup>9</sup>	7.2% were hereditary, 4.6% were due to congenital rubella syndrome, 15.1% secondary and 73% idiopathic.
Present study	12.90% were hereditary, 1.61% was due to congenital rubella syndrome, secondary were 8.06% (1 out of 5 cases was due to downs syndrome) and 77.41% were idiopathic.

**Table 6:** Prevalence of strabismus among various studies

Fakhoury et al. (France) <sup>7</sup>	19%
Kim et al. (Korea) <sup>10</sup>	28%
Lin et al. (Guangdong Province of China). <sup>11</sup>	9.5%.
Present study	12.90%

**Table 7:** Strabismus among both etiological groups

Strabismus	Unilateral	Bilateral
Exotropia	3	2
Esotropia	1	1
Convergent squint	0	2
		P value – 0.014 (<0.05)

In the present study, idiopathic was most common cause of pediatric cataract while rubella was least common.

Rubella accounts for 15% of congenital cataracts in South India<sup>5</sup> and 21% in North India,<sup>6</sup> which is much more than 1.61% cases noted in our study.

Down syndrome is the most frequent syndrome associated to cataracts, and there is an increased prevalence of congenital cataracts among these patients (2-6%).<sup>14</sup>

The most frequent cause of acquired cataracts was trauma (perforating traumatism). There were two cases of acquired cataracts secondary to uveitis in patients with HIV which were bilateral.

Majority of children presented in the age group between 1-5 years and more who have the ability to verbalize complaints and hence impaired visual acuity was the most frequent symptom (61.29%).

Ocular disorders such as strabismus and nystagmus were identified in majority of patients.

The prevalence of strabismus among various studies has been summarized in Table 6 and strabismus among both etiological groups has been summarized in Table 7.

More exotropia was seen in the cataractous eyes of unilateral cataract patients, while in patients with bilateral cataract, esotropia and convergent squint was more prevalent.

It has been reported that unilateral cataract cases in children were more prone to develop strabismus by Dermirkilinc et al.,<sup>15</sup> which was not identified in our study.

A possible explanation for unilateral cataract with exotropia was that, the cut off from essential light due to cloudy lens in the early age retarded the normal development of retinal function and corresponding striate cortex circuitry in infants, which left the cataractous eye exotropic, as Frank et al<sup>16</sup> reported infants did not start to show convergence until six weeks of age.

Nystagmus was found in 27.41% of patients and was more common in bilateral cataract due to severer vision impairment. Both strabismus and nystagmus were signs of severe vision deprivation early in life,<sup>17</sup> indicating unfavourable visual outcomes.

Trauma is the leading cause of 90% of acquired pediatric cataracts.<sup>18</sup> In the study, male to female ratio was 1.55:1 with male preponderance which is due to more involvement of males in fields, streets and outdoor activities.

Zaman et al. stated that majority (50.64%) of traumatic cataract patients ranged between 5 to 15 years, which coincides with the present study.<sup>19</sup>

Wooden stick was the most common object to cause trauma which could be attributed to the fact that agriculture is the main profession of the people living in this area.

Phacoaspiration with primary posterior capsulotomy, with or without anterior vitrectomy is currently the most frequently used technique for childhood cataracts.<sup>20</sup> The main aim of surgery is the promotion and maintenance of visual axis transparency. Primary intraocular lens (IOL) implantation is tried for majority of patients, however, selecting an IOL is challenging, especially in children less than two years of age, due to the changes of refractive status and complications.<sup>21,22</sup>

Stronger inflammatory response in children increases postoperative complications. The most frequent complication is visual axis secondary opacification.<sup>23</sup> The opacification of the posterior capsule, in the absence of primary posterior capsulotomy occurs invariably in children particularly aged less than four years.<sup>24</sup>

## 5. Conclusion

Pediatric cataracts are still an important and potentially treatable cause of childhood blindness. Timely approach is the key for the success of treatment of pediatric cataracts.

This study aims to contribute to the knowledge of epidemiological characteristics of pediatric cataracts in our locality. The high number of idiopathic cataracts worldwide and in this study pose a challenge for planning regarding prevention strategies.

Treatment should be tailored for each case and strict extended follow-up should be done for proper visual rehabilitation as well as managing any complications.

Timely recognition and intervention can eliminate blind years due to childhood cataract as the condition is treatable.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

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