

# The Gender Issue in Congenital and Developmental Cataract Surgery

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**Purpose:** To describe the demographic pattern of congenital cataract surgery at a referral ophthalmology center in Iran and to evaluate any possible difference between the genders.

**Methods:** Subjects aged 15 years or less scheduled for cataract surgery were enrolled in this cross-sectional study. Data was retrieved from the electronic medical records according to the ICD-10 coding system. Age and proportion of operations by sex were the main parameters of interest. We employed analysis of covariance to compare age at surgery and logistic regression to obtain the trend for the number of cataract procedures in boys and girls.

**Results:** Overall, 314 congenital cataract procedures were performed during the study period, 55 (17.5%) of which were related to second eye surgery. Operated eyes belonged to male subjects in 172 (54.8%) cases and female subjects in 142 (45.2%) cases. Mean age at operation for both first and second eyes was  $3.2 \pm 3.0$  years overall, and  $3.1 \pm 2.9$  versus  $3.4 \pm 3.0$  years in girls and boys, respectively ( $P = 0.62$ ). Surgery was performed before one year of age in 33.2% and before 5 years in 75% of cases. Among patients undergoing second eye surgery, girls presented significantly later than boys (at  $4.2 \pm 3.3$  vs.  $2.6 \pm 1.7$  years,  $P = 0.012$ ).

**Conclusion:** The rate of congenital/infantile cataract surgery in boys was almost 10% higher than girls. We observed a significant difference only regarding age at second eye surgery which comprised 17.5% of all operations. One third and two thirds of the procedures were performed under the age of one and five years, respectively.

**Keywords:** Congenital Cataract; Gender; Socioeconomic Factors

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## INTRODUCTION

About 1.4 million children in the world are blind and most of them live in developing countries.<sup>1</sup> Childhood blindness in high income countries is mostly due to optic nerve and higher visual pathways lesions. On the other hand, corneal

scarring from measles, vitamin A deficiency and the use of harmful traditional eye remedies in low income countries, and retinopathy of prematurity in middle-income countries are predominant causes. Cataracts and congenital abnormalities are equally important in all countries.<sup>2-3</sup>

More than half of blinding conditions in children are avoidable. Congenital cataracts are the leading cause of treatable blindness in children.<sup>1,2</sup> In China, a study on 1,131 blind students showed that cataract was one of the most common treatable causes of blindness.<sup>4</sup> Studies from Malaysia,<sup>5-6</sup> Africa,<sup>7</sup> India<sup>8</sup> and Iran<sup>9</sup> have demonstrated that cataracts are a major treatable cause of blindness or severe visual impairment in children.

The prevalence of blindness due to childhood cataract is 10 times higher in poor countries than in richer societies due to different health care facilities.<sup>1</sup> Furthermore, providing appropriate surgery for congenital cataracts is one of the specific disease control objectives in the Vision 2020 program to control blindness in children.<sup>2,10</sup> Long delays in surgical intervention in many developing countries is associated with harmful effects on visual outcomes and quality of life in children and their families.<sup>11</sup>

There is solid evidence that in most developing countries, women have less access to eye care than men.<sup>12</sup> Unfortunately, evidence is accumulating that children also suffer from gender discrimination in eye care services.<sup>13-14</sup>

Considering the lack of studies on the pattern of congenital cataracts in the Iranian population, we conducted this study to ascertain whether Iranian children also suffer from gender discrimination. Since there was neither a registry for congenital cataracts nor any prior studies addressing its prevalence, we focused on the population receiving service at a busy tertiary eye care center in Tehran.

## METHODS

All children aged 15 years or less who were scheduled for congenital cataract surgery between 2006 and 2009 at Labbafinejad Medical Center were enrolled in this cross-sectional study. The study was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences. Data was retrieved from the electronic records of the hospital admission data bank (Fox PR 6.2. Clipper 5.2) using the ICD-10 coding system. Q12.0 is a billable ICD-10-CM code that can be used to specify the

diagnosis of congenital/infantile cataract and includes hereditary cataracts and cataracts in association with syndromes and/or congenital ocular abnormalities.<sup>15,16</sup> In subjects older than 1 year of age, congenital cataracts were diagnosed in the presence of specific signs suggesting early onset such as cataract morphology (e.g., polar cataract), associated congenital ocular anomalies, or nystagmus.<sup>16</sup> As congenital and infantile cataract have similar management, these terms are usually used interchangeably in clinical practice.<sup>17</sup> Other types of childhood cataract such as traumatic cataract were excluded from the study.

Variables included age, sex, time of operation, duration of hospital stay, and main therapeutic interventions. The household locations for all patients were used as a proxy for access to health care services.

Data was registered and analyzed using SPSS software version 17. Mean  $\pm$  standard deviations of age at surgery were calculated for all patients and according to gender. Mean values were compared using *t*-test. We used analysis of covariance to compare age at surgery between male and female subjects. We also used logistic regression to determine the trend for the number of cataract procedures performed in either sex over the study period. Finally, we compared the age and proportion of operations by sex according to the location of residence.

## RESULTS

Overall, 314 congenital/infantile cataract surgeries were performed during the study period, 55 (17.5%) of which were second eye procedures. This number of eyes belonged to male subjects in 172 (54.8%) cases and to female subjects in 142 (45.2%) cases. Mean age at surgery for both first and second eyes was  $3.2 \pm 3.0$  years overall and  $3.4 \pm 3.0$  years (range, 1 month to 15 years) in boys versus  $3.1 \pm 2.9$  years (range, 2 months to 15 years) in girls ( $P = 0.62$ ). The age and sex distribution of the patients at first and second eye operations is presented in Table 1.

The number of cataract procedures increased steadily during the study period from 51 in 2006 to 76 in 2009 for first eyes, and from 4 in 2006 to

**Table 1.** Demographics of children undergoing congenital cataract surgery

			Age (year)		Percentiles			P-value	
			Mean	SD	25th	50th	75th		
First Eye	Female	115	44.4	2.9	2.7	1.0	2.0	4.0	0.095
	Male	144	55.6	3.5	3.2	1.0	2.0	5.0	
	Total	259	100	3.2	3.0	1.0	2.0	5.0	
Second Eye	Female	27	49.1	4.2	3.3	2.0	3.0	6.0	0.012
	Male	28	50.9	2.6	1.7	1.0	2.0	4.0	
	Total	55	100	3.4	2.7	2.0	2.0	5.0	

SD, standard deviation

21 in 2009 for second eyes. Figure 1 shows age distribution at the time of surgery by the order of operated eyes and the year of operation. In a general linear model including sex and the year of operation, no significant annual trend for age at operation was observed for first eye surgery ( $P= 0.34$ ), but mean age at operation for second eye surgery decreased significantly during the study period ( $P= 0.04$ ).

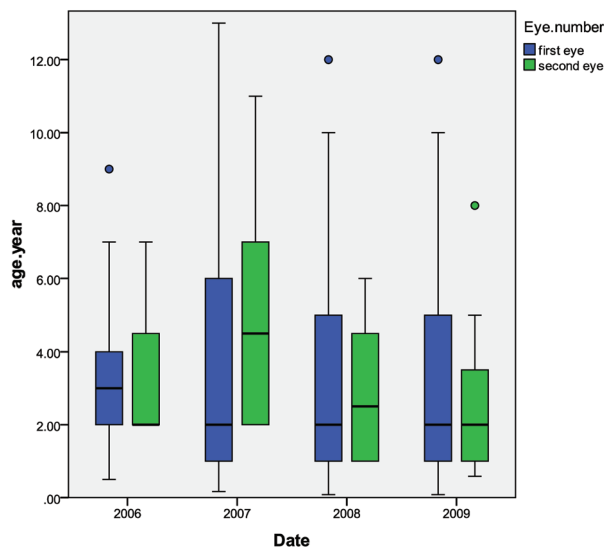
Figure 2 shows the proportion of different age groups at the time of operation by the order of operated eyes; 33.2% of congenital/infantile cataract surgeries were performed before one year of age including 29.3% first eye and 3.9% second eye procedures. In total, more than 80% of procedures were performed on first eyes. The proportion of first eye surgery decreased steadily in older age groups, but the proportion of second eye surgery was almost constant except in the 1-3 year-old age group in which the rate was

almost two times higher than that of other age groups.

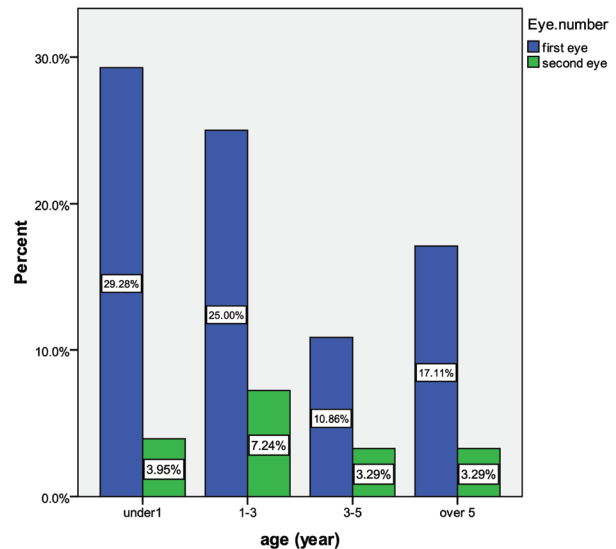
A total of 200 (63.7%) children were referred from provinces other than the capital, where the hospital is located. There were no significant differences in age at operation ( $P= 0.45$ ), sex ( $P= 0.71$ ) and proportion of second eye cataract surgery ( $P= 0.75$ ) between children residing in or outside the capital city.

**DISCUSSION**

Pediatric cataracts have become an important cause of childhood blindness in developing countries<sup>3</sup> and a priority for Vision 2020: the Right to Sight Initiative.<sup>2,10</sup> Consequently, information about the prevalence, sex distribution and surgical coverage for congenital cataracts has gained increasing importance. Despite sporadic reports, the process of cataract surgery, as the



**Figure 1.** Age at operation for congenital cataracts.



**Figure 2.** Proportion of children who underwent congenital cataract surgery in different age groups.

treatment of choice for congenital/infantile cataract, has not been properly documented and there have been no standard methods to monitor its progress.<sup>13</sup> In our country there is no national registry for congenital cataracts and its process of management is not well documented; therefore, we conducted this study for the first time to address the demographic pattern of congenital cataract care in Iran.

The rate of cataract surgery in boys was approximately 10% higher than girls in our setting (54.8% vs. 44.2%). A more prominent gender biased pattern has been reported from other developing countries where two-thirds of pediatric cataract operations were performed on boys.<sup>13,18-21</sup> This gender discrepancy is likely related to different care patterns for girls and boys in developing countries. Comprehensive studies on all children with congenital cataracts (not only operated cases) in developed countries has revealed no genetic predisposition or predominance for congenital or developmental cataracts in boys.<sup>15,16,22</sup> In a broad review on the incidence and causes of childhood blindness over a 20-year period in Denmark, no significant difference was observed between girls and boys in terms of congenital and "other" types of cataracts.<sup>15</sup> In the UK, 248 children with congenital or infantile cataracts were diagnosed during one year, among which 118 (48%) were girls.<sup>16</sup>

In our study, only 17.5% of surgeries were performed on second eyes which seems considerably lower than expected based on a 65% rate of bilateral congenital cataracts according to a comprehensive study from the UK.<sup>16</sup> It has been proven that early surgery improves the outcomes in both unilateral or bilateral cataracts.<sup>17</sup> Therefore, it seems essential to explore possibly delayed management of bilateral congenital/infantile cataracts in our setting; this requires a comprehensive longitudinal study.

Mean age at surgery was  $3.2 \pm 3.0$  years in our study which is comparable to a Korean study in 2008 where mean age at operation was 3.17 years.<sup>23</sup> Conversely, in some developing countries, age at surgery is considerably higher. In a hospital based study in Nepal in 2004, mean age at operation was  $6.2 \pm 4.3$  years.<sup>24</sup> Mean

age at surgery was  $9.56 \pm 4.35$  years in a study from India<sup>21</sup> and  $6.83 \pm 40.0$  years in China.<sup>25</sup> In Madagascar, mean age at the time of cataract surgery in children under 15 years was  $8.3 \pm 4.4$  years with no significant gender difference. Etiologies of cataract surgery in that study were congenital cataracts (59.7%), traumatic cataracts (19.3%), developmental cataracts (8.8%) and other non-specified types.<sup>18</sup>

In the UK it has been reported that almost 4 out of every 10,000 newborns will have congenital or infantile cataracts each year; 3 of them will be diagnosed by their first year of life but one will be diagnosed by the age of 15 years; therefore the probability of being diagnosed by the first birthday is 72%.<sup>16</sup> In our study, one third and two thirds of surgical procedures were performed under the age of one and five years, respectively. These two studies may not be comparable, since the former addressed age at diagnosis, while we report age at surgery. Nevertheless, it seems that cataract surgery services for children should be improved in our setting.

Yorston et al<sup>20</sup> in a survey on 118 eyes in 71 children with bilateral cataracts in East Africa reported no operation before the age of 3 months due to late presentation and risks of anaesthesia in small infants. In our study, minimum age at surgery was 1 month and 101 eyes were operated during the first year of life.

A comprehensive meta-analysis in 2009 revealed a global inequality between the two genders across all age groups regarding eye health services.<sup>12</sup> Patterns of inequality in adults have been noted in other Middle Eastern countries. A population-based study in Oman found that elderly Omani women had a higher prevalence of blindness.<sup>26</sup> A survey on inhabitants older than 50 years in a suburb of Tehran, Iran demonstrated significantly higher rates of severe visual impairment and low vision in women than men; however, blindness was almost equal in both sexes.<sup>27</sup> Based on other studies in Iran, we think that at least in metropolitan Tehran, cataract surgery services are equally accessible to both genders; a recent population-based study from this city reported that although cataract surgery is

more common in women, the reason cannot be attributed to better access to surgical services.<sup>28</sup> In the current study, we observed a significant difference in the age at surgery between girls and boys for second eye surgery. In addition, the proportion of operated eyes was 10% higher in boys. Reasons for these observations may be socio-economic issues, lack of awareness about pediatric cataracts, low capacity of our primary and secondary health systems to detect and refer patients, and gender discrimination which have been addressed by other research in developing countries.<sup>11,18</sup>

A hospital-based study such as ours has some limitations such as missing undiagnosed cases or those managed in secondary hospitals, but such a possibility is low in our study, because congenital cataracts are usually managed at academic referral hospitals. Additionally, the study setting was a tertiary eye hospital which provides care for a wide range of people from all over the country in addition to the capital city. Therefore, the study population could be considered a sample of patients seeking medical care in Iran.

All neonates born in sufficient medical facilities are routinely examined for congenital cataracts by red reflex examination in Iran, but there are no registries at a national level; therefore, we had to resort to a clinic-based method to study patients with congenital cataracts.

The World Health Organization has recommended establishing a Child Eye Health Tertiary Facility (CEHTF) per each 10 million people by 2020, therefore at least 7-8 CEHTFs should be set up in our country.<sup>19</sup> These facilities would be important for gathering valid comprehensive data and also for managing childhood blindness.

### Conflicts of Interest

None.

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