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Pediatric cataract profile in Mansoura Ophthalmic Center, Dakahlia, Egypt

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Running Title: Pediatric cataract profile in MOC.

Abstract:

Propose*:* Cataract in infancy is a significant cause of visual handicap worldwide. The demographic and morphological characteristics of cataract can help establish the etiology, post-operative outcome, and visual prognosis.

Aim of work: the aim of the present study was to study the prevalence, the epidemiological aspects and clinical profile of pediatric cataract in Mansoura ophthalmic center, Mansoura University, Egypt.

Patients and methods: This were a retrospective study that involved children diagnosed as pediatric cataract attending Mansoura Ophthalmic Center, Mansoura University, Egypt within the period from January 2016 till January 2021. The study Included all children (≤18 years) diagnosed with cataract and underwent cataract extraction with or without IOL implantation. Records were reviewed for epidemiological, clinical, and surgical data.

Results: Records of 160 eyes (of 124 patient) were reviewed. Mean age was 7.6 years, and ranged from 2 months to 17 years, (65.3%) were male (34.7%) female. Most of cases were free of nystagmus or strabismus. Among all studied cases, 41.3% of cases had congenital cataract, 53.1% had traumatic cataract. Among all studied congenital cataract cases., 30.3% had total cataract, 15.1% had Anterior polar cataract, 13.6% had Posterior polar cataract, 12.1% had Lamellar cataract, 9.0% had nuclear cataract, 7.5% had blue dot cataract, and 9.0% had Nuclear and posterior subcapsular cataract. All studied cases were subjected to surgical approaches, anterior approach was the most used approach, most of cases were associated with IOL implantation. **Conclusion:** Pediatric cataract cases in our locality represent a common and challenging aspect. Traumatic cataract was the most common followed by congenital cataract. Anterior surgical approach was the most common used management.

Keyword: Cataract, Pediatric, Mansoura Ophthalmic Center.

INTRODUCTION:

Pediatric cataract is a treatable leading cause of childhood blindness. It accounts for 7.4%–15.3% of pediatric blindness. The incidence ranges from 1.8-3.6/10,000 children. The overall prevalence of pediatric cataract is approximately 0.32-22.9/10000child and of congenital cataract is approximately 0.63-9.74/10000 children. There is a higher prevalence of pediatric cataract in low-income countries (0.63–13.6/10,000) in comparison within high-income countries (0.42–2.05/10,000). There is no difference in the prevalence based on sex or laterality. Two etiological types are usually identified for pediatric cataract. It might be congenital or acquired and in most of children it is treatable[1].

Congenital cataract is characterized by lens opacification at birth or in early childhood, while acquired cataract comprises traumatic and iatrogenic causes[2] Congenital cataract seems to affect the quality of sensory information available for the child during sensitive periods of visual system development resulting in permanent visual defects[3]. It has been reported to be hereditary as a non-syndrome ocular abnormality in 8.3%–25%

of cases, with 75% being autosomal dominant[4] or associated with other ocular or multisystem diseases; ; and could be unilateral or bilateral. They could be classified based on morphology, etiology, existence of metabolic disorders, or associated ocular abnormalities or systemic findings. or associated intrauterine infections including rubella, toxoplasmosis, cytomegalovirus, herpes, and syphilis infections[5].

Associated metabolic disorders include Galactosaemia, Fabry disease, Lowe syndrome, hypocalcemia, hypoglycemia and thyroid disorders. Galactosemia is the commonest metabolic disorder that causes congenital cataract[6]. Other syndromic conditions include Down's and Hallermann Strieff Francois syndrome, etc[7].

Prolonged visual deprivation causes permanent visual loss. However, in the early neonatal period, the developing visual system still relies on sub-cortical pathways. During such latent period, visual disturbances do not seem to affect visual outcomes[8]. Timely diagnosis of congenital cataract is of help in the improving of useful vision, managing amblyopia as well as visual rehabilitation. The knowledge of likely etiological cause of congenital cataract such as rubella infection could be helpful in preventing pediatric blindness. The demographic and morphological characteristics of cataract can help establish the etiology, post-operative outcome and visual prognosis[9].

The aim of the present study was to study the prevalence, the epidemiological aspects and clinical profile of pediatric cataract in Mansoura ophthalmic center, Mansoura University, Egypt.

PATIENTS AND METHODS:

The present study was a retrospective, analytical study which involved children diagnosed as pediatric cataract attending Mansoura Ophthalmic Center, Mansoura University, Egypt within the period from January 2016 till January 2021. The study was approved by the institutional review board (IRB), Faculty of Medicine, Mansoura University, (code number MS. 21.4.1483). The study Included all children (≤18 years) from Dakahlia government diagnosed with cataract and had cataract extraction with or without IOL implantation. Records with incomplete data were excluded from the study. Also, Patient from other government were excluded from the study. The study was retrospective, and all data were collected from the available data in patients' sheets.

All included records were reviewed for obtaining epidemiological, clinical, and surgical data. Epidemiological data included age, gender of children, age of presentation and presenting symptom (leukocoria, squint, decreased visual acuity, routine examination), Consanguinity of the parents, history of low birth weight, prematurity and admission to neonatal ICU, prenatal history (any febrile disease, medications, vaccination, exposure to irradiation or pre-eclampsia), family history of similar conditions and association of systemic diseases or syndromes.

Etiology of cataract was reported as (Congenital – Hereditary - Genetic syndrome – Traumatic - Intra uterine infection - Complicated – Metabolic).

Full ocular examination results were recorded including laterality, external appearance (presence of Nystagmus, strabismus or leukocoria). Examination was done using EUA (examination under general anesthesia) in uncooperative children. Visual acuity assessment: using landolt's broken ring chart and then converted to Log MAR in older verbal patients. VA was measured using fixation methods or Cardiff cards in preverbal children. Anterior segment examination: as regard; conjunctiva, cornea, sclera, anterior chamber, pupil, and iris configuration. Type of cataract morphology using slit lamp. posterior segment examination findings were recorded and other ocular and systemic anomalies. Corneal diameter measuring using caliper and IOP measuring using applanation tonometer. As regard investigations, keratometry to recorded K reading, B-scan was performed to evaluate posterior segment and rule out any intraocular pathological condition like PHPV or Retinoblastoma. Axial length by A scan and IOL power calculation were recorded. Surgical data were recorded as regard surgical approach (anterior or posterior), IOL implantation **as:** Acrylic IOLs, Polymethyl methacrylate (PMMA) IOLs, Silicone IOLs. Site of implantation**:** posterior chamber (in the bag implantation, sulcus implantation),

anterior chamber (iris fixation) and scleral fixation. and any intraoperative complications as: bleeding, posterior capsule tear.

Statistical analysis:

Data was analyzed by Statistical package for Social Science (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, V 25.0. Armonk, NY: IBM Corp.). Data were expressed and appropriate analysis was performed according to data type for each parameter. Kolmogorov Smirnov test was performed to test normality of data distribution. Means, Standard deviations (± SD) and ranges were utilized to express numerical data. Student T Test and ANOVA were utilized to evaluate the statistical significance of the difference between 2 groups and more than two groups respectively. Chi-Square test was utilized to assess the correlation between 2 qualitative variables. Fisher's exact test was utilized to assess the correlation between 2 qualitative variables when the expected count is < 5 in more than 20% of cells. A p value is considered significant if <0.05 at confidence interval 95%.

RESULTS:

The current study included 160 eyes of 124 children with pediatric cataract, during the period from January 2016 to January 2021. Their mean age was 7.6 years and ranged from 2 months to 17 years; They were 81 males (65.3%) and 43 females (34.7%). Mean age at presentation was 6 years, ranged from since birth till 17 years; 27.4% presented younger than 6 months, 4.8% aged from 6 months till 2 years, 21.8% from 2.5 till 6 years and 46% aged from 7 to 17 years *(table1)(figure1).*

Table (1): Demographics of the study papulation.

Parameter			Patients (n=124)	
Age (year)		**Mean**	7.6	(0.2-17)
	2-6 months	**N, %**	10	8.1%
	6 months-2 years	**N, %**	18	14.5%
	2.5-6 years	**N, %**	29	23.4%
	7-17 years	**N, %**	67	54.0%
Gender	**Male**	**N, %**	81	65.3%
	Female	**N, %**	43	34.7%
Age of presentation (years)		**Mean**	6	since birth-17
Age of presentation	**0-6 months**	**N, %**	34	27.4%
	6 months-2 years	**N, %**	6	4.8%
	2.5-6 years	**N, %**	27	21.8%
	7-17 years	**N, %**	57	46.0%

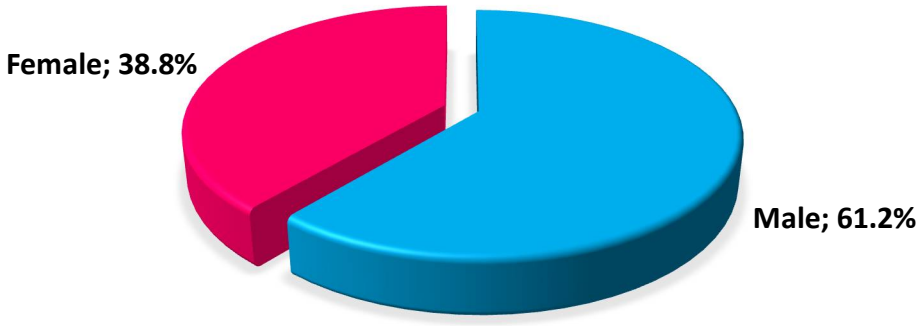

Figure (1). Gender distribution among all studied cases

Most of patients had no systemic association (85.5%); while 4% had associated bronchial asthma, 1.6% had Down syndrome, 1.6% had epilepsy, 1.6% had brain atrophy, 1.6% had Marfan's syndrome, 0.8% had hydrocephalus, 0.8% had G6PD deficiency, 0.8% had VSD, 0.8% had cerebral palsy, and 0.8% had anemia (table 2)

Table (2): Association of systemic diseases.

	Patients (n=124)	
	N	**%**
No systemic association	106	85.5%
Bronchial Asthma	5	4.0%
Down syndrome	2	1.6%
Epilepsy	2	1.6%
brain atrophy	2	1.6%
Marfan syndrome	2	1.6%
Hydrocephalies	1	0.8%
G6PD anemia	1	0.8%
VSD	1	0.8%
Cerebral palsy	1	0.8%
Anemia	1	0.8%

Table (3) shows cataract etiology among all eyes, 41.3% of cases had congenital cataract, 53.1% had traumatic cataract (33.1% penetrating trauma and 20.0% blunt trauma) and 5.6% had complicated cataract**.** Cataract morphology among congenital cataract cases where 21.2% total cataract, 18.7% anterior polar cataract, 16.8% posterior polar cataract , 15.0% lamellar cataract , 9.3% nuclear cataract , 9.3% blue dot cataract and9.3% nuclear and posterior subcapsular cataract (table 3)(figure2).

Table (3): etiology of cataract and morphological characteristics among congenital cataract cases.

		Eyes (n=160)	
		N	**%**
Type of cataract	**Congenital**	66	41.3%
	Traumatic	85	53.1%
	Complicated	9	5.6%
		Congenital **n=66**	
		N	**%**
Total cataract		20	30.3%
Anterior polar cataract		10	15.1%
Posterior polar cataract		9	13.6%
Lamellar cataract		8	12.1%
Nuclear cataract		6	9.0%
Blue dot cataract		5	7.5%
Nuclear and posterior subcapsular cataract		6	9.0%

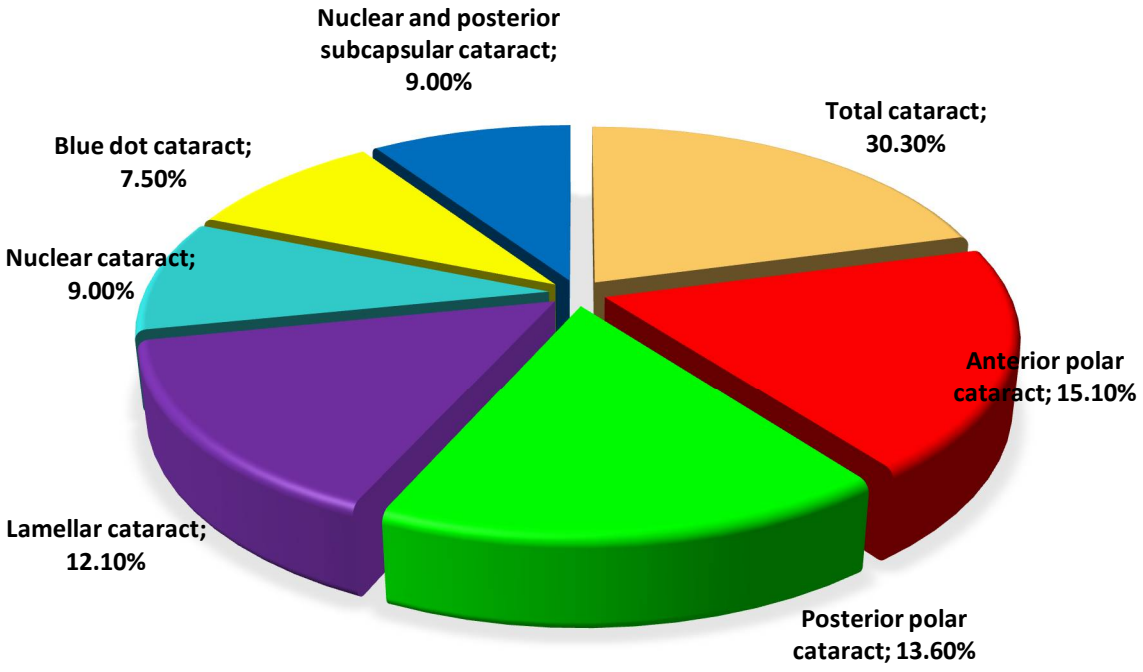

Figure (2). Cataract morphology among all studied cases.

Most of cases were free of nystagmus or strabismus (86.2%) . While 2.5% had nystagmus. Exotropia was found in 5.0%; esotropia was found in 6.2%. (Table 4).

Table (4): External appearance.

	Cases (n=160)	
	N	**%**
Normal	138	86.2%
Nystagmus	4	2.5%
Exotropia	8	5.0%
Esotropia	10	6.2%

Visual acuity was assessed by Log MAR. It was 0.8 in 5.0%, 1 in 5.0%, 1.1 in 4.3%, 1.2 in 2.5%, 1.3 in 1.8%, 1.4 in 21.8%, 1.5 in 20.6% and can't be assessed 38.7% and reported in table (5).

Table (5): Uncorrected visual acuity.

		Eyes (n=160)	
		N	**%**
visual acuity	**0.8**	8	5.0%
	1	8	5.0%
	1.1	7	4.3%
	1.2	4	2.5%
	1.3	3	1.8%
	1.4	35	21.8%
	1.5	33	20.6%
	Can't be assessed	62	38.7%

Anterior chamber was examined in all studied cases; 85.0% were normal depth with normal content, 1.2% had Iris atrophy, 1.8% had iridodialysis, 5.0% had synechiae (anterior and posterior), 1.2% had persistent pupillary membrane, 5.6% had Lens matter in AC. Posterior segment was also examined among all studied cases, it was normal in 86.8% of all studied cases, 8.7% had tigroid fundus. Other findings included myopic changes, pale optic disc, PHPV, retinal hemorrhage (table 6)

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Table (6): Anterior chamber and posterior segment examination.

	Eyes (n=160)	
	N	**%**
Normal depth with normal content	136	85.0%
Iris atrophy	2	1.2%
Iridodialysis	3	1.8%
Synechiae (anterior and posterior)	8	5.0%
persistent pupillary membrane	2	1.2%
Lens matter in AC	9	5.6%
	N	**%**
Normal	139	86.8%
tigroid fundus	14	8.7%
myopic changes	2	1.2%
pale optic disc	3	1.8%
PHPV	1	0.6%
retinal hemorrhage	1	0.6%

Mean (±SD) of IOP was 15.5±2.6 mmHg (table 10). Mean (±SD) corneal diameter was 11.3±0.67 mm. Mean K (mean±SD) of the assessed cases was 43.5±2.٤, axial length was 22.3±2.1; IOL was 24.4±7.6, (table 7) (figure3).

Cases were subjected to B scan ultrasonography, most of them were normal (91.8%) , vitreous opacities in 2.5%, opened posterior capsule in 4.3%, minimal vitreous hemorrhage in 0.6% and Tractional epiretinal membrane 0.6% (table 7) .

Table (7): Intraocular Pressure, Biometric value and B scan by Ultrasonography.

	Eyes (n=160)	
	mean±SD	
Measurement of IOP using Perkins application tonometer	15.5±2.6 mmHg	
Mean K	43.5±2.٤	
Axial length	22.3±2.1	
IOL power	24.4±7.6	
Corneal diameter (mm)	11.3±0.67	
	N	**%**
Normal	147	91.8%
Minimal vitreous He	1	0.6%
Vitreous opacities	4	2.5%
opened posterior capsule	7	4.3%
Epiretinal membrane	1	0.6%

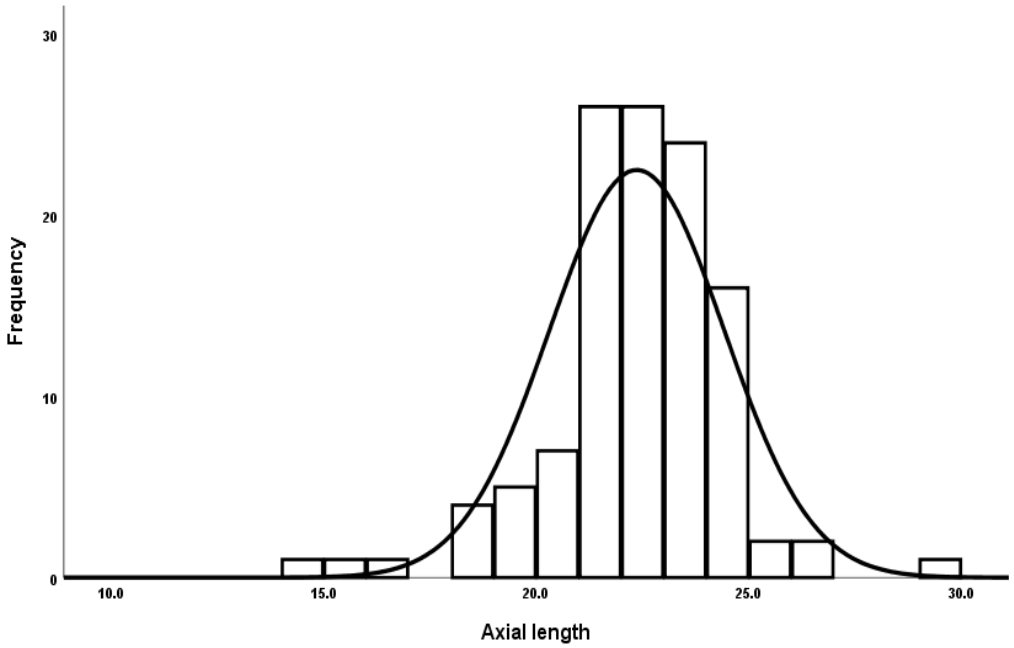

Figure (3). Axial length among all studied cases.

All studied eyes were subjected to surgical approaches, Anterior approach in 88.7%, 50.6% out of those was done with vitrectomy and 38.1% without vitrectomy and posterior approach in 11.25%.

74.3% were associated with IOL implantation and 25.6% without IOL implantation table (١1). In cases with IOL implantation all of them were implanted in the capsule bag. Iridoplasty was done in 4 cases (2.5) % with traumatic cataract and synechiolysis in 18 cases (11.2) % (table 8) (figure 4).

Table (8): Types of surgical approach.

			Eyes (n=160)	
			N	**%**
Type of surgical approach	**Anterior approach**	**with vitrectomy**	81	50.6%
		without vitrectomy	61	38.1%
	posterior approach		18	11.25%
With or without IOL implantation	**with IOL implantation**		119	74.3%
	without IOL implantation		41	25.6%

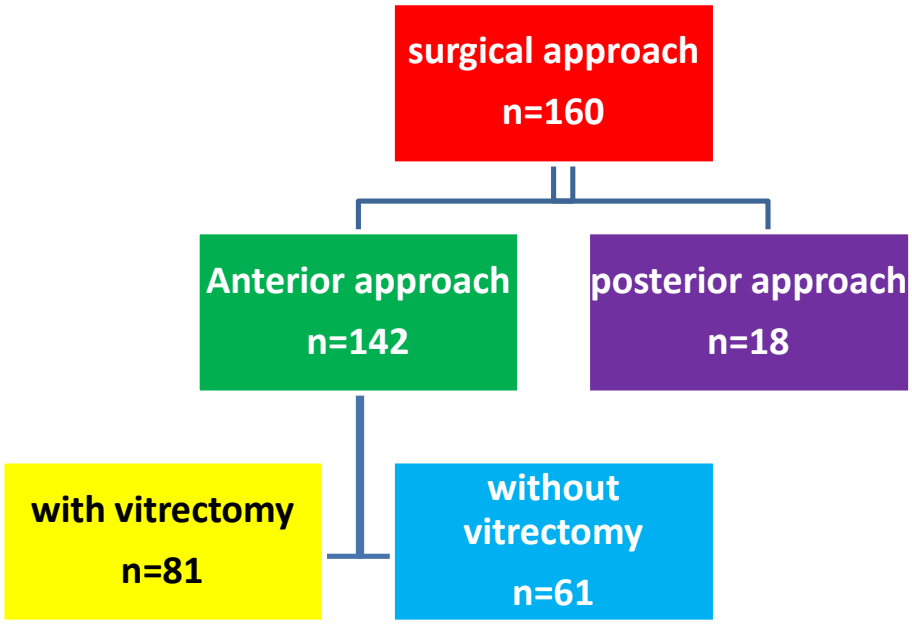

Figure (4): Types of surgical approach among all studied cases.

DISCUSSION:

Congenital and childhood cataracts are not common however frequently observed in most pediatric ophthalmology clinics. They are usually related to significant visual loss with a large percentage has a genetic etiology, some with profound extra-ocular comorbidities. Proper diagnosis and management often necessitate close collaboration within multidisciplinary teams. Surgical treatment is still the mains treatment. Various operative procedures, timings of intervention and optical correction options are available making treatment seem complex for clinicians infrequently seeing involved children[10].

This study evaluates the prevalence, the epidemiological aspects and clinical profile of pediatric cataract in Mansoura ophthalmic center, Mansoura University, Egypt.

The present study enrolled 160 eyes of 124 patient with pediatric cataract, from January 2016 to January 2021. 124 patients of pediatric cataract were included in this study after fulfillment of the inclusion criteria. The mean age at presentation was six years, ranged from since birth till 17 years; 27.4% presented younger than 6 months, 4.8% aged from 6 months till 2 years, 21.8% from 2.5 till 6 years and 46% aged from 7 to 17 years. Among all studied cases, 71% had unilateral cataract, while 29% had bilateral cataract. In consistence with our findings, CM et al showed that pediatric cataracts were more in age group beyond 5 years (66.09%) with 61.74% being unilateral[11]. Also, Adhikari and Shrestha studied a total of 178 eyes of 120 children. demonstrated that mean age of pediatric patients with cataract was 6.9 years (±3.6 SD). There were eight children below the age of 2 years and four children below 6 months[12].

Furthermore, we found that most of studied cases had no systemic association (85.5%); while 4% had associated bronchial asthma, 1.6% had Down syndrome, 1.6% had epilepsy, 1.6% had brain atrophy, 1.6% had Marfan's syndrome, 0.8% had hydrocephalus, 0.8% had G6PD deficiency, 0.8% had VSD, 0.8% had cerebral palsy, and 0.8% had anemia .

In agreement with our results, previous studies demonstrated that the prevalence of cataracts associated with Down's syndrome in children falls between 1 and 13%[13,14].

A study by Singh et al showed that congenital cataract could be a part of various generalized syndromes as Pierre Robin syndrome, Smith-Lemli-Opitz syndrome, Down's syndrome, Lowe syndrome, as well as Warburg syndrome[15].

Ambroz et al demonstrated that analysis of the personal medical history revealed that 31.7% (20 patients) presented with extraocular and ocular anomalies or diseases[16].

Regarding cataract etiology among all studied eyes, 41.3% of eyes had congenital cataract, 53.1% had traumatic cataract and 5.6% had complicated cataract. Found that the incidence of traumatic cataract was 13.19% of all pediatric cataract patients [17]. Higher rate of traumatic cataract in the present study might be due to the fact that Mansoura university Hospital being a tertiary referral center with general anesthesia facility and 24 h emergency service.

Tartarella et al showed that of the 207 patients, 150 (72.5%) had idiopathic cataract. Among these 150 cases, 74 (49.3%) had bilateral cataract. Infectious etiology was present in 18 patients (8.7%). Congenital rubella occurred in 14 patients (6.8%) and accounted for 77.8% of the cases in which infection was identified as the etiology[18].

Most of cases were free of nystagmus or strabismus (86.2%). While 2.5% had nystagmus. Exotropia was found in 5.0%; esotropia was found in 6.2%. indicating the early diagnosis of cataract.

Adhikari and Shrestha showed that on presentation, nystagmus existed in 17.9% while strabismus existed in 12.3% of eyes[19].

In one study, congenital cataracts which underwent lensectomy, strabismus existed in 54.8% of children while esotropia was found in 64.7% of them[20].

A study by Singh et al showed that the most common ocular association was nystagmus (41/109). Nine patients had esotropia, while 5 patients presented with exotropia[21].

As regard cataract morphology the present study showed that among all studied congenital cataract cases., 30.3% had total cataract, 15.1% had Anterior polar cataract, 13.6% had Posterior polar cataract, 12.1% had Lamellar cataract, 9.0% had Nuclear cataract, 7.5% had Blue dot cataract, and 9.0% had Nuclear and posterior sub capsular cataract.

Previous studies by Long et al demonstrated that in decreasing order, the types and subtypes of cataract were total (144, 32.9%), nuclear (133, 30.4%), polar (94, 21.5%, including 2 sub-types [anterior 35, 8.0% and posterior 59, 13.5%]), lamellar (42, 9.6%), nuclear combined with cortical (21, 4.8%, including 3 sub-types [coral-like 7, 1.6%, dust-like 12, 2.8%, and blue-dot 2, 0.5%]), cortical (2, 0.5%), and Y suture (2, 0.5%)[22].

In one series, 1804 of 2633 (68%) children had total cataract[23].

Anterior chamber was examined in all studied cases; 85.0% were normal depth with normal content, 1.2% had Iris atrophy, 1.8% had iridodialysis, 5.0% had synechiae (anterior and posterior) , 1.2% had persistent pupillary membrane , 5.6% had Lens matter in AC. Posterior segment was examined among all studied cases, It was normal in 86.8% of all studied cases, 8.7% had tigroid fundus . Other findings included myopic changes, pale optic disc, PHPV, retinal hemorrhage.

A study by Singh et al showed that nystagmus was the commonest association (41/109). Nine cases presented with esotropia, whereas five cases had exotropia. Congenital nasolacrimal duct obstruction existed in 6 (5.5%) of cases. Also, posterior lenticonus was detected in a similar number of patients. Less frequently associated findings were ROP, microspherophakia, vitreous hemorrhage, retinal detachment, and choroidal coloboma[21].

Mean (± SD) corneal diameter was 11.3 ± 0.67. Mean K (mean ± SD) power of the assessed cases was 43.5 ± 2.٤, axial length was 22.3±2.1mm; IOL was 24.4±7.6 diopter.

Two dimensional B-scan ultrasound could be used for diagnosing hidden posterior segment lesions and could be done routinely in pre-operative cataract cases, as this would be helpful for surgical planning[24]. In our study, All studied cases were subjected to B scan ultrasonography, most of them were normal (91.8%), minimal vitreous hemorrhage in 0.6%, opened posterior capsule in 4.3%, vitreous opacities in 2.5% and epiretinal membrane 0.6%.

Rafi et al studied 204 Patients with congenital cataract on B-Scan Ultrasonography 17 eyes (7.17%) showed finding suggestive of posterior segment pathology while two 212 (92.83%) eyes showed no pathology in posterior segment in patient with congenital cataract. The most common finding was in the vitreous.5 (2.5%) eyes showed persistent fetal vasculature (PHPV) and 3 (1.5%) showed hemorrhage. Intraocular tumor was present as elevated fundus lesion in 3

(1.5%) eyes. Retinal detachment was present in 1 (0.5%) eye. Detectable optic nerve lesions were present in 4 eyes; in 1 eye (0.5%) there was optic disc drusen, elevated optic disc was present in 2 (1%) and one eye (0.5%) showed cupping. Other demonstrable findings were posterior staphyloma in 1 (0.5%) eye[25].

In our study, all studied cases were subjected to surgical approaches, anterior approach in 88.7% and posterior approach in 11.2%. Out of those subjected to anterior approach, 50.6% with vitrectomy and 38.1% without vitrectomy. Among all studied cases, 74.3% were associated with IOL implantation and 25.6% without IOL implantation.

Xu et al studied Pediatric patients with traumatic cataract to evaluate the etiologies, management, and outcomes of pediatric traumatic cataract in eastern China. They found that of 68 eyes in patients with open-globe injuries who received cataract extraction, IOLs were primarily implanted in 47 eyes (68.12%), whereas of 18 eyes with closed-globe injuries, IOLs were primarily implanted in 17 eyes (94.4%)[26].

Adhikari and Shrestha showed that of 178 eyes, lens aspiration and IOL implantation was performed in only 75 (42%) eyes while in 103 (58%) eyes lens aspiration and anterior vitrectomy with IOL implantation were performed[19].

Special steps in certain cases were iridoplasty (2.5%) and Synechiolysis (11.2%). Koch et al. showed that among the eyes which had post-operative complications, 20 (35.7%) showed one complication, and 9 (16.0%) showed 2 complications. Corectopia was the commonest complication, followed by visual axis opacification (VAO) and intraocular lens (IOL) subluxation[27].

CONCLUSION:

Pediatric cataract cases in our locality represent a common and challenging aspect. Traumatic cataract was the most common followed by congenital cataract. Pediatric cataract surgery has become safer and more predictable. Anterior surgical approach was the most common used management. Early identification, immediate referral, and appropriate management have favorable outcome.

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Abbreviation: AC: Anterior chamber, EUA: Examination under general anesthesia, IOL: Intraocular lens, IOP: Intraocular pressure, G6PD: Glucose-6-phosphate dehydrogenase deficiency, LogMAR: Logarithm of the minimum angle of resolution, PHPV: persistent hyperplastic primary vitreous, VA: Visual acuity, VSD: Visual septal defect

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DATA AVAILABILITY

All data are included in this article.

Conflict of Interest

Authors declare no conflicts of interest.

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Ethics declarations

Conflict of interest

RAHAF M. ALAJAMI, Eman M. El Hefny, Walid M. Gaafar, Dina Abd El-Fattah. all authors have no conflicts of interest that are directly relevant to the content of this review.

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