Original Article

Profile of Pediatric Cataract Seen at Lagos University Teaching Hospital, Nigeria

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Purpose: To describe the characteristics of pediatric cataracts seen at Lagos University Teaching Hospital, Lagos, Nigeria.

Study Design: Retrospective descriptive study.

Place and Duration of Study: Pediatric Ophthalmology Clinic, Department of Ophthalmology (Guinness Eye Centre), Lagos University Teaching Hospital, Lagos, Nigeria between January, 2012 and December, 2015.

Materials and Methods: A retrospective review of the case files of all children below the age of 16 years, who had diagnosis of cataract was done. Information retrieved from the case files included demographics, laterality, duration before presentation, family history of childhood cataract, pregnancy and delivery history, preceding history of trauma, type of cataract, ocular and systemic co-morbidities as well as serological test result for intrauterine infections (in congenital cataract).

Results: Three hundred and thirteen eyes of 210 children with cataract were analyzed. There were 153 (72.9%) non-traumatic cataract and 57 (27.1%) traumatic cataract. The 153 non-traumatic cataract were made up of 78 (37.2%) congenital cataract, 62 (29.5%) developmental cataract as well as 13 (6.2%) complicated cataract. There were 132 (62.9%) males and 107 (50.9%) children had unilateral cataract. Only 79 (37.6%) children presented within three months of the onset of symptoms. One and two children were positive for cytomegalovirus and rubella IgM antibodies respectively. Forty-five (78.9%) out of the 57 children with traumatic cataract sustained ocular injury while playing or being flogged either at home or school.

Conclusion: Trauma and rubella were the main preventable causes of pediatric cataract identified in this study. Late presentation was the case in the majority of the patients.

Keywords: Pediatric Cataract, Lagos, Nigeria, Rubella.

Cataract is the opacification of the crystalline lens and remains one of the main causes of treatable blindness in children[1]. Cataracts are estimated to be present in approximately 1 to 15/ 10,000 children worldwide, accounting for 5 – 20% of childhood blindness.[2] Recent African population based surveys (mostly using key informants) suggest that 15 – 35% of childhood blindness is due to congenital or developmental cataract[3]. Cataract is the main cause of blindness among children in Africa, replacing vitamin A deficiency and measles[4].

Childhood cataract causes more visual disability than any other form of treatable blindness in children[5]. Children with untreated, visually significant cataracts face challenging lifetime blindness at enormous

quality of life and socioeconomic costs to the child, the family, and the society.[5] Unilateral cataracts associated with strabismus and bilateral cataracts associated with nystagmus are usually a reflection of the visual significance of the cataract, especially when intervention is delayed[6,7]. Pediatric cataracts are of immense importance because they have the potential to inhibit maximal visual development, resulting in severe visual impairment and permanent blindness. Hence, early diagnosis and prompt treatment of pediatric cataracts are very important to prevent the development of irreversible stimulus-deprivation amblyopia[7].

Pediatric cataracts are both preventable and treatable. Potentially preventable causes include congenital rubella syndrome, autosomal dominant disease and trauma. Hence, this study was aimed at describing the characteristics of pediatric cataracts seen at the Pediatric Ophthalmology Clinic of Lagos University Teaching Hospital, Lagos, Nigeria with a view to identifying preventable causes for which awareness programs and control strategies could be recommended.

MATERIALS AND METHODS

The case files of all children below the age of 16 years who had diagnosis of cataract at the Pediatric Ophthalmology Clinic of Lagos University Teaching Hospital, Lagos, Nigeria between January, 2012 and December, 2015 were retrieved and retrospectively reviewed. The information extracted from the case files included age at presentation, gender, laterality, main presenting complaint, duration before presentation, family history of childhood cataract, pregnancy and delivery history as well as preceding history of trauma. Other information retrieved included, visual acuity at presentation, type of cataract (chronological, etiological and morphological), ocular co-morbidities, systemic co-morbidities and serological test result for rubella, toxoplasmosis, cytomegalovirus, herpes simplex virus, syphilis and varicella (in congenital cataract). For traumatic cataracts, type of injury, agent of injury, injury environment and injury circumstance were also extracted.

Chronologically, cataracts noticed within the first year of life were classified as congenital cataract while those noticed after one year of life were classified as developmental cataract. Cataracts with underlying intraocular disease such as retinal detachment and uveitis were classified as complicated cataract. Etiologically, pediatric cataracts were broadly classified as traumatic (preceding history of trauma) and non-traumatic. Ethical approval was obtained from the Health Research and Ethical Committee of our institution.

Data obtained was analyzed using the Statistical Package for Social Sciences (SPSS) version 20 (IBM Corp. Armonk, NY). The associations between categorical variables were analyzed using cross-tabulation and chi-square test and a p-value of less than 0.05 was considered statistically significant. Fisher's exact was used where applicable.

RESULTS

Two hundred and ten cases of pediatric cataract were seen during the period under review.Table 1 shows the demographic characteristics and laterality of the pediatric cataract seen in this study. There were 153 (72.9%) non-traumatic cataract and 57 (27.1%) traumatic cataract. The 153 non-traumatic cataract included, 78 (37.2%) congenital cataract, 62 (29.5%) developmental cataract as well as 13 (6.2%) complicated cataract. There were 132 (62.9%) males with a male: female ratio of 1.7:1 while 107 (50.9%) children had unilateral cataract. There were no statistically significant association ($p = 0.92$) between gender and types of cataract (Table 1). Altogether, 313 eyes of 210 patients were studied. The mean age at presentation was 5.6 ± 4.5 years and the median age was 5.0 years. The most common presenting complaint was whitish dot in the eye documented in 115 (54.8%). This was followed by poor vision and ocular deviation in 90 (42.9%) and 3 (1.4%) children respectively.

The most common morphological type of cataract was total cataract documented in 178 (56.9%) out of 313 eyes. This was followed by lamellar, nuclear, cortical and posterior sub-capsular cataract observed in 70 (22.4%), 23 (7.3%), 14 (4.5%) and 10 (3.2%) eyes respectively. Other types of morphological cataract documented were seven (2.2%) eyes each of anterior polar and membranous cataract as well as two (0.6%) each of posterior polar and anterior capsular cataract. Overall, only 79 (37.6%) children presented within three months of the onset of symptoms while 131 (62.4%) children presented after three months (Table 2). Although, presentations were largely late, a large proportion of children with unilateral cataract presented relatively earlier than those with bilateral cataract ($p = 0.00$). However, gender did not have any

statistically significant influence on the duration before presentation (p = 0.47) as shown in Table 3.

Table 1: Demographics and Laterality of Pediatric Cataract.

Demographics/ Laterality	Types of Pediatric Cataract				Total N (%)	p-value
	Traumatic n (%)	Congenital n (%)	Developmental n (%)	Complicated n (%)		
Age Group						
0 – 3	2 (3.5)	63 (80.8)	17 (27.4)	3 (23.0)	85 (40.5)	0.00*
4 – 6	11 (19.3)	9 (11.5)	17 (27.4)	2 (15.4)	39 (18.6)	0.97
7 – 9	19 (33.3)	4 (5.1)	13 (21.0)	4 (30.8)	40 (19.0)	0.002*
10 – 12	16 (28.1)	2 (2.6)	7 (11.3)	4 (30.8)	29 (13.8)	0.001*
13 – 15	9 (15.8)	0 (0.0)	8 (12.9)	0 (0.0)	17 (8.1)	0.03*
Total	**57 (100.0)**	**78 (100.0)**	**62 (100.0)**	**13 (100.0)**	**210 (100.0)**	
Gender						
Female	21 (36.8)	32 (41.0)	18 (29.0)	7 (53.8)	78 (37.1)	0.92
Male	36 (63.2)	46 (59.0)	44 (71.0)	6 (45.2)	132 (62.9)	
Total	**57 (100.0)**	**78 (100.0)**	**62 (100.0)**	**13 (100.0)**	**210 (100.0)**	
Laterality						
Bilateral	0 (0.0)	54 (69.2)	45 (72.6)	4 (30.8)	103 (49.1)	0.00*
Unilateral left eye	26 (45.6)	9 (11.6)	11 (17.7)	3 (23.1)	49 (23.3)	
Unilateral right eye	31 (54.4)	15 (19.2)	6 (9.7)	6 (46.1)	58 (27.6)	
Total	**57 (100.0)**	**78 (100.0)**	**62 (100.0)**	**13 (100.0)**	**210 (100.0)**	

*Statistically significant

Table 2: Duration before Presentation of Pediatric Cataract.

Duration before Presentation	Types of Pediatric Cataract				Total n (%)	p-value
	Traumatic n (%)	Congenital n (%)	Developmental n (%)	Complicated n (%)		
Within a month	15 (26.3)	17 (21.8)	5 (8.1)	1 (7.7)	38 (18.1)	0.09
> 1 month -3 months	14 (24.5)	16 (20.5)	7 (11.3)	4 (30.8)	41 (19.5)	0.35
> 3 months - 6 months	9 (15.8)	9 (11.5)	4 (6.4)	1 (7.7)	23 (11.0)	0.26
> 6 months - 9 months	3 (5.3)	3 (3.9)	1 (1.6)	0 (0.0)	7 (3.3)	0.39†
> 9 months - 1 year	7 (12.3)	7 (9.0)	13 (21.0)	2 (15.4)	29 (13.8)	0.87
> 1 year	9 (15.8)	26 (33.3)	32 (51.6)	5 (38.4)	72 (34.3)	0.001*

Total	**57 (100.0)**	**78 (100.0)**	**62 (100.0)**	**13 (100.0)**	**210 (100.0)**	

* Statistically significant, † = Fisher's exact

Table 3: Association between Gender, Laterality and duration before Presentation.

	Duration before Presentation		**Total (210)**	**p - value**
	Within Six Months (n = 101)	**After Six Months (n = 109)**		
Gender				
Female	35 (44.9%)	43 (55.1%)	78 (100%)	0.47
Male	66 (50.0%)	66 (50.0%)	132 (100%)	
Laterality				
Bilateral	36 (35.0%)	67 (65.0%)	103 (100%)	
Unilateral	65 (60.7%)	42 (39.3%)	107 (100%)	0.00

Out of the 313 eyes with pediatric cataract, 222 (70.9%) eyes had visual acuity worse than 6/60 while another 30 (9.6%) eyes and 15 (4.8%) eyes had their visual acuity documented as less than 6/24 and at least 6/24 respectively (using hundreds and thousands). 15 (4.8%) eyes had a visual acuity of 6/6 to 6/18 while the remaining 31 (9.9%) eyes had a visual acuity of 6/24 to 6/60. Twelve (7.8%) out of the 153 children with non-traumatic cataract had a positive family history of childhood cataract. Five (41.7%) out of these 12 had congenital cataract while the remaining seven (58.3%) had developmental cataract. Still on non-traumatic cataracts, 33 (21.6%) affected children had a positive history of maternal febrile illness in pregnancy. Twenty-five (75.8%) out of these were congenital cataract while the remaining eight (24.2%) were developmental cataracts. Similarly, 9 (5.9%) and one (0.7%) children with non-traumatic cataracts had a positive history of maternal rashes and use of abortifacients respectively in pregnancy. All of them had congenital cataracts. Seven (77.8%) out of the nine children with maternal rashes in pregnancy equally had a positive history of maternal febrile illness in pregnancy. Furthermore, eight (5.2%) children with non-traumatic cataracts had a positive history of maternal ingestion of herbal concoctions in pregnancy. Seven (87.5%) out of these had congenital cataracts while the remaining one (12.5%) had developmental cataract. Ninety-two (35.9%) out of the 256 eyes with non-traumatic cataracts had ocular co-morbidities with nystagmus, strabismus and microphthalmos/nanophthalmos observed in 34 (40.0%), 22 (23.1%) and 18 (19.6%) children respectively (some eyes had multiple ocular co-morbidities) as shown in Table 4. Twenty-six (17.0%) out of the 153 children with non-traumatic cataracts had systemic co-morbidities. The most common systemic co-morbidity was cardiac diseases documented in 10 (38.5%) children, followed by delayed developmental milestones and deafness in 7 (26.9%) and 5 (19.2%) children respectively as shown in Table 4. Out of the 10 children with cardiac diseases, patent ductus arteriosus (PDA) was documented in 6 (60.0%) children being the most common, followed by ventricular septal defect (VSD) and atrial septal defect (ASD) in 3 (30.0%) and 2 (20.0%) children respectively (some children had multiple cardiac diseases). Seventy-five (49.0%) out of the 153 non-traumatic cataracts neither had family history, ocular nor systemic co-morbidities.

The mean age at presentation for congenital cataract was 2.0 ± 2.5 years with a median age of 1.0 year. The youngest was a week old baby while the oldest was 11 years at presentation. Fifty-four (69.2%) out of the 78 congenital cataracts were bilateral. Forty (51.3%) children presented at age one and below. Only 17 (21.8%) out of the 78 congenital cataract presented within a month of noticing the main presenting complaint while 36 (46.2%) presented after six months

(Table 2). Out of the 132 eyes of 78 children with congenital cataract, 83 (62.9%) eyes had total cataract being the most common. This is followed by nuclear, lamellar, anterior polar and membranous cataracts observed in 23 (17.4%), 9 (6.8%), 7 (5.3%) and 5 (3.8%) children respectively. Out of the 40 children with congenital cataract who presented at age one and below, 12 did the TORCH screening test. Out of these 12, 7 (58.3%) were positive for rubella IgG antibodies but only 2 (16.7%) were positive for rubella IgM antibodies. Similarly, 4 (33.3%) children were positive for cytomegalovirus IgG but only one (8.3%) child was positive for the IgM antibodies. Furthermore, five (41.7%) and one (8.3%) children had a positive IgG for herpes and toxoplasmosis respectively but none of them had positive IgM.

There were 107 eyes of 62 patients with developmental cataract. The mean age was 6.6 ± 4.1 years and 45 (72.6%) had bilateral cataract. The most common morphological type of cataract was lamellar observed in 61 (57.0%) eyes followed by total and cortical cataract documented in 39 (36.4%) and three (2.8%) eyes respectively. Two (1.9%) eyes each with developmental cataract had membranous and posterior sub-capsular cataract respectively. Seventeen eyes of 13 children had complicated cataract with a mean age of 7.4 ± 3.7 years. Nine (69.2%) out of the 13 children had unilateral cataract. Total, posterior sub-capsular and cortical cataracts were seen in 14 (82.4%), two (11.7%) and one (5.9%) eyes respectively. Seven (41.2%) eyes with complicated cataract had co-existing retinal detachment while the remaining 10 (58.8%) were post-uveitic with seclusion pupillae. Only three (23.1%) children out of the 13 with complicated cataract had systemic comorbidities. The systemic comorbidities were deafness, delayed developmental milestone and human immunodeficiency virus (HIV) infection.

There were 57 children with traumatic cataract. All (100.0%) of them had unilateral cataract ($P < 0.01$) as shown in Table 1 and the mean age at presentation was 9.1 ± 3.8 years. The youngest was a year old child who was inadvertently hit by a belt in the eye while the parents had a fight. The most common morphological type of cataract was total documented in 42 (72.4%) eyes. This was followed by cortical, posterior sub-capsular and anterior capsular cataract in seven (12.1%), six (10.3%) and two (3.4%) eyes respectively. Forty-five (78.9%) cases were associated with closed globe injuries while 52 (91.2%) children sustained ocular injury at home or school as shown in Table 5. The trauma circumstances were during playing or flogging in 45 (78.9%) children while wood, stick, broom, cane or belt were the most common agents of injury documented in 29 (50.9%) children. Overall, forty-five (78.9%) out of the 57 children with traumatic cataract sustained ocular injury while playing or being flogged either at home or school.

Table 4: Ocular and Systemic Co-morbidities in Non-traumatic Cataract Patients.

Ocular and Systemic Co-Morbidities	Frequency	Percentage
Ocular Co-morbidities in 92 eyes		
Nystagmus	34	40.0
Strabismus	22	23.9
Microphthalmos/ Nanophthalmos	18	19.6
Seclusiopupillae	15	16.3
Retinal detachment	7	7.6
Corneal opacity	5	5.4
High myopia	5	5.4
Persistent fetal vasculature	2	2.2
Aniridia	2	2.2
Others	2	2.2
Systemic Co-morbidities in 26 Children		
Cardiac diseases	10	38.5
Delayed developmental milestone	7	26.9
Deafness	5	19.2
Seizure disorders	2	7.7
HIV infection	2	7.7

Down syndrome	1	3.8
Others	2	5.0

*Some eyes and children had multiple ocular and systemic co-morbidities respectively.

Table 5: Characteristics of Traumatic Cataract.

Ocular co-Morbidities	Frequency	Percentage
Trauma Type		
Closed globe injury	45	78.9
Open globe injury	12	21.1
Total	**57**	**100.0**
Trauma Environment		
Home	33	57.9
School	19	33.3
Farm	1	1.8
Not recorded	4	7.0
Total	**57**	**100.0**
Trauma Circumstances		
Playing	34	59.6
Flogging	11	19.3
Others	7	12.3
Not recorded	5	8.8
Total	**57**	**100.0**

DISCUSSION

This study recorded a mean age of 5.6 years for pediatric cataract. This was within the range of 5.1 years and 7.1 years documented in previous studies from Nigeria, Ethiopia and India[8-11]. However, a higher mean age at presentation of 11.1 years was reported in Bosnia and Herzegovina[12]. This has been attributed to unavailability of cataract surgical services during the war period, lack of information and poor socio-economic background. The preponderance of non-traumatic cataracts (NTC) over traumatic cataracts compares favorably with the observations of Halilbasic et al[12], Johar et al[13] and Randrianotahina et al[14]. Late presentation was rampant in this study with over 60% presenting after three months of the onset of symptoms, more so that over 90% of the cataracts were visually significant. In fact, this study recorded a child with bilateral congenital cataract with nystagmus presenting at the age of 11. Similar experiences of late presentation were documented in previous studies from Nigeria[9,15], Bosnia-Herzegovina[12] and Tanzania[16]. Late presentation could lead to the development of stimulus deprivation amblyopia with attendant effect on visual outcome after surgical intervention. Furthermore, late presentation suggests barriers to early presentation. Mwendeet al[16] attributed the late presentation in their study to awareness of the problem (and surgical intervention), access to surgical services or acceptance of surgical services. Unfortunately, barriers to early presentation could not be analyzed in this study because they were not documented in most patients' record. To this end, there is a need for a prospective study to unravel these barriers to early presentation with a view to plan a result-oriented awareness and health education campaign. In spite of the rampant late presentation, children with unilateral cataract significantly presented earlier than those with bilateral cataract. This was contrary to the observation of Mwende et al[16] who found no association between laterality of cataract and duration before presentation. This is surprising as one would have expected the bilateral cataract to present earlier. However, this could be explained by the difference in study design because Mwende et al[16] only analyzed NTC and the cut-off for late presentation was 12 months compared to six months in this study. Furthermore, the unilateral nature of all the traumatic cataracts in this study could have influenced a relatively early presentation as trauma could be associated with inflammatory eye symptoms like redness, photophobia and pain which could be scary for the parents and caregivers. However, gender did not influence the duration before presentation as reported by Mwendeet al[16].

Overall, there were more males with pediatric cataracts compared to females similar to observations in previous studies[8-19]. This study recorded more unilateral cataracts in children. This compares favorably with the observations of Randrianotahina et al[14], Lim et al[18] and Khandehar et al[19]. Haargaard et al[17] and Wirth et al[20] however, documented more

bilateral cases. This disparity could be explained by the inclusion/exclusion criteria as the studies which included traumatic cataracts while those with more bilateral cataracts excluded traumatic cataract. Trauma has been known to be a significant cause of monocular cataracts. In fact, if traumatic cataracts were excluded from this study, there would have been more bilateral cataracts as nearly 70% of congenital cataracts and over 70% of developmental cataracts in this study were bilateral. The preponderance of bilateral involvement in congenital cataract in this study was similar to the findings of Rana et a[21], Naz et al[22] and Nadeem et al[23].

In this study, 7.8% of the NTC had a positive family history of childhood cataract. However, the pattern of inheritance could not be ascertained because of the lack of pedigree charts in the files of the patients. There were one and two cases of laboratory confirmed (IgM positive) cytomegalovirus and rubella respectively although more chilren tested positive for their corresponding IgG including Herpes Simplex and toxoplasmosis. Intuitively, these proportions could have been more if all the 40 children with congenital cataracts seen at age one and below had done the TORCH screening. Rubella is particularly relevant for being a preventable cause of congenital cataract since the vaccine is available in Nigeria but not part of the national immunization coverage for school aged girls and women of child bearing age. To this end, the determination of the seroprevalence of rubella in children with congenital cataracts could be an important advocacy tool for the clamour for inclusion of rubella vaccination in the Nigerian national vaccination program.

The most common systemic co-morbidity in this study was cardiac diseases while the most common cardiac disease was patent ductus arteriosus. This finding compares favorably with the findings of Duke et al[8]. Congenital heart diseases as well as mental retardation, deafness and seizure disorders are common features of the disease entities that form the acronym "TORCH" infection.

Traumatic cataract was more common in boys compared to girls. This agrees with findings in previous studies by Tomkins et al[10], Johar et al[13] and Gogate et al[24]. This is not surprising because boys are known to engage in rough play and activities that could attract punishment from parents or other care-givers. All the 57 cases of traumatic cataracts in this study were unilateral. This was similar to the observation of Xu et al[25]. However, Gogate et al[24] reported a case of bilateral traumatic cataract in a ten-year old girl following a fall from a height. Furthermore, closed globe injury was more associated with traumatic cataract in this study similar to the observations of Johar et al[13] and Gogate et al[24] although Xu et al[25] documented more open globe injury related pediatric traumatic cataracts. Nearly 80% of the children with traumatic cataract sustained the ocular injuries while playing or being flogged either at home or in the school. These were inadvertent ocular injuries sustained while engaging in rough and unsupervised rough play as well as while being punished for perceived misbehaviour by the parents, teachers and other care givers. This calls for a better supervision of children while playing as well as the need to devise other punitive measures apart from corporal punishment when a child is deemed to have misbehaved. Johar[13] et al also reported that 80% and 20% of the pediatric traumatic cataracts in their study were play and work-related respectively.

CONCLUSION

In conclusion, trauma and rubella were the main preventable causes of pediatric cataract identified in this study. Late presentation was the case in the majority of the patients. This preventable attitude could affect the visual outcome after intervention.

Conflicts of Interest: There are no conflicts of interest.

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