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Causes and Pattern of Eye Diseases in Children Attending the Pediatric Eye Unit of Ahmadu Bello University Teaching Hospital, Shika, Zaria

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ABSTRACT

Aim: The purpose was to determine the causes and pattern of eye diseases in children 0-15 years of age who attended the paediatric unit of the Ophthalmology department Ahmadu Bello University Teaching Hospital Shika, Zaria with a view of obtaining data for planning of children eye care.

Method: This was a descriptive cross-sectional study. All children that met the inclusion criteria were recruited. Subjects had visual acuity assessments as appropriate for age. Anterior segment examination was done using a loupe or slit lamp biomicroscope as appropriate while posterior segment was examined by direct ophthalmoscopy. Manual refraction was done using streak retinoscope (cycloplegic refraction when required).

Result: A total of 12,516 patients attended the Ophthalmology out-patient clinic of the hospital during the 30- month study period (May 2014- Oct. 2016), 1,760 old and new patients (14.1%) were patients 0- 15 years of age (study population). A total of 448 children were recruited for the study. The male to female ratio M: F was 1.3:1. Allergic conjunctivitis 181 (40.4%), refractive error 42 (9.4%) and infective conjunctivitis 39 (8.7%) were the most common ocular disorders seen. The prevalence of visual impairment was 34.4%. Trauma was the most common cause of uniocular visual impairment. The proportion of blind eyes was 3.1% (n=12).

Conclusion: Majority of the ocular disorders seen among the children were treatable causes of visual impairment. Public health education is necessary to create awareness on the causes of blindness. However, there was no statistically significant difference in the ocular disorders with respect to age and gender of the children.

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Introduction

Good vision is very important. The social, psychological, educational, and intellectual development of children into healthy adulthood is contingent on good vision [1]. Greater than half of a child's learning come through visual stimulation [2]. Globally, about 13.5million children had visual problems n 2009 of which 1.26million were bilaterally blind [3-4]. In India the economic burden of blindness was US $4.4 billion with childhood blindness accounting for greater than a quarter of this (28.7%) [5].

Differences in the social, ecological, economical and health status from one region/ country to the other may account for variations in the causes of visual morbidities across the world as well as between developed and developing countries [4].

Whereas, childhood biologically is defined as the period between birth and puberty there is debate on the definition of childhood by age. Legally, the term "child" may refer to anyone below the age of majority or some other age limit [5]. In Singapore, childhood is taken to be the period 14 years and below, in the United Kingdom the year of consent is set as 16 years [5]. The United Nations Convention on the Rights of the Child defines child as "a human being below the age of 18 years subject to domestic laws in various countries [6]. Meanwhile, the United Nations International Emergency Fund (UNICEF) adopted the age of 15 years as the upper limit of childhood with respect to childhood abuse [7].

In Nigeria, about 41.83% of the total population are children less than 15 years of age [8].The Universal health coverage remains sub-optimal with less than 30% coverage. With a high under –five mortality rates of 143 children death per 1000 live births in 2010, it's underscores the low immunization coverage in the country which remains lower than the global benchmark [9-10]. Thus, Nigerians still suffer from preventable and treatable diseases, ocular conditions inclusive.

This study was aimed at determining the causes and pattern of eye diseases in children under 15 years of age who attended the paediatric unit of the Ophthalmology Department of Ahmadu Bello University Teaching Hospital, Shika, Zaria with the aim of getting data for planning of children eye care in the hospital and in similar hospitals around the area.

Materials and Method

This was a descriptive cross-sectional study conducted on all children under 15 years of age who were referred or presented to the paediatric Ophthalmology clinic of ABUTH, Zaria from May 2014 to October 2016 (a 30-month period)

The study sample size was calculated using the Cochran's

formula[10] $n = \frac{z2pq}{d2}$

where n = desired sample size,
Z = standard normal deviate, set as 1.96 which corresponds to 95% confidence interval,
P = prevalence taken as 50% (0.5),
q = 1.0-p = 0.5,
d = desired level of precision taken as 5% (0.05),
thus n = 3.8416 x 0.5 x 0.5/0.0025 = 384.
Attrition rate taken as 15% therefore,
minimum sample size is 384+ 57 = 441.Total number of subjects sampled = 448

Inclusion Criteria

Children 15 years of age and below presenting to the paediatric Ophthalmology clinic with informed consent by the parents/ guardians and who gave assent/willingness to participate.

Exclusion Criteria

Children above 15 years of age, follow up cases and those who declined to participate were excluded from the study.

Ethical approval was obtained from the Health Research Ethics Committee (HREC) of Ahmadu Bello University Teaching Hospital Shika, Zaria. The informed consent of the parents'/ guardians was obtained, as well as the assent of the children that participated in the study. The study was conducted in accordance with the tenets of Helsinki declaration.

Study Definition

1. A diagnosis of congenital disease was made when the disease was present since birth and other diseases were diagnosed as acquired.
2. Refractive error: myopia was recorded if refractive error was worse than –0.5 DS (dioptre sphere), worse than +0.5 DS in hypermetropia and was worse than +0.5 DC (dioptre cylinder) for astigmatism
3. Vernal conjunctivitis: redness and/or pigmentation with presence of conjunctival papillae on the upper tarsal conjunctiva and/or limbal infiltration/papillae with/without secretions [11].
4. Infective/ microbial conjunctivitis: conjunctival hyperemia, lacrimation, irritation, and discharge [12].
5. Visual impairment: mild or nil: vision equal to or better than 6/18, moderate: vision between 6/18-6/60, severe: vision 6/60-3/60, blindness: vision less than 3/60 or nil light perception
6. Glaucoma: glaucoma was defined as fundus findings of vertical cup disc ratio of ≥ 0.50 or asymmetry of ≥0.2 between the two eyes with or without increased intraocular pressure, with associated visual field changes [13].

Procedure

- Patients who met the inclusion criteria had appropriate visual acuity assessment for age, anterior segment examination (with slit lamp Haag Streit,BM 900, Germany) and posterior segments examinations with ophthalmoscopes (HeineR Beta 200, Germany).
- Refractive errors (V.A < 6/12 with improvement of 2 or more lines with pin hole) had streak retinoscopy + subjective refraction (cycloplegic and non- cycloplegic) as required.
- The data were collected, stored and analysed by using Statistical Package for Social Sciences version 20.0 (IBM SPSS statistics, Chicago, Illinois, USA).

Results

A total of 12,516 patients attended the Ophthalmology out-patient clinic of the hospital during the 30- month study period (May 2014- Oct. 2016) 1,760 were children less than 15 years of age (study population). giving a prevalence of (14.1%)

Majority of the children that participated in the study were between the ages of 0-4 years 56.4% (n=252) Males constituted 58.0% (n= 260) and most of the participants were from the Hausa ethnic group 79.5% (n=356) Table 1.

Table 1: Socio-demographics of 448 children 0-15 years of study population

Characteristics	Frequency (percentage) (n= 448)
Age	
0-4	252 (56.3)
5-9	108(24.1)
10-15	88 (19.6)
Sex	
Male	260 (58.0)
Female	188(42.0)
Ethnic distribution	
Hausa	356 (79.5)
Yoruba	20(4.5)
Igbo	12(2.7)
Others	60(13.4)
Informants	
Father	68(15.2)
Mother	356(79.5)
Siblings	16(3.6)
Relative	4(0.9)
Others	4(0.9)

Moethan 50% of the study population were children 4years and below. Almost 80% of the informants were the participants' mothers

Allergic conjunctivitis 40.4% (n =181) was the commonest disease observed followed by refractive error 9.4% (n=42) and microbial conjunctivitis 8.7% (n = 39) (Tables 2, 3) Equal number of patients had congenital cataract and congenital glaucoma in this study with 6.3% (n= 28) and they constituted the most common congenital ocular abnormalities observed. Multiple congenital anomalies and retinoblastoma were 3.6 % (n=16) and 1.8% (n=8) respectively. The causes of blindness in 12 eyes amongst verbal children 5-15 years were cortical visual impairment, congenital cataract, retinoblastoma and penetrating eye injuries (Table 3)

Table 2: Diagnosis of eye disorders of 448 children of the study population

Diagnosis	Frequency	Percentage (%)
Allergic Conjunctivitis	181	40.4
Refractive error	42	9.4
Microbial conjunctivitis	39	8.7
Cong cataract	28	6.3
Cong glaucoma	28	6.3
Trauma	24	5.4
Strabismus	16	3.6
Foreign body	6	1.3
Corneal ulcer	4	0.9
Measles keratopathy	4	0.9
Glaucoma	8	1.8
Oculocutaneous albinism	4	0.9
Nasolacrimal duct obstruction	8	1.8
Stargardt disease	1	0.2
Multiple congenital anomalies	16	3.6
Sympathetic ophthalmitis	1	0.2
Sturge Weber	1	0.2
Tuberous sclerosis	1	0.2
Traumatic cataract	3	0.7
Blepharoconjunctivitis	8	1.8
Cerebral palsy with cortical blindness	5	1.5
Corneal opacity	4	0.9
Dermoid cyst	1	0.2
Lid retention cyst	1	0.2
Orbital cellulitis	1	0.2
Preseptal cellulitis	4	0.9
Toxoplasmosis	1	0.2
Retinoblastoma	8	1.8
Total	448	100

Allergic conjunctivitis, refractive errors and microbial conjunctivitis were the commonest diseases seen in the children

Table 3: Eye disorders in 448 children 0-15 years by age groups

Diagnosis	Age group (Years)			Test of Stat
	0-4	5-9	10-15	X^2 df P value
Allergic Conjunctivitis	104	46	31	260 0.18
Refractive error	5	5	32	
Microbial conjunctivitis	26	4	9	
Trauma	4	20	0	
Congenital cataract	18	6	4	
Congenital glaucoma	28	0	0	
Strabismus	12	4	0	
Foreign body	0	4	2	
Corneal ulcer	4	0	0	
Measles keratopathy	4	0	0	
Glaucoma	0	0	8	
Oculocutaneous albinism	4	0	0	
Nasolacrimal duct obstruction	4	4	0	
Stargardt disease	0	0	1	
Multiple congenital anomalies	16	0	0	
Sympathetic ophthalmitis	0	1	0	
Sturge Weber	1	0	0	
Tuberous sclerosis	0	1	0	
Traumatic cataract	2	0	1	
Blepharoconjunctivitis	0	4	0	
Cerebral palsy with visual disorders	2	3	0	
Corneal opacity	4	0	0	
Dermoid cyst	1	0	0	
Lid retention cyst	1	0	0	
Orbital cellulitis	1	0	0	
Preseptal cellulitis	0	4	0	
Toxoplasmosis	0	0	1	
Retinoblastoma	5	3	0	

Most of the children with allergic conjunctivitis were below age 5 years, while refractive error was more in the older children. (P value > 0.05). There is no significant statistical difference between eye disorders and age.

Discussion

Workers have reported that eye diseases differ with age, gender and geographical locations from one region of the world to the other [14,15]. Eye diseases in children can potentially cause visual impairment and even blindness if not treated early [16]. The family serves as a primary unit in health and medical care. Sick role is culturally more compatible with women and this include the traditional role of care for their household especially children [17]. In this work, majority of the informants were mothers (79.5%). This underscores the role of mothers in child care and in seeking health for a vulnerable population like children.

Allergic and vernal conjunctivitis more often occurs in warm, dry, climates with a decrease in inflammation and symptoms in the winter [18]. The location of the study area has a tropical wet and dry climate with warm weather all year-round- with a wet season lasting from April to September and a drier season from October to March [19]. The onset of symptoms of allergic conjunctivitis especially vernal conjunctivitis begins from childhood and peaks in early teen around age 13 years. The finding in this study also agreed with the description of early onset of allergic/ vernal eye disease which peaked around the age of 11 years (table 3.0) P value >0.05

Earlier works by researchers in Nigeria have revealed that refractive error is one of the common reasons people present to the eye clinic [20,21]. Out of the total number of 42 children (9.4%) diagnosed to have refractive error, a greater percentage had hypermetropic-astigmatism (40.0%) followed by hypermetropia (26.2%) (table 4.0) More females (73.8%) patients were observed to have refractive error compared to their male counterparts (26.2%) (P value >0.05). This was in contrast with the findings of Isawumi et al in which males constituted 33.9%- of children who had refractive error and myopia was reported more in their study. Rural dwelling is associated with a higher risk of hypermetropia. The study area serves predominantly a rural population and this may explain why hypermetropia was more common in the study. Children in rural settings are less likely to be involved in indoor games as against outdoor games which may be a reason for lower percentage of children having myopia as noted. Most of the children with refractive error were between the ages of 10-15 years. This observation of a high proportion of refractive error in older children compared to children of younger age reported in this study is similar to reports in Germany and India [22,23]. The relatively higher percentage adolescents with refractive error may probably be due to the fact that it is around this age range that there is increased need for near vision because of school activities and children may be more articulate at expressing their complaints compared with the younger children.

Table 4: Type of refractive errors in 42 children by age groups

Type of error	Age group (Years)			
	0-4	5-9	10-15	Total
Myopia	0	2	3	5
Hypermetropia	0	0	11	11
Myopic-astigmatism	0	2	3	5
Hypermetropic-astigmatism	5	1	11	17
Mixed astigmatism	0	0	4	4

Simple hypermetropia and hypermetropic-astigmatism were the most common refractive error and were observed to be more in the age group 10-15 years.

Table 5: Causes of blindness in 12 eyes of verbal patients aged 5-15 years

Causes	Frequency	Percentage (%)
Cortical Visual disorder	4	33.3
Congenital cataract	4	33.3
Orbito-ocular tumour (Retinoblastoma)	2	16.7
Penetrating globe Injury	2	16.7
Total	12	100

Microbial conjunctivitis constituted about 1% of all cases in a general primary eye clinic but was as high as 40% in the peadiatric eye care [24,25]. The number of children with bacterial conjunctivitis could be age dependent. Our work reported 8.7% of the total number of patients had microbial conjunctivitis (table 2.0). Out of the total children with microbial conjunctivitis, patients who were 0-4 years range had the highest number of cases 66.7%, followed by the age range 10-15 years 23.7% respectively. Reports estimated that bacterial conjunctivitis was 23% in children 0-2 years age range, 28% in 3-9 years old and 13% in older children in the United State[26]. Furthermore, age 6 years and below, dry season, absence of watery eyes are some indicators that predispose to microbial conjunctivitis [27]. Our work underscored the fact above with the majority of the patients with infective conjunctivitis been children less than 6 years of age. Besides, the study period also spanned through the dry period of the year (between December and March) which are typically dry and with low humidity. Trachoma was a cause of blindness with concern in the 80s and was responsible for 12% of world blindness, although a decreasing trend has been recorded by the WHO since then [28,29]. A study opined that trachoma was more of a population- based problem rather than hospital based. No case of trachoma was recorded in this study. The efforts of the various government agencies and Non-Governmental Organization (NGOs) towards the execution of the various strategies towards the elimination of trachoma could have yielded the reduction in the disease burden. Whereas studies in Calabar and Benin –City reported ophthalmia neonatorum (neonatal conjunctivitis) as 1.1% and 1.7% respectively, ophthalmia neonatorum was not recorded in this study [30,31]. Perhaps, increased maternal health education, improvement in antenatal and obstetric care may be responsible for this observation.

One of the most frequent reported ocular abnormalities recorded was congenital cataract in 28 patients (6.3%). Other studies also indicated that congenital cataract was a common ocular congenital anomaly operated [32-34]. Congenital cataract as a common ocular congenital anomaly was also noted in India and the United Kingdom[35,36].

Similar to the number of patients who had congenital cataract, the patients who had congenital glaucoma were 28(6.3%), although lower than what was recorded in Ogun (14.3%) and Lagos (8.7%) but however, it was higher than the report from a suburban region of Edo State(1.7%) [33,34]. All the patients with congenital glaucoma presented within the first four (4) years of life (Table 3.0). This early presentation is similar to the pattern reported in Edo and Ibadanof between 2 to 5 months and 12.31 (±17.13) respectively [37,38].

Parents who have children with birth defects often have anxieties and burdens socially, emotionally, financially on how to manage a child with defect [39]. In this work, the patients who had multiple congenital anomalies n =16 (3.6%) had cleft lips and palates, microphthalmos, lids coloboma, microcephaly and polydactyly. Most of the cases of congenital anomalies early in life between the ranges of 0-4 years of age. The concern and eagerness of parents to find answers to the question of care for these children may have accounted for this early presentation.

The only orbito-ocular tumour recorded in this work was retinoblastoma n=8 (1.8%) in children less than four years of age. Over forty years earlier in Kaduna, Kaduna State Nigeria Abiose et al reported retinoblastoma as n=63 (60.5%) of all orbito-ocular tumours. Fifteen years later in a report from Zaria, also in the same State, retinoblastoma recorded a lower percentage n=50 (40.3%) amongst orbito-ocular tumours reported [40,41]. In comparison to the above studies the relatively small percentage in this work may be due to the fact that their studies were solely on orbito-ocular tumours relative to retinoblastoma. Additionally, there are more tertiary health facilities now as against the time of the previous studies around the study area affording patients the options of visiting other centres thus possibly reducing the concentration of patients only to the study area. Besides, the cultural -based behaviour of consanguineous marriage predominant in this region which is a risk factor for genetic diseases including retinoblastoma is likely to have reduced now due to civilization.

The proportion of blindness observed in in verbal children in the study was 12 (3.1%) as shown in table 4.0. Adegbehingbe Kemmanu et al recorded lower percentages [42,43]. The leading causes of blindness as seen in this study were cortical visual impairment and congenital cataract (33.3% each n=4). Although childhood cataract and cortical blindness were also reported as the leading causes of blindness by Adegbehingbe the proportions reported were higher than those recorded in this study. The different timelines between this study and Adegbehingbe'sand the difference in the study area may explain the reason for the varying results.

Conclusion

Treatable eye diseases (avoidable and preventable) were the majority of the cases seen in the Paediatric unit, of the eye department in ABUTH. We recommend that adequate provision should be made in the optical unit to promote children access and uptake of eye glasses, target education for mothers in the community on ocular health, training and retraining of Ophthalmologists in paediatric ophthalmology and procurement of latest technology/ equipment to build more functional Paediatric surgical units of the department of Ophthalmology across the region.

Limitation of the Study

The technicality and availability of materials for examining the visual acuity of preverbal children and children under 4 years of age. In preverbal children, often vision is assessed to actually find out if the child can see at all and not usually to be able to quantify the degree to which they can see by way of visual acuity assessment. Specialised instruments like electrophysiological tests, electronic picture charts containing modern day pictures (for instance mobile phones instead of analogue telephone) are some of the materials required for the adequate assessment of vision in children.

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