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Research Article

Extended Childhood Eye Diseases in Southern Highlands of Tanzania: Profile and Patterns from a Tertiary Hospital Over Five Years

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Abstract

Background: Childhood eye diseases are among the top cause of medical consultations, they are of concern because of their prolonged impact on a child's development, learning ability, quality of life, and future work opportunities. Children are at increased risk for ocular complications as compared to adults, because of their inability to express their eye problems which most of them go undetected until in their late stages of life.

This study aimed to assess the distribution of eye conditions among children and young people at a tertiary hospital in Southern Highlands, Tanzania. To recommend customized age specific intervention to prevent sight loss due to delay in treatment.

Method: Hospital-based retrospective cross-sectional study involving patients aged up to 24 years. Data from January 2014 to December 2018 were extracted from eye clinic registry books segregated by age, sex and diagnosis. Eye disorders were classified into various categories. Participants were grouped into three age groups. Ratios, percentages, and chi-square associations were calculated. P value < 0.05 was considered statistically significant.

Results: A total of 505 patients records were reviewed, males were 273 (54.06%). The leading complaints were headache 127 (25.15%) and distant blurred vision 79 (15.64%). The leading diagnosis were uncorrected refractive errors, allergic conjunctivitis and trauma with 189 (37.43%), 119 (23.56%) and 47 (9.31%) respectively. Medical management was provided to 206 (40.79%) of patients, 204 (40.40%) were prescribed spectacles, and 69 (13.66%) were managed surgically. Surgical procedures were corneal repair 28 (40.58%), cataract surgery 15 (21.74%) and superficial foreign body removal 9 (13.04%).

Conclusion: Uncorrected refractive errors, allergic conjunctivitis and ocular trauma are significant cause of ocular morbidity among the study population. These conditions are easily diagnosed and when detected can be sufficiently treated with better outcomes. Delay in seeking medical care or lack of screening programs customized to this age group poses increased risk of visual impairment. Early age screening and eye health promotion are effective methods to reduce this load.

Keywords: Eye Diseases; Refractive Errors; Childhood Blindness; Visual Impairment; Corneal Repair

Introduction

Childhood eye diseases are among the top cause of medical consultations, they are of concern because of their impact on a child's development and learning ability, quality of life, and future work opportunities [1-3]. The most common childhood eye conditions which lead to visual impairment and/or blindness are refractive errors, corneal infections, allergic conjunctivitis, and ocular trauma [4].

Globally the prevalence of eye diseases in children is estimated to be 78/100,000 and the burden of blindness is approach 1.5 million; of which ¾ are located in developing countries [1,5,6]. In most developing countries most of the kids who become blind die within a few years either due to systemic complications of the disease-causing blindness or due to increased inability for self-care [7,8]. These can be due to a lack of sustainable screening programs in those countries. In places where these programs exist screening is done only by sporadic eye personnel and many children miss the opportunity for an early eye examination. Screening programs could enable early detection and treatment of different eye conditions because the majority of cases of childhood blindness are either treatable or preventable [2,9,10].

The World health organization (WHO) defines Low vision as presenting visual acuity less than 6/18 and equal to or better than 3/60 in the better eye [11,12]. Recent studies have confirmed the existence of a large burden of uncorrected RE, although the interventions required are significantly cost-effective, and have an important impact on economic development and quality of life. Uncorrected RE has been estimated to account for 5 million visual impairment cases. About a fourth of these would benefit from simple spectacle correction services which they are yet to be offered [13,14].

Usually, 'childhood' eye diseases are considered when a person is of age under 16 years, in our study we extended the age category up to 24 years and term it as "extended childhood" so as we can address the visual impairment in this special age group which often is forgotten and not included in majority of existing literature. 'Extended childhood blindness' is considered for person aged up to 24 years of age. The same WHO visual impairment categories apply where blindness is defined as presenting visual acuity worse than 3/60 [15,16].

The major causes of blindness in children vary widely from region to region, being largely determined by socioeconomic development, and the availability of eye health care services. In high-income countries, lesions of the optic nerve and higher visual pathways predominate as the cause of blindness [17,18]. In low-and middle income countries the major causes are corneal scarring from measles, vitamin A deficiency, the use of harmful traditional eye remedies, ophthalmia neonatorum, and congenital cataract [19,20]. Retinopathy of prematurity is an important cause in middle-income countries and a growing problem due to improvement in neonatal care [21]. This paper aimed to assess the distribution of eye conditions among children and young people at a tertiary hospital in Southern Highlands, Tanzania.

Material and Methods

Study design, settings, participants and data sources

We conducted a hospital-based retrospective cross-sectional study in Mbeya Zonal Referral Hospital, which is the tertiary hospital in Southern Highland Tanzania, whereby data were extracted from the patient hospital registry for all people aged up to 24 years from January 2014 to December 2018. It is one of the five tertiary hospitals in Tanzania providing services to Southern Highlands regions. With an estimated current population of 2.34 million and people aged 24 years and below account for 56.8% [22].

Variables

The independent variables for this study were socio-demographic characteristics of children and place of residence. The dependent variables were prevalence of eye conditions/diseases in children and treatment modalities offered.

Bias and mitigation

The main bias in this study was the selection bias since the selected population is not representative of all children but it can be generalized for the same situation of tertiary hospitals in Tanzania and in most of developing countries.

Study size and statistical methods

A convenient sampling technique was used to extract data from registry books, there were several books with records from the year 2000 but only books with records from January 2014 to December 2018 were used. Patient's data were extracted from the registry

as per the data collection tool. This data was recorded in a semi-structured questionnaire. Data were checked for completeness using a checklist on each item then coded and entered in excel sheet then analyzed using Stata version 13. The analysis included frequency distribution by age groups, gender, and diagnosis and association for significant factors was also applied where appropriate.

Approval for this study was obtained from the University of Dodoma and Mbeya Zonal Referral Hospital Ethical Committee. Confidentiality to participants was ensured (patients names and addresses were not taken). Data obtained were used only for research purposes.

Results

A total of 600 records of patients were reviewed for completeness and 505 (84.20%) records had adequate information as per the data collection tool and hence were used in this study.

Among 505 records, 273 (54.06%) were male, and 232 (45.94%) were female, resulting into a Female: Male ratio of the majority 235 (46.54%) were of the age group between 16-24 years. The median (IQR) age of the children was 15 (9 to 19) years. Majority of children 348 (68.91%) came from Mbeya urban, 21.58% Mbeya rural, the remaining 9.5% came outside the Mbeya region as shown in table 1.

Variables	Description	Frequency (%)
Age	1-5	86 (17.03)
	6-15	184 (36.43)
	16-24	235 (46.54)
Sex	Male	273 (54.06)
	Female	232 (45.94)
Residence	Mbeya Urban	348 (68.91)
	Mbeya Rural	109 (21.58)
	Outside Mbeya region	48 (9.50)

Table 1: Demographic characteristics of participants (N = 505).

Presenting visual acuity

World health organization visual impairment categories were used for categorizing participants. Visual Acuity categories were based on presenting vision of the better eye as obtained from the patient's registry, Majority of children 276 (54.65%) had normal vision with presenting VA ≥6/18, 77 (15.25%) had low vision (VA between 6/18 - 3/60), the remaining 78 (15.54%) were blind with VA <3/60. In 70 (13.86%) children VA was undetermined. This was largely due to lack of enough skills to take VA in children aged 5 years and below. See Table 2 below for more details.

		Visual Acuity Categories				
	Age group	≥6/18	6/18 – 3/60	<3/60	Undetermined*	TOTAL
Visual Acuity (In better eye)	1-5	11	3	8	60	86
	6-15	118	39	42	10	184
	16-24	147	35	28	0	235
	Total (%)	276	77	78	70	505
		(54.65)	(15.25)	(15.45)	(13.86)	100

Table 2: Clinical characteristics of participants.

*undetermined= It was not taken and written as "Child".

Main complaint to visit eye clinic

In a review of complaints that brought patients to the clinic, the leading complaints were headache (25.15%), blurred vision (15.64%), eye itching (10.69%), eye injury (9.9%), and eye discharge (6.73%) as shown in table 3 below.

Variable	Frequency (%)
Headache	127 (25.15)
Blurred vision	79 (15.64)
Itching	54 (10.69)
Injury	50 (9.90)
Eye pain	47 (9.30)
Discharge	34 (6.73)
Redness	33 (6.53)
Vision loss	29 (5.74)
Swelling	23 (4.55)
Excessive tearing	19 (3.76)
Other complaints *	10 (1.98)
TOTAL	505

Table 3: Complaints that brought the patient to the clinic (N = 505).

*Other complaints = Eye deviation, eye discomfort, eye drooping, foreign body sensation, photophobia, unable to read, and visual problems.

Diagnosis

In the review of eye conditions that patients were diagnosed with, the most common diagnoses were Refractive errors (37.43%), and Allergic Conjunctivitis of all types (23.56%). Refractive errors were slightly higher in females 53.44% than males 46.56% with a P value of 0.02 at 95% level of significance. Males were more diagnosed with conjunctivitis, foreign body, glaucoma and cataract. Corneal perforation, blindness, and corneal ulcer were almost equally distributed among males and females as shown in table 4 below.

Variable	Male	Female	Total (%)
Refractive errors	88	101	189 (37.43)
Allergic Conjunctivitis	69	50	119 (23.56)
Corneal ulcer	23	15	38 (7.52)
Chalazion/Stye	8	11	19 (3.76)
Corneal perforation/ laceration	9	9	18 (3.56)
Cataract	10	7	17 (3.37)
Superficial foreign body	13	2	15 (2.97)
Glaucoma	10	4	14 (2.77)
Congenital NLDO*	8	5	13 (2.57)
Optic neuropathy/ Maculopathy	5	3	8 (1.58)
Others **	30	25	55 (10.89)
TOTAL			505

Table 4: Diagnosis at presentation (N = 505).

NLDO* = Nasal Lacrimal Duct Obstruction.

Others ** = CMV retinitis, Congenital ptosis, Dacryocystitis, Dermoid cyst, Epithelial cyst, Fibroma, Herpes Zoster Ophthalmicus, Pre-septal cellulitis, Pterygium, Retinal detachment, Subconjunctival haemorrhage, Traumatic endophthalmitis, , Trichiasis, Uveitis.

Refractive errors (RE)

Among 189 (37.43%) patients who were diagnosed with RE, myopia was the commonest 78 (41.27%) with equal distribution among male and female patients. The overall prevalence of Myopia was 15.44% in this study. The least common type of RE was astigmatism of any type 50 (26.46%), which was slightly higher in males than females (P value = 0.041 at 95% level of significance). This is shown in table 5 below.

Type of refractive error	Male	Female	Total
Myopia	39	39	78 (41.27)
Hypermetropia	23	38	61 (32.28)
Astigmatism	29	21	50 (26.46)
Total (%)	91 (48.15)	98 (51.85)	189

Table 5: Types of refractive errors (N = 189).

Discussion

In this study the majority (68.91) of participants came from urban areas which was unexpected in Mbeya region, where 73.5% of its population lives in rural areas [23,24]. This may be partially attributable to a study confounding variable of definition of rural versus urban; rural patients classified as urban patients if they had lived with their relatives in an urban location for at least six months. Another explanation for the decreased number of rural patients is that high myopia is less common in rural regions, which

is consistent with earlier research [25,26]. Majority (54.65%) of children fell in normal vision category due to the fact that we used better vision for categorizing VA impairment. This was done because it's the WHO recommendation to use the better eye when discussing VA [11]. This has a potential categorical confounding and we propose a study which will utilize diseased eye for VA category.

The most common symptoms was headache (25.15%), blurred vision (15.64%), eye itching (10.69%), eye injury (9.9%), and eye discharge (6.73%), the headache was the leading complaint which justifies the observation of a large number of children with RE. This is similar a study conducted in Nigeria reported that itching was the most common symptom presented accounting for 24%, followed by blurring vision (19%) and prickling sensation (18%), itching was more presented in this study because the majority of children were later diagnosed with vernal conjunctivitis which commonly presents with itching and prickling sensation [27].

This study found that the most prevalent eye diseases were RE (37.43%) and Allergic conjunctivitis (23.56%) with a slightly higher number in females than males by 53.44% and 46.56% respectively, similar to this study, a number of studies have reported that RE was the most common diagnosis accounting for 31.6% [14,15,28]. Another study in India also showed that RE was the commonest eye condition among children attending eye clinic accounting for 23.7% [29]. However contrarily to this study a study conducted in Ethiopia among 341 children, RE was the third most common diagnosis accounting for 8.5% [30]. This can be explained by the age category which was included in their study.

Among patients who presented with RE myopia was the commonest eye condition observed accounting for (41.27%) followed by hypermetropia (32.28%) and astigmatism (26.46%), contrarily to this study, a study conducted in Ethiopia showed that astigmatism was the most common type of RE observed accounting for 53.6%, followed by myopia 40.5% and hypermetropia be observed in few cases accounting for 5.9% of cases [7]. The higher proportion of RE reported in children can be a result of better articulation and detection of vision problems by their parents or teachers. Other studies have shown a very high prevalence of Myopia like these two studies which shown to be between 92.1% to 96.5% [26,31]. This could be due to their study population which was mainly in urban areas. It has been shown that residing in urban areas is a risk for myopia development due to the increased nature of indoor activity [32].

The second most common diagnosis was Allergic Conjunctivitis which accounted for 23.56% and was more common in males than females by 57.98% and 42.01% respectively, similar to this study a study conducted in Ethiopia showed that conjunctivitis was the leading disorder accounting for 35%, another study conducted in Malawi also showed that conjunctivitis was among the leading eye disorder accounting for 51% of study participants in contrarily to this study it showed that females were more affected than males [6,7]. Sufficient data support that Conjunctivitis is among the leading eye disorder in children with male predominance this is likely due to the dusty local environment in the school environment, agriculture activities and the likelihood of boys engaging in physical activities that predispose them to eye irritants [9,33].

Ocular injuries were not more common in this study as they accounted for 9.9% with male predominance, in a study conducted in Nigeria ocular injuries were the leading disorder accounting for 21.7% [27]. In India, it accounted for 12.74% and it was more common in male than female as a second most common cause of blindness [4].

The findings of this study have important implications for clinical practice, public health, policy, and research. First, they highlight the need for improving the accessibility and quality of eye care services for children in this region, especially in rural areas where most of the population lives. This includes increasing the availability and affordability of eye screening, diagnosis, treatment, and referral services; training and equipping more eye care professionals; and raising awareness and education among parents and caregivers about common eye diseases and their prevention. Second, they underscore the importance of addressing ocular trauma in children since its among the top three prevalent eye condition in this study. Hence the importance of promoting eye protection and safety measures. Third, they suggest the need for developing and implementing evidence-based policies and guidelines for the management of childhood eye diseases in this region, taking into account the local epidemiology, resources, and preferences. Fourth, they indicate the need for conducting more

research on childhood eye diseases in this region, especially on their etiology, pathogenesis, risk factors, complications, prognosis, and cost-effectiveness of interventions as this was just a snapshot of the whole condition. Long term follow up of this children is crucial o determine the outcome of their eye condition.

This study has some limitations that should be acknowledged. First, the study did not measure the long-term impact of childhood eye diseases on the quality of life, education, and productivity of the affected children. Second, the study did not compare the results with other regions or countries that may have different epidemiological patterns and health systems. Therefore, the generalizability of the findings may be limited.

Conclusion

Ocular disorders in children are still an important cause of blindness worldwide, this study found a significant proportion of children with blindness. The leading diagnoses were RE and conjunctivitis both conditions are easily diagnosed and when detected can be sufficiently treated with better outcomes. A significant number of children in this study were firstly presented in the hospital with terminal eye conditions which are hardly treatable or reversed. This shows delayed detection or delays to seek medical care by children themselves, their teachers, and caretakers. Most children do not report mild eye symptoms until when the symptoms become severe enough to alert their caretakers to seek medical help. Most of the children in this study were managed by medications and corrective glasses, although no data were available to comment on outcomes and effectiveness of the management, sufficient data support the effectiveness of medications in managing conditions like conjunctivitis and corrective glasses in managing RE. School eye screening programs should be initiated or emphasized to increase the early detection of eye conditions and children diagnosed with eye conditions that are chronic or with an increased risk of complications should be enrolled for follow-up.

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Conflict of Interest

No financial interest or any conflict of interest exists for this study.

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