

Screening for ocular abnormalities and subnormal vision in school children of Butajira Town, southern Ethiopia

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Abstract

Background: As in most African countries there is no national preschool or school eye screening service in Ethiopia. The purpose of this study was to conduct school eye screening in Butajira town to identify the causes of ocular morbidity and subnormal vision in school children and suggest possible intervention strategies.

Methods: A cross-sectional study of 1846 students from Mekicho (1397) and Dobo-tuto (449) junior and elementary schools of Butajira Town selected by systematic random sampling of the sections of each grade was performed from Sep.13 to Nov.11, 1999. Visual acuity and detailed ophthalmologic examinations were done.

Results: One or more ocular abnormalities were found in 62.6% of the students. Trachoma was the leading cause (54%) of ocular morbidity, followed by refractive error (11.8%), strabismus (4.4%), non-trachomatous acute conjunctivitis (2.3%), corneal opacity (1.3%), Xerophthalmia (1.1%) and Vernal keratoconjunctivitis (0.7%). Refractive error was the leading cause of low vision.

Conclusion: Trachoma is a public health problem in the community, hence mass mobilization and the WHO comprehensive SAFE strategy has to be implemented. Concerned government bodies as well as NGO's should take the initiative of providing those children with refractive error with low cost eyeglasses. Health education and yearly school eye screening by local health personnel will prevent common causes of blindness and visual impairment. [*Ethiop.J.Health Dev.* 2002;16(2):165-171]

Introduction

It has been estimated that 80-85% of the learning process is done via the visual pathway (1). However, if parents and teachers of children who are blind or visually impaired do not understand the nature of the visual disability and fail to provide appropriate compensatory learning options, the children's opportunities, experiences, and development will be more restricted than necessary (2).

School eye screenings that are routinely done in the developed world concentrated more on visual impairment associated only with refractive errors and muscle imbalance (3,4).

But, in developing countries, like Ethiopia, school eye screening should as well encompass other common, but treatable and preventable ocular problems that could have immediate or long-term negative effect on the learning activities of the student (5). As in most African countries, no national preschool or school eye screening service exists in Ethiopia. Very few children undergo regular complete eye examination (5).

Ethiopia, being one of the developing countries with low socio-economic level and underdeveloped health infrastructure, suffers from innumerable preventable and treatable diseases. Population based studies in different parts of the country indicate that trachoma is responsible for 20-35% of all blindness and 10-30% of low vision, whereas, xerophthalmia

and measles cause blindness in 3.4% and diminished vision in 4.2% of cases (6, 7).

Although not in itself a major cause of blindness in children, trachoma is a major cause of morbidity in Ethiopian children (8, 9). Since children constitute a large proportion of the population in hyper endemic trachoma areas, those with active disease are the major reservoirs of trachomatous infection in the community (10). Trichiasis is generally a late complication of trachoma but it is not uncommon to see it in children of some hyper endemic areas (11,12).

Corneal opacity, secondary to vitamin A deficiency accounts for up to 70% of childhood blindness in the developing countries (13). Studies show that children even with mild xerophthalmia die at three to nine times higher rate compared to their well-nourished peers (14).

The purpose of this study was to conduct school eye screening in Butajira Town to identify the causes of ocular morbidity and subnormal vision in these school children and suggest possible intervention strategies.

Methods

Study Area: Butajira Town, the administrative center of Meskan and Mareko District, is located 130km. south of Addis Ababa and 50 Km west of Zway Town in the Rift valley. The district is one of the eleven districts of Gurage Zone of southern Ethiopia. The population of Butajira Town was estimated to be about 25,000 by 1999(15). It is located at 2,100m above sea level. The main source of water is pipe water from two wells.

Butajira Town is divided in to four kebeles. There are five schools in the town; one technical school, one high school, two junior and elementary schools and one elementary school. There is also a health center and a new hospital that has not been operational during the study period. The *Girar Bet Ledekuman's* (GBL) eye center, a nongovernmental organization, is the only center in the town that renders ophthalmologic service.

A cross-sectional eye examination was conducted in 1846 students from Mekicho (1397) and Dobo-tuto (449) junior and elementary schools of Butajira Town between Sep.13 to Nov.11, 1999. There were a total of 3791 students attending Mekicho and Dobo-Tuto junior and elementary schools. The section of each grade was taken as cluster and simple systematic random sampling of these clusters was entertained.

One thousand nine hundred and forty four students were selected by systematic random sampling of the sections of each grade. Fifty-eight students were above the age of 15 years thus they were excluded from the study.

The purpose of the study was explained to the principals of the schools, school parents' committee members and teachers.

Visual acuity was assessed using a Snellen's 'E' Chart at 6 meters in bright sun light. Examination of the eyelid margins and cilia, bulbar and tarsal conjunctivae, the cornea and anterior segment was done using a pen-torch and a 2x magnifying loupe. Emphasis was given for signs of trachoma and xerophthalmia. This was followed by a cover-uncover test to look for latent or manifest ocular deviation. Those students with vision of <6/9 in one or both eyes were subjected to visual acuity check using a pinhole. Examinations were performed in the respective school compounds. Detailed examination including Slit lamp microscopy, funduscopy and retinoscopy followed by subjective refraction was made when found indicated.

The cut-off uncorrected visual acuity for defining sub-normal vision, in this study, was taken as a visual acuity of <6/9 in the worst eye. The WHO clinical staging for trachoma and xerophthalmia was used (16, 17).

Refractive error was considered;

a/ when there was a sub-normal vision that had a non-zero retinoscopy value, in the absence of anterior or posterior segment abnormalities.

b/ if the visual acuity improved with a pinhole, and

c/ in those students who were found to have latent hyperopia i.e., a visual acuity of 6/6 with a +1.75D lens.

The students with sub-normal vision that didn't improve with refraction in the absence of external eye, anterior segment, or posterior segment pathology but in the presence of conditions that give rise to amblyopia, i.e., strabismus, astigmatism, or anisometropia were labeled as having amblyopia.

Those students who were found to have active trachoma and xerophthalmia were treated. Those cases with refractive error were given glass prescriptions. Those found to have surgical problems like; trichiasis and strabismus were referred to GBL center. The possible causes were documented and analyzed.

Results

The total number of study subjects were 1846, 1000 males and 846 females with M:F ratio of 1.2:1. The mean age of the students was 10.2 yrs, the range being 5-15yrs.

One or more ocular abnormalities were found in 62.6% of the students. Trachoma was the leading cause (54%) of ocular morbidity followed by refractive error (11.8%). About 4.4% of the students had muscle imbalance of either the latent or manifest types and 2.3% were suffering from non-trachomatous acute conjunctivitis, and other ocular abnormalities which affected about 4.1% of the school children (Table-1).

The prevalence rate of active trachoma decreased with increasing age, 356(41.6%) in the age group of 5-10 years whereas it was 252

Table 1: Pattern of eye diseases in Mekicho and Dobo-Tuto elementary schools, Butajira Town, 1999

No	Diseases	Age				Total (%)
		05-10		11-15		
		Male	Female	Male	Female	
1	Trachoma	259	232	274	223	988 (54%)
2	Refractive error	52	50	61	54	217 (11.8%)
3	Strabismus	12	25	18	27	82 (4.4%)
4	Non-trachom. Conjunctivitis	3	12	17	10	42 (2.3%)
5	Corneal opacity	6	9	6	4	25 (1.3%)
6	Xerophthalmia	4	4	8	5	21 (1.1%)
7	FKC	4	4	0	4	12 (0.7%)
8	Phthisis-bulbi	2	1	1	2	6 (0.33%)
9	Others	2	4	5	3	

(25.5%) in the age group of 11-15 years (P-value < 0.0001, 95 % CI, OR= 2.69 2.05<OR< 3.54). To the contrary, the prevalence rate of inactive trachoma increased with increasing age i, e.135 (15.8%) in the age group of 5-10 years versus 251(25.4%) in the age group of 11-15 years. It was also found that the prevalence rate of active and inactive trachoma didn't show significant difference between the two genders (P-value= 0.198, 95 % CI, OR=0.84 (0.64<OR<1.09) i.e. active trachoma in males was 319(31.9%) versus 289(34.2%) in females whereas inactive trachoma in males

was 214(21.4%) versus 171(20.4%) in females (Table-2).

Two hundred and ninety-seven (16.1%) of the students had sub-normal vision in one or both eyes from different causes, of which the leading was refractive error 11.8% followed by anterior segment pathologies 1.6%. Nineteen (1.4%) of the students with refractive error were found to have amblyopia. Of the 29 anterior segment pathologies, corneal opacities contributed for about 25(86.2%) of the cases. The different causes of sub-normal vision are shown in table 3.

Table 2: Distribution of different stages of trachoma by age and sex, Butajira town, 1999

Stage of Trachoma	05 - 10 No (%)		11 - 15 No (%)		Total	
	Male	Female	Male	Female		
Active Trachoma	TF	116 (6.2)	86 (4.7)	86 (4.7)	60 (3.2)	348 (18.9)
	TI	69 (3.7)	85 (4.6)	48 (2.6)	52 (2.8)	254 (13.8)
Inactive trachoma	TS	74 (4.0)	58 (3.1)	137 (7.4)	102 (5.5)	371 (20.1)
	TT	0 (0)	3 (0.2)	3 (0.2)	8 (0.4)	14 (0.8)
	CO	0 (0)	0 (0)	0 (0)	1 (0.05)	1 (0.05)
Total	259 (14)	232 (12.6)	274 (14.8)	223 (12.1)	928 (53.5)	

Table 3: Causes of subnormal vision (VA<6/9) in Mekicho and Dobo-Tuto elementary schools, Butajira town

Causes of subnormal vision	Eyes	%
Refractive error	217	11.8%
Anterior-segment pathology	29	1.6%
Posterior-segment pathology	1	0.05%
Nystagmus	2	0.1%
Phthisis bulbi	6	0.32%
Unknown	42	2.23%
Total	297	16.1%

The cause for low/ and very low vision (VA<6/18- >3/60) in the Worst eye and also the causes for unilateral blindness were assessed and are shown in tables 4&5. Strictly confining our findings to the WHO classifications of visual impairment, i.e. low vision (grade 1&2) with VA<6/18- >3/60 in the better eye was detected in only 24(1.3%) of the students. There was no student who fulfilled the WHO criteria for blindness (Grades 3,4&5) i.e. a VA<3/60- NLP in the better eye as such students cannot attend regular classes.

Table 4: Causes of low vision (VA<6/18->3/60) in Mekicho and Dobo-tuto elementary schools, Butajira Town, 1999

Causes of low vision	On. of eyes		Bilateral	
	Unilateral			
Refractive errors	35	1.9%	20	1.1%
A/segment pathology	12	0.7%	1	0.005%
P/segment pathology	0	0	0	0
Nystagmus	2	0.1%	0	0
Unknown	1	0.05%	1	0.05%
Total	50	3.9%	22	1.2%

Unilateral blindness, however, was detected in 16(0.84%) of the students, the leading causes being amblyopia, of either strabismic or anisometropic origin, in 6(0.32%) and phthisis bulbi in 6(0.32%). Of the 16 cases of unilateral

blindness, two of the three anterior segment pathologies and four of the six phthisis bulbi cases were due to trauma. Therefore trauma contributed for about 6(37.5%) of the causes for unilateral blindness. Muscle imbalance was detected in 82 (4.4%) of the students, of which 32 (1.7%) were found to have heterophoria where as 50 (2.7%) had heterotropia.

Clinical xerophthamia manifested with Bitot's spots in 17(0.9%), conjunctival xerosis in 2(0.1%) and corneal scarring in 2(0.1%), making the total cases 21(1.1%). Night blindness was not inquired because of a possible unreliable response, especially from children of the lower age groups.

Table 5: Causes of unilateral blindness (VA<3/60 - NLP) in Mekicho and Dobo-toto elementary schools, Butajira town, 1999

Causes	Number	%
Amblyopia	6	0.32
Ant Segment Pathology	3	0.15
Post segment Pathology	1	0.05
Phthisis Bulbi	6	0.32
Total	16	0.84

Discussion

Butajira is a small, dusty, town with no asphalt roads and with many commercial and construction heavy vehicles passing through the town daily. Both schools didn't have proper fence. Some of the class- rooms were without adequate windows, there were hardly enough chairs or benches to accommodate the 80-110 students in each class room and as a result some of the students had to sit on the dusty earthen floor. A good number of the students were seen carrying tens of flies, happily feeding on the eye and nose

dischargés, and most seemed not to be bothered by the presence of the flies on their faces. The above facts could be some of the reasons that contributed to the high prevalence of trachoma (54%), of 33% being in active form, and to the 2.3% prevalence of a non-trachomatous acute conjunctivitis. This is supported by observational studies, which have suggested that the prevalence of trachoma is lower in children with clean faces than in those with ocular and nasal discharges or flies on the faces (18).

Unlike a community based study in Dalocha, a neighboring district, no variation in the prevalence of both active and inactive trachoma was found between both sexes in these school children. Female children not attending schools care for their younger siblings and that could make them at a higher risk of acquiring recurrent trachoma infection.

The findings, in this study, that prevalence of active trachoma decreases with increasing age and the vice versa being true for the inactive form is also in agreement with the natural history of trachoma. An inflammatory stage during childhood, with the formation of lymphoid follicles and diffuse infiltration with papillae in the conjunctiva, and chronic inflammation, eventually resulting in conjunctival scarring, which in turn leads to trichiasis and corneal complications in older children and adults (16). The high prevalence of active trachoma in under 10 years children with TF=23.6% and TI=18.05 (33%) is an indicator that trachoma is a public health problem in the community, hence mass mobilization and the WHO comprehensive SAFE strategy has to be implemented.

The uncorrected best monocular VA<6/18 was 3.9 %, and this was similar to a retrospective study of eye disease among school children in Los Angeles (3.4%) (19). A recent study in primary school children of rural Tanzania have found out 10.2 % of them have visual acuity of < 6/12 in at least one eye (5).

The second common cause of ocular abnormality and the leading cause of unilateral

and bilateral sub-normal vision was found to be refractive error. These and the findings in manifest ocular deviation of 2.7% and amblyopia of 1.4% are comparable to findings in ophthalmic screening of school children done in Ankara, Turkey (20). The prevalence of refractive error in our study is markedly higher than a recent study in primary school children in rural of Tanzania, reported to be 1% (5). Despite this fact, it was only one student, with high myopia, who had a corrective glass. The rest, are either not aware of the presence of the problem, the treatability of the problem, or couldn't afford to go to health institutions or to buy glasses.

Since most of these children's parents are very poor to buy refractive glasses at the standard cost, concerned government bodies as well as NGO's should take the initiative of providing these needy children with cost-free or low cost eyeglasses. These students need special attention and support from their teachers, friends and parents as well. They should be advised to sit in the front row and teachers should understand the problem of these students and try to write eligible and larger prints on the blackboard so that it could be easily readable to these children with low vision.

Next to refractive errors, it was the anterior segment pathology which was found to be a cause of ocular morbidity, sub-normal and low vision and also unilateral blindness. The major contributor to this category was corneal opacity of either post-inflammatory or post-traumatic origin. The manifestation of clinical xerophthalmia, in our study, was more with Bitot's spot (17 patients) and conjunctival xerosis (2 patients). WHO estimates that every year 100,000-200,000 children suffer from corneal ulceration due to Vit.A deficiency (VAD), and VAD accounts for up to 70% of visual losses in some countries (13). The blinding form of VAD tends to occur in children between the age of one and three years, but does not usually cause blindness unless accompanied by protein-energy malnutrition (13). However, it is also known that Bitot's spots (and conjunctival xerosis), is

occasionally unassociated with active vitamin A deficiency (VAD) and remains unresponsive to Vitamin A therapy in older children (21,22). Owing to this, it will be difficult to conclude that these students are really suffering from active VAD. Nevertheless, since even children with mild, sub clinical VAD are at increased risk of respiratory diseases, diarrhea, anemia, growth retardation and death (23,24), the Vitamin A treatment given to the above children is warranted. As these findings may not be conclusive, it should be taken as possible index cases and further detailed evaluation has to be done in the area.

The majority of the causes for ocular morbidity, sub-normal and low vision as well as unilateral blindness were either preventable or treatable. Trauma and amblyopia were the leading causes of unilateral blindness. Both of these problems are preventable, the latter being treatable as well.

Health education for the prevention of blindness in primary schools has shown a marked decrease in the prevalence of trachoma infection (25). Thus, health education and yearly school eye screening by local health personnel will prevent these causes of blindness and visual impairment.

We established school eye clubs in both schools. The objective of the eye-club shall include:

-To give Sustained health education to the students, teachers and parents, with special emphasis to personal hygiene, environmental sanitation and eye care.

-To detect children with any kind of eye problems and send them to the nearby eye center.

-To facilitate an arrangement with the district health bureau for the annual eye screening program.

The committee members are selected from teachers, students, representatives from school parents' committee and one medical professional from GBL center. The purpose of the eye-club is to create awareness among students, teachers and parents regarding of ocular problems in the school and give health

education. The activity and its impact ought to be evaluated periodically.

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