Prevalence of significant refractive errors in primary school children of a rural district of Kenya

AUTHORS

[1]Muma M K, [2]Kimani K, [2]Kariuki – Wanyoike M M

[1]Eye Unit, University Teaching Hospital, P/Bag RW 5000X Lusaka, Zambia; mkmuma@yahoo.com
[2]Department of Ophthalmology, School of medicine, University of Nairobi, College of Health Sciences, P.O. Box 19676-00202, Nairobi, Kenya

ABSTRACT

Objective: To determine the magnitude and pattern of significant refractive errors (visual acuity less than 6/18) among primary school children.

Design: A cross sectional school based study

Setting: Eight primary schools in Kilungu division, Makueni District, Kenya

Subjects: 1439 primary school pupils aged between 12 and 15 years

Results: Prevalence of significant refractive error was 5.2% (75/1439); being responsible for 92.6 % of all causes of poor eyesight. Hypermetropia accounted for 3.2%, myopia 1.7% and astigmatism 0.3% of refractive errors. Myopia was more likely to be present in the pupils aged 14 to 15 years than those aged 12 to 13 years with OR 0.3 which was statistically significant (p = 0.022).

Conclusion: The overall prevalence of significant refractive errors in pupils aged 12 to 15 years in Makueni's Kilungu division at 5.2% was high enough to justify a regular school eye screening in primary schools in Kenya.

INTRODUCTION

Refractive errors are the fourth commonest cause of blindness in the developing world.[1] In the developed countries, screening for eye diseases including refractive errors in school going children is done routinely.[2] In the UK for instance, almost all children with important visual problems including refractive errors have been detected before entry into school, and by the age of 8 years only 1.7% have not been screened for eye diseases.[2] Eye services are easily accessible in the developed countries and majority of children with eye problems access them without requiring referral by other health professionals from the primary level of health care.[2,3] In many developing countries, there are no national preschool or school eye screening programmes and in most cases screening is done for the purposes of research.[1] Therefore, little is known about the prevalence and public health importance of eye diseases in school age children. [4]

Effective management of blindness due to refractive errors is readily available in developed countries as compared to developing countries where it is scarce.[1] This management includes prompt refraction, easy accessibility to primary eyecare and affordable quality spectacles.[1] In Africa, centres which offer these services are few, inadequate and limited compared with the magnitude of the problem. These very few centres are also not easily accessible and the spectacles are not affordable to most people.[5] There is, therefore, need to develop service structures to match the magnitude of the problem.[5, 6]

METHODS

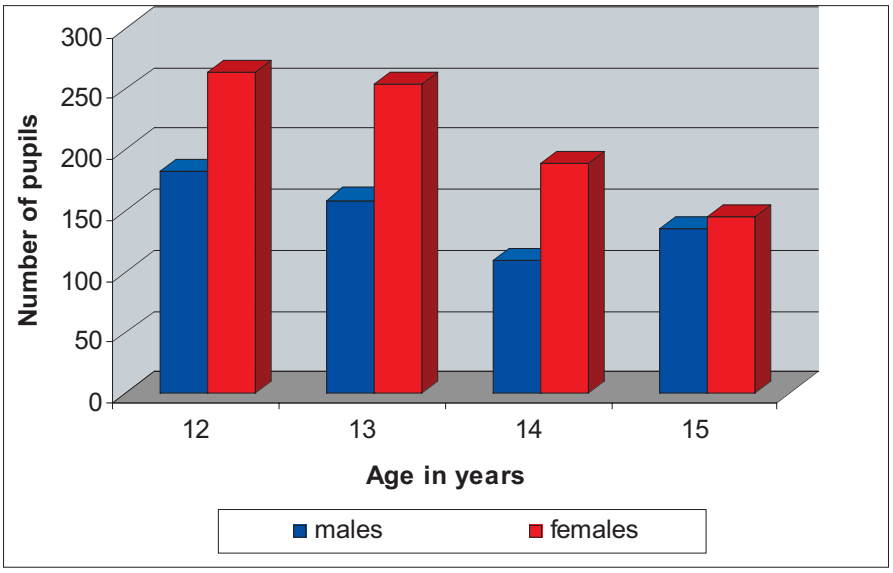
Computer generated random numbers were used to randomly select Kilungu divison and the 8 primary schools in which the study was conducted. From the selected schools all pupils aged between 12 and 15 years were included into the study. Pupils in this age range were picked from the school register. The ages of the pupils were determined from admission school records. Pupils absent during the survey were excluded from the study. 1439 pupils were examined. Study approval was granted by the Ministry of Education (MoE). Written consents from the head teachers of the school were obtained. Ethical approval was obtained from Kenyatta National Hospital ethical committee.

A questionnaire was used to capture demographic data and ocular history. Visual acuity was assessed using a Snellen's E chart at 6m in a well lit room. Each eye was tested separately. Objective refraction was carried out in all those with visual acuity (VA) less than 6/18 (significant refractive errors). Cycloplegic objective refraction was done by retinoscopy in a darkened room after dilating the pupils with 1% cyclopentolate in all students with visual acuity less than 6/18. Other ocular findings were documented. Pupils who needed further management were referred appropriately.

RESULTS

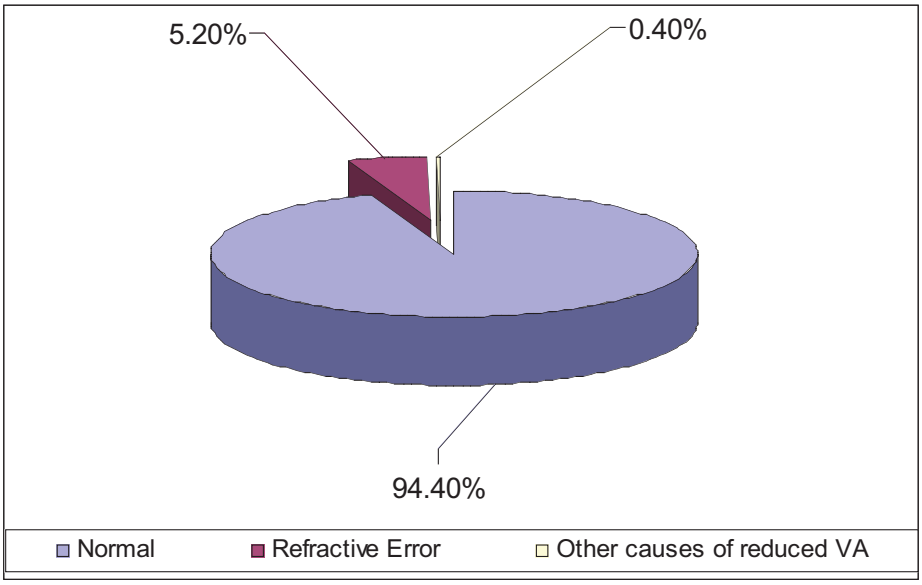
A total of 1439 pupils participated in the study representing a response rate of 94.5%.

Figure 1: Distribution of the pupils by age (n = 1439)



There was no statistically significant difference between the total number of boys and girls, p = 0.453.

Figure 2: Eye examination findings (n = 1439)



5.2% (75) pupils had refractive errors and the rest 94.4% (1358) had normal vision. The prevalence of refractive errors was 5.2%.

Table 1: Types of refractive errors in the examined children (n = 75)

Refractive error	frequency	Percentage
Myopia	24	1.7
Hypermetropia	47	3.2
Astigmatism	4	0.3

Hypermetropia was the most prevalent refractive error at 62.7% (47) followed by myopia 32.0% (24) and astigmatism at 5.30% [4].

Table 2: Distribution of refractive errors by Sex (n = 75)

Characteristics	Sex			
	Females,n(%)	Males,n(%)	OR (95%CI)	P-value
Myopia	14 (29.8)	10 (35.7)	0.8 (0.3-2.1)	0.595
Hypermetropia	30 (63.8)	17 (60.7)	1.0 (0.4-18.6)	0.032
Astigmatism	3 (6.4)	1 (3.6)	1.8 (0.2-18.6)	0.600

There was no significant association between refractive errors and sex of pupil, but the females were 1.8 times more likely to astigmatic compared to male pupils. Of the 75 pupils with refractive errors and in need of spectacles, 66(88%) had no spectacles. 9(12%) of the pupils said they had been prescribed spectacles previously but only one (13%) was noted to be wearing spectacles at the time of examination. Those without said they could not afford spectacles.

DISCUSSION

Of the 1522 primary school pupils who were eligible 1439(94.5%), examined. 852 (59.2%) were girls and 587 (40.8%) were boys (figure 1). There was no statistically significant difference between the proportion of males and females, p = 0.453.

Reduced VA considered to be < 6/18 was present in 81 (5.6%) pupils (figure 2). The main cause of reduced VA was refractive error with a prevalence of 5.2% (75), being responsible for 92.6% of all cases of reduced vision (figure 2). Therefore the prevalence of refractive errors in Kilungu division of Makueni district was found to be 5.2% (75), (figure 2). This was almost half of what Nzuki et al found in Nairobi's Langata division where the prevalence of refractive errors was found to be 10.2%.[7]

Myopia was found in twenty four (24) pupils giving a prevalence of 1.7%, table 1. Wedner et al and Nzuki et al found a higher prevalence of myopia in their studies at 5.6% and 4.2% respectively. [7,9] Similarly Naidoo et al in Uganda found an equally higher prevalence of myopia at 9.6%. [13] This could be attributed to the fact that the studies were conducted on urban based pupils who tend to be more myopic due to the activities they are mostly involved in which involves a lot of near work as explained by Wedner et al, Saw et al, Zhang et al and Garner el al. [5, 10, 11, 14]

The prevalence of myopia in our study was similar between males and females at 1.8% and 1.7% respectively and the difference was not statistically significant, p = 0.595, table 3. Kawuma et al and Nzuki et al found myopia more prevalent in the females as compared to males. [7, 8] Prevalence of myopia in pupils age 14 and 15 years in this study was similar to what Naidoo et al found.[13] There was statistically significant difference between those pupils aged 12 to 13 years and those aged 14 to 15 years (p = 0.022) and OR of 2.9 (0.1-9.2), table 2. This was contrary to what Wedner et al found were myopia was more prevalent in the pupils aged 11 to 13 years as compared to those aged 14 to 15 years and mostly female pupils.[8]

The prevalence of hypermetropia in our study was found to be 3.2% (47) with a distribution of 2.1% (30) females and 1.1% (17) males. The difference between the two sexes was statistically significant (p = 0.032), table 3. Nzuki et al found the prevalence of hypermetropia to be 0.3% and there was no statistical difference between the sexes. 13 In our study the prevalence of hypermetropia was found to be 10 times more than the Nzuki study. 13 Wedner et al and Garner et al also found lower prevalence of hypermetropia at 0.4% and 0.2% respectively. [8, 14]

In this study, hypermetropia was found more prevalent than myopia unlike what has been reported in other studies where the opposite has been found. Mclaren and Garner pointed out that school going pupils who are urban dwellers tend to have a myopic shift because they tend to do more near work as compared to their rural counterparts. [9, 12, 14]

The prevalence of astigmatism in these pupils was found to be 0.3% (4). This was slightly higher than what was found by Wedner et al were the prevalence was found to be 0.1%. 9 Nzuki found prevalence of astigmatism to be 0.5%.[7]

Only 1 (1.3%) of pupils with refractive errors already had full spectacle correction (table 4). This was attributed to the fact that they could not afford to buy spectacles. The other 66 (88.0%) had never been seen at any health facility and therefore did not have any correction.

CONCLUSION

The overall prevalence of significant refractive errors (VA worse than 6/18) in pupils aged 12 to 15 years in Makueni's Kilungu division was 5.2%. A regular school screening programme would be beneficial to the primary schools in this area.

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