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Study of Refractive Needs in School Children: Case of a Private Eye Care Structure in Bamako

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Abstract

Introduction: Refractive errors in school children continue to receive less attention and priority in many developing countries. Refractive errors can be a source of poor vision and disinterest in school. The aim of this study was to describe the epidemiological and clinical characteristics of ametropia in school children. **Materials and Methods:** This was a descriptive cross-sectional study carried out at the International Ophthalmology Center of Mali covering the period from January 1 to June 30, 2024, involving all school children. **Results:** A total of 207 children out of 702 school children received during the study period presented refractive errors. The most affected age group was 16 - 20 years old, with an average age of 16.95 years. The female sex was the majority, with 77.2% compared to 22.2% for the male sex. The main reasons for consultation were visual fatigue (36.2%) and tearing (20.2%). Hyperopia astigmatism was the most common refractive error, with a frequency of 62.3%. Low ametropia (<3 diopters) was dominant. **Discussions:** The management of refractive errors in school children is a major factor in their educational success. **Conclusion:** Early detection and management of refractive needs in school children can be key elements allowing them to be more efficient in daily activities.

Keywords

Children, Refractive Errors

1. Introduction

Ametropia or refractive errors or refractive vice are pathological entities frequently encountered in ophthalmology. Refractive errors in children in school continue to receive less attention and priority in many developing countries. However, the management of these refractive needs in school children is a major factor in their educational success. According to the literature, the prevalence of ametropia in children varies considerably depending on the studies. It varies from 2% to 30% depending on the age group, the geographical region, and the examination method [1] [2]. In Pakistan and Ivory Coast, the prevalence was 24.4% and 29.95%, respectively [3] [4]. In Mali, according to two studies carried out on the question, the prevalence varied from 27.7% to 46.8% [5] [6]. Refractive errors can be a source of poor vision and disinterest in schools, so their management is rightly one of the objectives of the global initiative "Vision 2020" [7]. Given the increasing attendance at the center by school children for visual difficulties related to their school activities, we initiated this study, the aim of which was to participate in improving the management of refractive errors in school children by describing the epidemiological and clinical characteristics of ametropia.

2. Materials and Methods

Study setting: The study was carried out at the International Ophthalmology Center of Mali, which is a private 2nd-level eye care facility.

Type and period of study: We conducted a descriptive cross-sectional study covering the period from January 1 to June 30, 2024.

Study population and selection criteria and information collection:

The sampling was exhaustive and concerned all young school-age patients, regardless of their level of education, who consulted during the study period. For patients under 18 years of age, informed consent from parents to participate in the survey was required. For patients aged 18 and over, the choice of whether or not to participate in the study was theirs directly. Those who did not consent to participate in the study were excluded. Information on patients was collected on a pre-established survey form.

Ophthalmologic examination:

All patients underwent a complete ophthalmologic examination based on distance acuity measurement assessed by the Snellen optotype scale, the status of the anterior segment and posterior segment at the slit lamp examination. Those who had a refractive need and were under 16 years of age underwent cycloplegia as follows: three successive instillations of cyclopentolate, each spaced 20 minutes apart. These were completed 20 minutes later by an instillation of a mixture of

tropicamide and neosynephrine. The patients then underwent an objective refraction and then a subjective refraction to determine the exact value of their correction.

***Case definition*:**

Ametropias were divided according to their refractive value as follows: in low myopia, when it was less than −3 diopters. In medium myopia, between −3 and −6 diopters, and in high myopia when greater than −6 diopters. In low hyperopia, when it was less than +3 diopters. In medium hyperopia, between +3 and +6 diopters. In high hyperopia, when greater than +6 diopters. In low astigmatism, when it is less than 3 diopters, a medium between 3 and 6 diopters, and high when it is greater than 6 diopters, its axes are defined from 0 to 180 degrees.

***Variables studied, Data entry and analysis*:**

The variables studied were age, sex, the reason for consultation, the type of ametropia diagnosed, its refractive value, its isolation, and its association with other ametropias. Data entry, processing, and analysis were done using Word and SPSS 25 software. Proportions were expressed in absolute or relative values.

3. Results

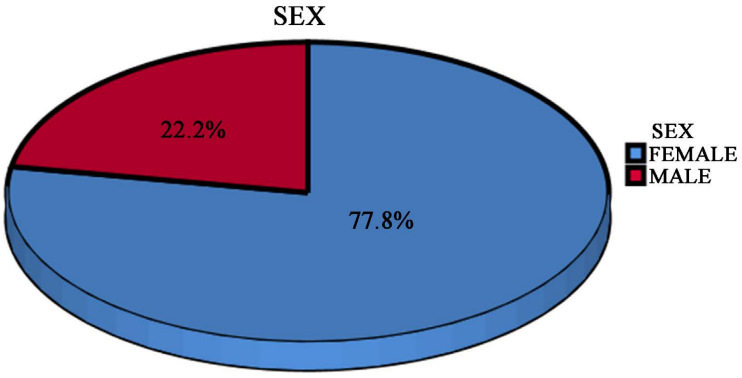
Of the 940 children who consulted during the study period, we collected 702 children with different levels of education, *i.e.*, a proportion of 74.68. Among them, 207 children presented refractive errors, *i.e.*, an incidence of 29.48%. The average age was estimated at 16.95 years, with extremes of 6 and 29 years, and the most represented age group was 16 - 20 years, with a frequency of 36.7% (Table 1). The female sex was in the majority with 77.8% against 22.2% for the male sex, *i.e.*, a ratio H/F of 3.50 in favor of girls (Figure 1). Visual fatigue and tearing were the most mentioned reasons for consultations, with 36.2% and 20.2% frequency, respectively (Table 2). The mean visual acuity without optical correction was 6.97/10 in the right eye and 6.85/10 in the left eye. Hyperopic astigmatism was the most common refractive error, with a frequency of 62.3% (Table 3). First-degree ametropia (<3 diopters) was dominant, with 95.23% for myopia and 100% for hyperopia and astigmatism (Table 4).

3.1. Socio-Demographic Characteristics

Table 1. Distribution of patients according to age.

Age group	n	%
0 - 6	2	1
7 - 10	15	7.2
11 - 15	65	31.4
16 - 20	76	36.7
21+	49	23.7
Total	207	100

The age groups **16 - 20** and **11 - 15** were the most represented.



The **female gender** was the most represented.

Figure 1. Distribution of patients by gender

3.2. Clinical Characteristics

Table 2. Distribution of patients according to the reason for consultation.

Reason for consultation	n	%
Decreased visual acuity	19	9.2
Eye pain	40	19.3
Eyestrain	75	36.2
Tearing	43	20.8
Photophobia	30	14.5
Total	207	100

Eye fatigue and **watery eyes** are the most commonly cited reasons for consultation.

Table 3. Distribution of patients according to the type of refractive need.

Ametropia	n	%
Isolated myopia	7	3.4
Astigmatism + myopia	14	6.8
Isolated hyperopia	42	20.3
Astigmatism + hyperopia	129	62.3
Isolated astigmatism	15	7.2
Total	235	100

Hyperopic astigmatism and **isolated hyperopia** were the most commonly encountered refractive errors.

Table 4. Distribution of ametropias according to their refractive value.

Refractive value	Ametropia					
	Myopie		Hypermétropie		Astigmatisme	
	n	%	n	%	n	%
Weak	20	95.23	171	100	158	100

Continued

Average	1	4.76	0	0	0	0
Strong	0	0	0	0	0	0
Total	21	100	171	100	158	100

Low ametropias were the most common.

4. Discussions

4.1. Limitations

The non-assessment of risk factors, the cross-sectional, monocentric nature of the study, and its short duration could be its limitations. A large-scale survey could provide broad insights into the subject.

4.2. Epidemiology Frequency

We collected 702 school-age patients, among whom 207 presented a need for refraction, *i.e.*, a frequency of 29.48%. This result is close to those found by Latif, Konaté, Gbé *et al.*, who respectively reported a frequency of 24.4%, 27.7%, and 33.03% [3]-[5]. In the literature, higher results have been reported. Thus, Basnet, Al-Thomali, Ayed, and Kra reported largely high frequencies with 49.37%, 50.91%, 57.2%, and 87.54%, respectively. [8]-[11] On the other hand, Pokharel U reported a frequency of 19.8% [12]. The difference between these results could be explained by the differences in methodologies.

4.3. Distribution of Patients as Follows

4.3.1. Age

The most affected age group was 16 - 20 years with 36.7% (n = 76), followed by 11 - 15 years with 31.4% (n = 65), and the least affected were 0 - 6 and 7 - 10 years with 1% (n = 2) and 7.2% (n = 15), respectively. Refractive error was more common in children in the 116 - 15 age group than in their younger counterparts [13]. The visual needs of school children would be more pronounced from the age of 7. The less pronounced impairment in younger patients could be explained by the fact that the visual needs expressed by this segment of the population continue to be often neglected by many parents.

4.3.2. Gender

Girls were more affected, with 77.8% (n = 161) versus 22.2% (n = 46) for boys. This female predominance was also found in Nigeria and Mexico [14] [15]. On the other hand, Kedir J and Basnet A reported in their studies a predominance in favor of the male sex with a frequency of 54% and 56.78%, respectively[8] [16]. Differences in methodology could explain the variability of the results obtained.

4.4. Clinical Aspect

4.4.1. Reason for Consultation

Visual fatigue predominated the reasons for consultation with 36.2% (n = 75),

followed by tearing with 20.8% (n = 43). In younger populations, Jeddi A and KRA A N reported headaches and blurred vision as the dominant symptoms respectively [17] [11].

4.4.2. Type of Ametropia

In this series, hypermetropic astigmatism was the predominant refractive error with 62.3% (n = 129), followed by isolated hypermetropia and isolated astigmatism with 20.3% (n = 42) and 7.2% (n = 15), respectively. Our results are consistent with those of Gbé, who reported a predominance of hypermetropic astigmatism at 43.95%, followed by simple hypermetropia at 22.54% [4]. In the work of Thera and Latif, the most frequent ametropia was simple myopia, with a frequency of 43.36% and 52%, respectively[3] [18].

4.4.3. Refractive Value

Among the refractive errors encountered, low ametropia (<3 diopters) was the most frequent, whether it was myopia, hyperopia, or astigmatism, with respectively 95.23%, 100%, and 100%. Similar observations have been reported in the literature in most studies carried out on refractive errors in children, such as those of Ayed and Odoulami-Yehouessi [10] [19]. This result corroborates the observations made in practice, according to which medium and high ametropia are less frequent.

5. Conclusion

This study provides an overview of the epidemiological and clinical characteristics of refractive needs in schoolchildren who received consultations in a private ophthalmological care center. It shows an increase in these needs with age, and girls seem to be more affected. Hyperopic astigmatism is the most common refractive disorder. Early detection and management of refractive needs in schoolchildren can be key elements that allow them to be more efficient in their daily activities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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