

AMETROPIA OF THE CHILD: REVIEW OF 432 FILES

Abstract

Background: In France, more than 10% of children under the age of 5 may have one or more vision abnormalities. The most frequent deficits (hyperopia, myopia, astigmatism and strabismus), often without significant immediate impact on the behavior or daily life of the infant or young child, are sometimes difficult to detect. **Methods:** A descriptive study based on the analysis of patient records was conducted in the Ophthalmology Department of the Teaching University Hospital of Brazzaville from January 2014 to December 2016. The data collected in the records were based on the interrogation which clarified the reason for consultation, the antecedents, the inspection and the ophthalmological examination. **Results:** Out of a total of 1126 files of children aged 5 to 15 years old, all enrolled during the study period, 432 patients had a refractive disorder. Astigmatism was the most found ametropia in 80.6% of cases ($p<0.01$), followed by myopia (12%) and finally farsightedness (7.4%). The most affected age group was 8-10 years, with hyperopia leading the way (62.5%; $p<0.05$) followed by astigmatism (53.4%; $p<0.05$). Visual acuity was less than or equal to 7/10th in 432 ametropics.

Keywords: ametropia, astigmatism, child, amblyopia

1. Introduction

Ametropia or refractive errors are most often accompanied by a decrease in visual acuity which is the gravity of its pathologies and can complicate the learning of social life including school or even create a real handicap [1]. Ametropia is the worldwide reason for frequent consultation with visual acuity declines [2] and requires early detection and appropriate management [3]. In our developing countries the situation is not worrying as the loss of visual acuity is not life-threatening. However, in Tunisia, Ayed et al [4] observed in 2000 that 57.2% of school children aged 6 to 15 were ametropic. It is then that we propose to determine the profile of these ametropia and their impact on low vision.

2. Materials and methods

A descriptive study based on the analysis of patient records was conducted in the Ophthalmology Department of the Teaching University Hospital of Brazzaville from January 2014 to December 2016. The data collected in the records were based on the interrogation

which clarified the reason for consultation, the antecedents, the inspection and the ophthalmological examination made of a measurement of the visual acuity by far in monocular to 5 meters using age-appropriate otopotypes, automatic refractometry using a TOPCON AR-8800 refractometer and cyclopentolate cycloplegia (skiacol), anterior segment biomicroscopy, automatic tonometry, and a fundus. Ametropia were divided into three categories: myopia (M), hyperopia (H) and astigmatism (A) whose simple shape was defined for positive or negative cylindrical refractive values, the compound form for positive and spherical refractive values and / or negative. Three degrees of severity were adopted: low spherical ametropia for refraction less than 3 D (dioptries), moderate spherical ametropia for refraction between 3 and 6 D, strong spherical ametropia for a refraction below 6 D all at algebraic value [5]. Astigmatism was considered low when it was less than 2 D, moderate when it was between 2 and 4 D, and strong at 4 d. Anisometropia was defined by a difference in refraction between the two eyes greater than 2 D [6]. Any child with a subjective measure of visual acuity by far on a log-progression decimal scale of less than or equal to 7 / 10th in at least one eye was considered ametropic [2]. Variables analyzed were: age, sex, visual acuity and refractive power of each eye. The analysis of the data was carried out with the software Epi info, version 2012. Data analysis was performed using SPSS software (Statistical Package of Social Sciences), version 16.1. Comparison of more than two percentages used Sokal's S test. The threshold of significance of the test was set at 5%.

3. Results

Out of a total of 1126 files of children aged 5 to 15 years old, all enrolled during the study period, 432 patients had a refractive disorder, relative frequency equal to 38.3%.

Among these subjects, 242 patients (56%) were male and 190 (44%) female, with no significant difference ($p>0.05$). The frequency by type of ametropia and sex was shown in Table 1.

Table 1 : Distribution of ametropia by sex

Sex	Male		Female		Total	
	n	%	n	%	n	%
Hyperopia	12	37.5	20	62.5	32	7.4
Myopia	30	57.7	22	42.3	52	12.0
Astigmatism	200	57.5	148	42.5	348	80.6***
Total	242	56	190	44	432	100

Abbreviation :***, $p<0.01$

63 Astigmatism was the most found ametropia in 80.6% of cases ($p<0.01$), followed by myopia
64 (12%) and finally farsightedness (7.4%).

65 Table 2 shows the distribution of astigmatisms. Astigmatism was present in 52.4% of boys
66 and 28.2% of girls ($p<0.05$). It was simple in (57.9%), composed in (24.7%) associated with
67 myopia (15.7%) and hyperopia (7%), a total of 27.7% cases of myopia and 14, 4% cases of
68 hyperopia.

69 **Table 2:** Distribution of astigmatism by sex
70

Sex	Male %	Female %	Total %
astigmatism simple	34.7	23.2	57.9
Myopic compound astigmatism	12.2	3.5	15.7
Hypermetropic composite astigmatism	5.5	1.5	7.0
Total	52.6*	28.2	80.6

71
72 **Abbreviation :** *, $p<0.05$
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74
75 The mean age of our patients was 10.4 years (range: 5-15 years). The different ametropia
76 were analyzed according to age groups and shown in Table 3. The 8-10 age groups were the
77 most representative with 231 cases (53.4%; $p<0.05$). Compound astigmatism was
78 predominant between 10 and 13 years with 128 cases (36.7%).
79

80 **Table 3:** Distribution of types of ametropia by age group
81

Age groups	5-7 years		8-10 years		11-3 years		14-15 years		Total	
	n	%	n	%	n	%	n	%	n	%
Hyperopia	1	3.1	20	62.5*	6	18.7	5	15.7	32	7.4
Myopia	2	3.8	25	48.1	20	38.5	5	9.6	52	12.0
Astigmatism	38	10.9	186	53.4*	74	21.3	50	14.4	348	80.6
Total	41	9.5	231	53.5	100	23.1	60	13.9	432	100

82 **Abbreviation :** *, $p<0.05$
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84 The most affected age group was 8-10 years, with hyperopia leading the way (62.5%;
85 $p<0.05$) followed by astigmatism (53.4%; $p<0.05$). Visual acuity was less than or equal to
86 7/10th in 432 ametropics. It was not improvable in 9 cases (2%). Two cases of anisometropia

87 were noted. In the majority of cases, ametropia was low (68.5%), and mild astigmatism was
88 small in 225 (52.9%) cases of all ametropia.

89

90 **4. Discussion**

91 Ametropia are the most common pathologies encountered in schoolchildren, specially aged 8-
92 10 years old. Its prevalence varies according to the series from 60% to 2%. Our frequency of
93 38.3% is close to that found by Omgbwa Eballé et al. in Cameroon 43.1% [7]. High
94 prevalences of 50.8%, 56.3%, 57.2% were reported by He et al. [8] in China, Maul et al. [9]
95 in Chile, Ayed et al. [4] in Tunisia. These high prevalences seem to be justified by automatic
96 cycloplegic refractometry [4]. Other authors, however, found low frequencies such as China
97 18.8% [10], Benin 10.6% [2] and Nepal 2.2% [11].

98 Sex has no influence on the occurrence of ametropia in children, our result is similar to those
99 reported in Tunisia, Cameroon, and Japan [4, 7,12].

100 Astigmatism was the most recovered refractive error (80.6%), especially in its simple form
101 (57.9%). Our results are superimposed on those of Sounouvou in Benin [2] who report
102 prevalences of 91.9% of total astigmatism and 46.4% in its simple form. A predominance of
103 hyperopia has been reported in studies by Hashemi et al. [13] in Iran 56.6% and Jeddi et al.
104 [3] in Tunisia which estimates it to 67% [13]. This disparity in ametropia is explained more
105 by ethnic factors than by genetic factors [14]. Myopia (27.7%) and hyperopia (14.4%) were
106 observed in similar proportions: 33.9% and 19.7% in Benin [2], and 33% and 22% in the
107 Republic Democratic of Congo [15]. In our study, 2 boys were astigmatism for a girl, but this
108 difference does not appear to be a risk factor for ametropia.

109 The frequency of ametropia increased in our study until the age of 10 and then gradually
110 decreased. The same trend has been observed for each type of ametropia. Sounouvou et al.
111 [2] found the same results with no statistically significant relationship between age and
112 ametropia (P greater than 0.05).

113 All children whose visual acuity was less than or equal to 7 / 10e had a refractive anomaly,
114 but subjective visual acuity alone is insufficient to make the diagnosis of ametropia. For
115 Roche [16], a large number of children with 7 / 10th or less acuity were emmetropic. Hence
116 the need to minimize the risk of errors by objective refraction under cycloplegia. The nine
117 cases (2%) of visual acuity that could not be improved were made up of 5 cases of strong
118 myopia, 3 cases of compound myopic astigmatism and 1 case of all amblyogenic hyperopia.
119 Both cases of anisometropia were due to unilateral strong myopia. This shows the importance
120 of early detection of ametropia and its best correction to prevent low vision.

Ametropia was in the majority of cases low (68.5%), with 225 cases or 52.9% of simple astigmatism low of all ametropia. Sounouvou et al. [2] and Odoulami-Yehouessi et al [5] made the same observations and reported respectively 89.3%, 45.5% and 71.8%, 17.1%.

5. Conclusion

Vices of refraction are frequent in our daily practice, they were present in 38.3% of cases with a strong predominance of astigmatism (80.6%) and weak ametropia (68.5%). The non-negligible frequency of amblyopia (2%) requires mass actions for the early detection of ametropia and its adequate treatment.

Ethical approval

It is not applicable.

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