Ametropiain Children: A Review of 432 Cases

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Authors' contributions

This work was carried out in collaboration between all authors. Authors MC, NNGCF, KRC and DB were the doctors consulting patients. The author MA performed the statistical analysis and writing of the study. The author MC was responsible supervising and writing the study. All authors read and agreed with the final version.

Original Research Article

ABSTRACT

Aims: To determine the epidemiological and clinical aspects of ametropia and their impact on low vision.
Study Design: Retrospective.
Place and Duration of Study: Department of Ophthalmology, University and Hospital Center of Brazzaville Congo between January 2014 and December 2016.
Methodology: The records of 1,126 children aged 5–15 years who attended the ophthalmic department were assessed. A refractive error was considered visual acuity less than 0.7 (decimal notation of visual acuity) on the measurement of visual acuity by far in monocular to 5 meters using otoptypes adapted for age.
Results: Of the 1,126 records, 432 children had a refractive disorder, with a relative frequency of 38.3%. Of these, 242 (56%) were males, and 190 (44%) were females. Concerning the reasons for consultation, a headache ranked first 218 (50.5%), followed by problems with visual acuity 106 (24.5%). Astigmatism was the most common type of ametropia 348 (80.6%), followed by myopia 52 (12%) and farsightedness 32 (7.4%). Astigmatism was present in 52.4% of boys and 28.2% of girls

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(P<0.05). Astigmatism was associated with myopia in 15.7% of cases and hyperopia in 7% of cases. The mean age of the patients was 10.4 years, with children aged 8–10 years accounting for the majority of cases (n = 231, 53.4%). Visual acuity was ≤0.7 in 432 patients with refractive errors. Ametropia did not improve in 9 (2%) cases. There were 2 cases (0.5%) of anisometropia. In the majority of 296 (68.5%) cases, ametropia was not severe. In 225 (52.9%) ametropic cases, the astigmatism was the simple form.

Conclusion: The prevalence of ametropia observed in this study points to the need for action to enable early detection and treatment.

1. INTRODUCTION

The ametropia or a refractive error is most often accompanied by a decrease in visual acuity, with the severity depending on the underlying pathology [1]. In children, ametropia can have adverse effects on learning [1]. It can also impede social aspects of life. Worldwide, ametropia is the most common cause of declines in visual acuity and ophthalmic consultations [2]. Ametropia requires early detection and appropriate management [3]. In developing countries, loss of visual acuity is not life threatening. However, in under-developed countries, such as Tunisia, it poses a major threat. According to a study conducted in Tunisia in 2000, 57.2% of schoolchildren aged 6–15 years were ametropic [4]. The aim of the present study was to determine epidemiological and clinical aspects of ametropia and the impact of these on low vision in Congo Brazzaville.

2. MATERIALS AND METHODS

2.1 Study Population

We conducted a retrospective study of the records of patients who attended the Department of Ophthalmology, University and Hospital Center of Brazzaville Congo from 1 January 2014 to 31 December 2016. A data collection sheet was compiled based on information in patient records, including the reasons for consultations, medical histories and results of ophthalmic examinations. Children aged 5–15 years were included in the study. A subjective measure of visual acuity was used based on a logarithmic scale ≤ 0.7 decimal in at least one eye and spherical or cylindrical ametropia of ≥ 0.5D. The exclusion criteria were: aged less than 5 and greater than 15 years, incomplete files, and existence of organic amblyopia. The study was approved by the ethics committee of the Medical Society of Congo-Brazzaville. The variables analysed were age, sex, reason for consultation, visual acuity and refractive power of each eye.

2.2 Ophthalmic Examinations

All the patients underwent an ophthalmological examination, including measurements of uncorrected monocular visual acuity at a viewing distance of 5 m using age-appropriate ototypes; automatic refractometry using a TOPCON AR-8900 refractometer before and after the induction of cycloplegia (achieved using cyclopentolate eyedrops); anterior segment biomicroscopy; automatic tonometry; and a fundus assessment.

2.3 Definitions

Ametropia was divided into three categories: myopia, hypermetropia and astigmatism. The simple form was defined as positive or negative cylindrical refractive values, and the compound form was defined as positive and spherical refractive values and negative or negative values. Three degrees of severity were recognized: low spherical ametropia was considered refraction less than 3 D (dioptres), moderate spherical ametropia was considered refraction between 3 and 6 D, and strong spherical ametropia was considered refraction greater than 6 D, all at algebraic values [5]. Astigmatism was considered low when it was less than 2 D, moderate when it was between 2 and 4 D and strong when it exceeded beyond 4 D. Anisometropy was defined by a difference in refraction between two eyes greater than 2 D [6].

2.4 Statistical Analysis

The analysis of the data was carried out using Epi Info, version 2012 software. To compare the percentages of the various parameters the S test of Sokal was conduted. P values were considered significant when the threshold of significance was ≤0.05.

3. RESULTS

Of a total of 1,126 patient records of children aged 5–15 years who presented during the study period, 432 children had a refractive disorder, a relative frequency of 38.3%. Of these, 242 (56%) patients were males, and 190 (44%) were females, with no significant difference (P>0.05). The average age of the patients was 10.4 years (range: 5–15 years). As shown in Fig. 1, a headache was the most common reason for consultation 218 (50.5%) of cases, asthenopia was observed in 106 (24.5%) of cases, a decrease in visual acuity was noted in 72 (16.7%) of cases and 36 (8.3%) wore glasses of correction for prior optical equipement.

The frequency by type of ametropia and sex is presented in Table 1. Astigmatism was the most common ametropia (n=348, 80.6%), followed by myopia (n=52, 12%) and farsightedness (n=32, 7.4%).

Table 2 shows the distribution of astigmatisms. Astigmatism was present in 52.4% of boys and 28.2% of girls (P<0.05). Composed astigmatism 22.7% of cases, associated with near-sightedness in 15.7% and hypermetropia (7%); for a total of 27.7% cases of myopia and 14,4%, cases of hypermetropia.

The different types of ametropia, analysed by age group, are shown in Table 3. Ametropia was most common among those aged 8–10 years (n = 231, 53.4%) (P<0.05). Compound astigmatism was common in those aged 10–13 years (n = 128, 36.7%).

Visual acuity was ≤ 0.7 in 432 ametropia cases. It was not improved in 9 (2%) cases. There were 2 (0.5%) cases of anisometropia. In terms of the severity of ametropia, it was classified as low in the majority 296 (68.5%) of cases. The astigmatism was the simple form in 225 (52.9%) cases.
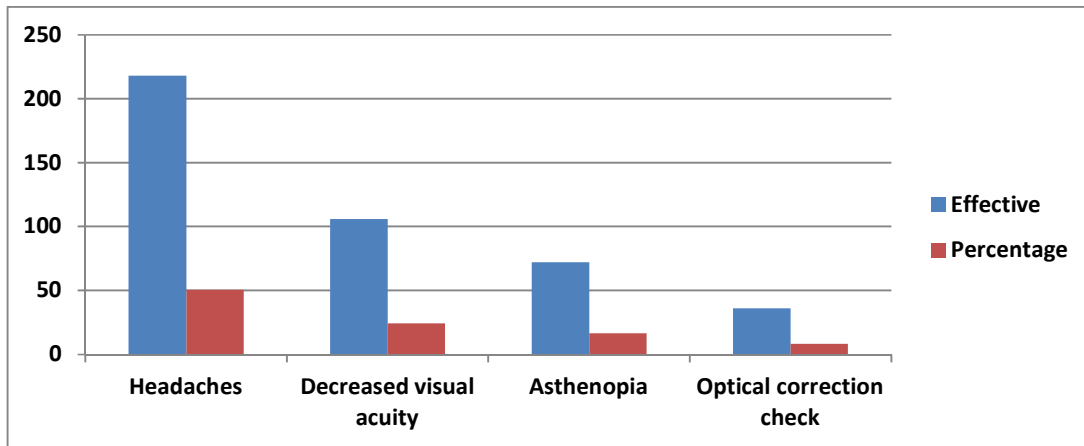

Fig. 1. Frequency distribution of functional signs

Table 1. Distribution of ametropia by sex

Sex	Male		Female		Total	
	n	%	*n*	%	*n*	%
Hypermetropia	12	37.5	20	63.5	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

n = number of patients

Table 2. Distribution of astigmatism by sex

Sex	Male %	Female %	Total %
Simple astigmatism	34.7	23.2	57.9
Compound myopic astigmatism	12.2	3.5	15.7
Compound hypermetropic astigmatism	5.5	1.5	7
Total	52.6	28.2	80.6

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Table 3. Distribution of type of ametropia by age group

Age range	5–7 years		8–10 years		11–13 years		14–15 years		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Hypermetropia	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
igmatism	38	10.9	186	53.4*	74	21.3	50	14.4	348	80.6
Total	41	9.4	231	53.4	100	23.1	60	13.8	432	100

* P <0.05

4. DISCUSSION

Ametropia is one of the most common pathologies encountered in schoolchildren, with a reported prevalence of 28–60%, depending on the series [3]. The frequency (38.3%) found in the present study was close to that (43.1%) reported in a previous study conducted in Cameroon [7]. Studies conducted in China and Chile reported a higher prevalence of 50.8% and 56.3%, respectively, [8,9]. A study in Tunisia found a prevalence of 57.2% [4]. The high recorded prevalence of ametropia is likely attributed to the use of automatic refractometry measurements after the induction cycloplegia [4]. Other studies conducted in China (18.8%) [10], Benin (10.6%) [2] and Nepal (2.2%) [11] found low frequencies of ametropia.

In the present study, sex was not associated with the occurrence of ametropia in children. This finding is in accordance with that reported in studies conducted in Tunisia, Cameroon and Japan [4,7,12].

In this study, astigmatism was the most common type of refractive error (80.6%), especially the simple form (57.9%). Our observations are comparable with those of a previous study, which reported a prevalence of 91.9% for total astigmatism and 46.4% for simple astigmatism in a paediatric population in Benin [2]. On the other hand, studies conducted in Iran and Tunisia reported a predominance of hypermetropia (56.6% and 67%, respectively) [13,14]. Disparities in the prevalence of ametropia are likely attributed to ethnic rather than genetic factors [15], as can be seen in the present study. In our study, the proportions of patients with myopia (27.7%) and hyperopia (14.4%) were similar to those reported in studies conducted in Benin (33.9% and 19.7%, respectively) [2] and the Democratic Republic of Congo (33% and 22%, respectively) [16]. In the present study, two boys for one girl have astigmatism, but this difference did not appear to be a risk factor for ametropia.

The frequency of ametropia in our study increased until the age of 10 years and then gradually decreased. The same trend was observed for each type of ametropia. A previous study found similar results, with no statistically significant relationship between age and ametropia (*P*>0.05) [2].

All children with visual acuity ≤ 0.7 are considered to have a refractive anomaly. However, subjective visual acuity alone is insufficient to make a diagnosis of ametropia. According to Roche [17], a large number of children with visual acuity ≤ 0.7 were emmetropic. The refraction objective by cyclopegia undoubtedly minimizes the risk of refractive error.

In the present study, nine (2%) cases of visual acuity could not be improved. These consisted of five cases of strong myopia, three cases of compound myopic astigmatism and one case of amblyogenic all-round hypermetropia. Both cases of anisometropia were due to unilateral strong myopia. These findings high light the importance of early detection of ametropia and its best correction of refraction anomalies to prevent low vision.

In the majority of cases (68.5%), the severity of ametropia was classified as low, with 225 (52.9%) cases of ametropia due to simple astigmatism. Sounouvou et al. [2] and Odoulami-Yehouessi and al. [5] presented similar findings, reporting, respectively, 89.3%, 45.5% and 71.8%, 17.1%.

5. CONCLUSION

Refraction anomalies are common in daily practice. In this study, they were present in 38.3% of cases, with a strong predominance of astigmatism (80.6%) and low ametropia (68.5%). Amblyopia (2%) was also detected. The prevalence of ametropia observed in this study points to the need for action to enable early detection and treatment.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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