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Refractive Errors among Children Aged 12-18 at the Secondary Ophthalmology Center of Ouelessebougou

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Abstract **Original Research Article**

Refractive errors are the most common causes of visual acuity reduction globally and are one of the main reasons for ophthalmology consultations. The aim of this study is to examine refractive errors in children aged 12 to 18 years at the secondary ophthalmology center of Ouelessebougou. This retrospective study was conducted from January 2020 to December 2022, including 130 patients seen at the center. Data analysis was performed using SPSS and Excel 2016 software. Decreased visual acuity was the most common reason for consultation (23.8%), while LCET was the most frequently associated ocular pathology (31.5%). The majority of our patients were mild myopes with a frequency of 45.4% in both right and left eyes. With correction, almost all patients (95.4%) achieved a visual acuity of 10/10 in both eyes. Optical correction yields excellent results with significantly improved visual acuity; early detection of refractive errors is essential to reduce the risk of amblyopia.

Keywords: Refractive Errors, Children, Ouelessebougou.

INTRODUCTION

Vision is a sensory function that provides information about the shape, size, color, and mobility of the environment. An emmetropic eye has normal refraction, and the image of an object forms on the retina. Refractive error occurs when the image does not form on the retina. Refractive errors are a public health issue socially and educationally, but their extent in sub-Saharan African countries is not well known [1].

The WHO estimates that around 153 million people worldwide live with uncorrected or poorly corrected refractive errors; about 6.3 million live in Africa. They represent the second leading cause of preventable blindness after trachoma. Refractive errors are among the five priority diseases of the WHO and other international organizations [2].

In Conakry, a retrospective study of children aged 5 to 16 years at the Bartimée Ophthalmology Clinic found a frequency of 14.1% [4].

In Benin, a prospective descriptive study conducted from November 1, 2005, to March 31, 2006, at Cadjehoum Primary School found a frequency of 10.6% [5]. In Cameroon, a 2008 study on common pathologies among school children aged 6 to 15 years showed a frequency of 43.1% for refractive errors [6].

In Mali, a descriptive cross-sectional study of children aged 5 to 18 years at IOTA between January 2017 and February 2018 found a prevalence of 46.8% [1].

In Bamako's Commune IV, a 2007 study of refractive errors in school children aged 12-18 years found a prevalence of 18.9% [7].

In Communes V and VI, a 2002 study on the prevalence of astigmatism in school settings found a frequency of 41.6% among school children aged 5 to 14 years [8].

In the Koulikoro region, a study on the prevalence of refractive errors in primary education found an overall prevalence of 13.6% [9]. Given these considerations, we conducted a study on refractive errors at the secondary hospital in Ouelessebougou.

PATIENTS AND METHODS

This retrospective study was conducted from January 2020 to December 2022, covering a period of 3 years.

All children aged 12-18 years admitted to the service for refractive errors and who underwent refraction were included. Patients were recruited during consultations.

They were seated 5 meters in front of the Snellen visual acuity chart.

Each patient's name, surname, age, gender, residence, phone number, and consultation reason were recorded.

The patients' presence on-site reassured them and focused their attention on the visual acuity measurement technique, quickly understanding the E orientation of the Snellen chart. Each patient underwent a complete ophthalmological examination, including:

- Measurement of uncorrected distance visual acuity in each eye.
- Examination of the anterior segment and adnexa with a slit lamp.
- Fundus examination with direct ophthalmoscopy.
- Stenopaeic hole examination and autorefractometer use for children with less than 10/10 vision in one or both eyes.

Data collection tools included consultation registers, patient files, and study forms. Data processing and analysis were performed using IBM SPSS and Excel 2016. The document was written using Word 2016.

RESULTS

Socio-Demographic Aspects

Out of 3090 patients, we recorded 130 cases of refractive errors, representing a frequency of 4.21%. In our sample, 12-year-olds were the most numerous, accounting for 25.4% (Table I). In our study, 69.2% of refractive error patients were male, and 30.8% were female (Table II). The majority ethnic group was Bambara, representing 56.1% (Table III).

Anatomo-Clinical Aspects

In our study, decreased visual acuity was the most common reason for consultation, accounting for 23.8% (Table IV). In our sample, 85.4% of children had parents who wore corrective lenses (Table V). 66.2% of patients did not wear corrective lenses (Table VI). In our study, 98.5% of patients had uncorrected distance visual acuity less than 10/10 in both eyes (Table VII). After correction, 95.4% of patients achieved a visual acuity of 10/10 in both eyes (Table VIII). Mild myopia was the most frequent type of refractive error in both eyes, at 45.4% (Table IX). LCET was the most common associated ocular pathology at 31.5% (Table X).

APPENDICES

SURVEY FORM

I – SOCIO-DEMOGRAPHIC DATA

1. Survey Form Number: ……
2. Date: ……
3. Last Name: ……
4. First Name: ……
5. Age: ……
6. Gender: / _ / 1- Male 2- Female
7. Ethnicity: ……
8. Educated: / _ / 1- Yes 2- No
9. Optical Correction:

○ Self: / _ / 1- Yes 2- No

If yes, specify:

- Right Eye (OD): ……
- Left Eye (OG): ……..

○ Parent: / _ / 1- Yes 2- No

II- INTERROGATION 10. Child's Complaints: …… …… ……

III- VISUAL ACUITY (VA) 11. Uncorrected Visual Acuity (UVA) = - Right Eye (OD): …….. - Left Eye (OG): …….. - Both Eyes (ODG): …….. 12. Pinhole Test (PT) = - Right Eye (OD): …….. - Left Eye (OG): …….. - Both Eyes (ODG): …….. 13. Automatic Refractometry: - Right Eye (OD): ……. - Left Eye (OG): ……. 14. Corrected Visual Acuity (CVA): - Right Eye (OD): …….. - Left Eye (OG): …….. - Both Eyes (ODG): …….. 15. Best Corrected Visual Acuity (BCVA): - Both Eyes (ODG): ……..

IV- EYE EXAMINATION: 16. Eyelids and Adnexa: - Right Eye (OD): …….. - Left Eye (OG): …….. 17. Anterior Segment: - Right Eye (OD): …….. - Left Eye (OG): …….. 18. Fundus Examination: - Right Eye (OD): …….. - Left Eye (OG): ……..

V- DIAGNOSIS 19. Positive Diagnosis: - / _ / 1- Ametropia 2- Emmetropia - a. Hypermetropia / _ / 1- Yes 2- No - If Yes, specify: 1- Low [+0.50 +2] 2- Medium [+2 +5] 3- High [+5 ∞] - b. Myopia / _ / 1- Yes 2- No - If Yes, specify: 1- Low [-0.50 -3] 2- Medium [-3 -6] 3- High [-6 ∞] - c. Astigmatism / _ / 1- Yes 2- No - If Yes, specify: 1- With-the-rule (0-30°) 2- Against-the-rule (60-120°) 3- Oblique (30-60°) (150-180°) (120-150°) - If Ametropia, specify: - Right Eye (OD): …….. - Left Eye (OG): …….. 20. Ocular Pathology: / _ / 1- Yes 2- No - If Yes, specify: - Right Eye (OD): …….. - Left Eye (OG): ……..

VI- TREATMENT 21. Method: / _ / 1- Optical Correction 2- Medical 3- Surgical 4- None 22. Optical Correction: / _ / 1- Yes 2- No - If Yes: - Right Eye (OD): Sphere …… Cylinder …… Axis …… - Left Eye (OG): Sphere ……

Cylinder …… Axis …… - CVA: - Right Eye (OD): …… - Left Eye (OG): …… - Both Eyes (ODG): ……

Table 1: Distribution of the Sample by Age

Age	Frequency	Percentage
12	33	25.4%
13	18	13.8%
14	15	11.5%
15	8	6.2%
16	14	10.8%
17	28	21.5%
18	14	10.8%
Total	130	100%

In our sample, patients aged 12 were the most numerous, representing 25.4%.

Table 2: Distribution of the Sample by Gender

Gender	Frequency	Percentage
Male	90	69.2%
Female	40	30.8%
Total	130	100%

The majority of our sample were male, with a frequency of 69.2%.

Table 3: Distribution of the Sample by Ethnicity

Ethnicity	Frequency	Percentage
Bambara	73	56.1%
Senoufo	11	8.3%
Minianka	8	6.1%
Dogon	7	5.3%
Peuhl	8	6.8%
Sonrhaï	13	9.8%
Bozos	10	7.6%
Total	130	100%

The majority ethnic group was Bambara, with a frequency of 56.1%.

Table 4: Distribution of the Sample by Reason for Consultation

Complaint	Frequency	Percentage
Visual acuity loss	31	23.8%
Visual difficulties	20	15.4%
Tearing	30	23.1%
Eye pain	15	11.7%
Itching	9	6.9%
Photophobia	7	5.4%
Redness	4	3.0%
Discharge	4	3.0%
Stinging	8	6.2%
Dizziness	2	1.5%
Total	130	100%

In our study, visual acuity loss was the primary reason for consultation, accounting for 23.8%.

Table 5: Distribution of the Sample by Previous Use of Corrective Glasses Among Children

Use of Corrective Glasses	Frequency	Percentage
Yes	44	33.8%
No	86	66.2%
Total	130	100%

In our sample, 66.2% of the patients did not wear corrective glasses.

Table 6: Distribution of the Sample by Previous Use of Corrective Glasses Among Parents

Use of Corrective Glasses	Frequency	Percentage
Yes	111	85.4%
No	19	14.6%
Total	130	100%

In our sample, 85.4% of the children had parents who wore corrective glasses.

Table 7: Distribution of the Sample by Uncorrected Distance Visual Acuity in Right and Left Eyes

Uncorrected VA in Both Eyes	Frequency	Percentage
10/10	2	1.5%
<10/10	128	98.5%
Total	130	100%

In our study, 98.5% of the patients had an uncorrected distance visual acuity of less than 10/10 in both eyes.

Table 8: Distribution of the Sample by Corrected Distance Visual Acuity in Right and Left Eyes

Corrected VA in Both Eyes	Frequency	Percentage
10/10	124	95.4%
9/10	5	3.8%
≤ 3/10	1	0.8%
Total	130	100%

In our study, 95.4% of the patients had a corrected distance visual acuity of 10/10 in both eyes.

Table 9: Distribution of the Sample by Types of Ametropia in Right and Left Eyes

Types of Ametropia	Frequency	Percentage
Low Myopia	59	45.4%
Low Hypermetropia	18	13.8%
Simple Myopic Astigmatism	24	18.5%
Compound Myopic Astigmatism	11	8.5%
Mixed Astigmatism	13	10.0%
High Myopia	1	0.8%
AMsp/AMCP	2	1.5%
AMsp/Mixed	1	0.8%
High Hypermetropia	1	0.8%
Total	130	100%

Low myopia was the most common type of ametropia in both right and left eyes, with 45.4%.

Table 10: Distribution of Ametropia by Associated Ocular Pathologies

Associated Ocular Pathology	Frequency	Percentage
Normal	50	38.5%
Strabismus	6	4.6%
Stye	3	2.3%
Conjunctivitis	17	13.1%
LCET	41	31.5%
Conjunctival Hyperemia	13	10.0%
Total	130	100%

In our study, LCET was the most common ocular pathology, with 31.5%.

DISCUSSIONS

Sociodemographic Characteristics of Patients

Age:

Our patients were aged 12 to 18 years. Studies by O Diallo [8], Kim IS *et al*., [20], in Korea in 1971, Ayed T [21], in Tunisia in 2000, Sethi S *et al*., [22], in 1998, S Matta *et al*., in New Delhi [23], and SNN NWOSUV [24], in Nigeria in 2002 focused on the same age range. This age group is when students have intense academic activities.

Gender:

In our study, 69.2% of refractive error patients were male and 30.8% female. Similar observations were made by O Diallo [7], Ayed T [21], and S Matta *et al*., [23], who found 53% boys and 47% girls. However, Téra B [9], found that females were more affected by refractive errors, with a prevalence of 65% compared to 35% for boys. CORNET V [25], found 61% for girls and 39% for boys.

Ethnicity:

In our study, 56.1% of patients were Bambara. This result is similar to O Diallo [7], who found 31.1%, possibly because Bambara is the majority ethnic group.

- Most of our sample were students, accounting for 86.2% (Table IV).
- In our study, 73.8% of patients were from rural areas (Table V) (VII).

Clinical Characteristics

Complaints:

In our study, decreased visual acuity accounted for 23.8%. This rate is similar to Houda and K Michelle [26], who found 42.1% and 90%, respectively.

- Patients with corrective lenses represented 33.8%. This result is similar to O Diallo [7], and K Michelle [26], who found 21.2% and 26%, respectively.
- In our study, 85.4% of patients had parents with corrective lenses. This may be due to the genetic or hereditary nature of refractive errors.
- Myopia was found in 46.2% of refractive error patients. This result is comparable to S Sethi [22], and S Matta [23], who found 63.5% and 55.6% myopes, respectively.
- LCET was the most common associated pathology at 31.5%, followed by conjunctivitis at 13.1%. These results align with O Diallo [7], and Théra [9], who found 72.17%, 71% for LCET and 24.74%, 25.7% for conjunctivitis.
- In our study, 98.5% of patients had uncorrected distance visual acuity less than 10/10 in both eyes.
- In our study, 95.4% of patients achieved a visual acuity of 10/10 after correction in both eyes.

CONCLUSIONS

Refractive errors remain a leading cause of visual impairment in children worldwide. This retrospective study conducted over one year concludes that refractive errors are a significant public health issue. In our study, refractive errors were prevalent among children aged 12 to 18 years. The proportion of patients wearing corrective lenses was low. Effective measures such as early detection and timely optical correction can significantly improve visual acuity, reducing the risk of amblyopia. Public health initiatives focusing on vision screening in schools and providing affordable corrective lenses can greatly benefit children's ocular health. Further research and longitudinal studies are necessary to better understand the dynamics of refractive errors in different populations and age groups.

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