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Research Article

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Hyperopia in Young People: Risk Factors and Prognosis at the CADES/O of the Donka National Hospital Guinea

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Abstract

Objective: To study hyperopia in young people aged 1 to 40 years at the CADES/O of the Donka National Hospital.

Method: This is a prospective descriptive study of young subjects aged between 1 and 40 years who were seen in an ophthalmology consultation during the period from 1er October 2020 to 31 January 2021, and who were diagnosed with hyperopia after an automatic refractometry undercycloplegia.

Results: Hyperopia with risk factors had a frequency of 89.9% among the young hyperopic subjects. Of the 170 young hyperopic subjects with risk factors, the majority were between 11and 20 years of age (51.8□). Females were predominant (68.2%). The majority of the young hyperopic subjects had a secondary or university education (36.5%); and the most represented occupation was that of pupils or students (76.5%). Outdoor activities (78.8%) and the wearing of glasses by at least one parent before the age of 40 (48.2%) were the main risk factors found. Low hyperopia was the most frequently observed degree of hyperopia (84.1% OD and 75.4% OG). Only 3.2% of young hyperopic subjects had a complication.

Conclusion: Hyperopia is mostly found in young people between 11 and 20 years of age and is often of low degree. Several risk factors such as genetic factors, and prolonged practice of outdoor activities, favour the occurrence of hyperopia.

Key words: Hyperopia; young subjects; risk factors; prognosis.
breast cancer treatment.

Introduction

Hyperopia is a common refractive error in children and adults [1.2]; characterised by an eye that is not convergent enough or is too short in relation to its convergence. [3] In a hyperopic eye, parallel rays of light entering the eye reach a focal point behind the plane of the retina [1]

; the image is therefore formed virtually behind the retina and not on the retina as it should be.

[3,4]

Hereditary factors are probably responsible for most cases of refractive error, including physiological hyperopia, with the environment playing some role in the development and degree of error. [1] In addition, ethnicity and socio-economic development are also factors contributing to the development of hyperopia. [5] There is evidence that Caucasian children are more farsighted than African American, Black and Asian children. [6]

Hyperopia can produce variable symptoms, depending on its magnitude, the age of the individual, the state of the accommodation and convergence systems, and the demands placed on the visual system (distance vs. proximity). [1] It has been shown by several authors that thereis a physiological hyperopia that decreases from the age of 3 years with emmetropisation around the age of 13-14 years. [7] Most neonates and infants are hyperopic, and at least 95% of infants have a hyperopic refraction of up to 3.50 diopters (D). Up to 9% of infants aged 6 -9 months have hyperopia greater than 3.25 D, but this prevalence decreases to 3.6% in the one-year-old population. Over the following 10-15 years, there is a further decrease in the prevalence of hyperopia. [1]

Although it is difficult to give a global estimate of the prevalence of hyperopia, **in 2017 Hashemi H et al**. reported in a meta-analysis that 4.6% of children and 30.9% of the **world's** adult population are hyperopic.[8]

In **France** in **2010**, the **National Union of Ophthalmologists of France** reported that hyperopia was present in 9% of the French population. [9]

In **Côte d'Ivoire** in **2012**, a cross-sectional study carried out by **Kouassi LJ et al.** among schoolchildren found a frequency of hyperopia of 67.32% with a female predominance.□ 10□ The lack of previous studies on the risk factors of hyperopia in CADES/O, the multiplicity of it's a etiologies and its impact on patients' quality of life motivated the present study.

General objective:

- Study of hyperopia in young people aged 1 to 40 years at the CADES/O of the Donka NationalHospital.

Specific objectives:

- To determine the frequency of hyperopia in a CADES/O patient population
- To describe the sociodemographic characteristics of young subjects aged 1 to 40 yearswith hyperopia at the CADES/O of the Donka National Hospital.
- Identify the risk factors linked to the occurrence of hyperopia in young subjects aged 1 to 40 years at the CADES/O of the Donka National Hospital
- Assessing the prognosis of hyperopia in young subjects aged 1 to 40 years at the CADES/O of the Donka National Hospital.

Materials and Method

The Application Center for the diploma in ophthalmology (CADES/O) located within the Donka National Hospital served as the setting for this study.

The study included all young subjects aged 1 to 40 years admitted to the CADES/O and diagnosed with risk factor hyperopia after automatic refractometry under cycloplegia.

It was a prospective descriptive study, lasting four (4) months, from 1er October 2020 to 31 January 2021.

All consenting subjects aged 1 to 40 years who underwent automatic refractometry after cycloplegic dilatation and had hyperopia with risk factors for CADES/O during our study period were included in this study.

The following were excluded from the study:

- all young subjects aged 1 to 40 years who underwent automatic refraction after cycloplegic dilatation and had hyperopia without risk factors at CADES/O during our study period.

- all subjects aged 1 to 40 years who underwent automatic refraction after cycloplegic dilatation and who had ametropia other than

hyperopia, at CADES/O during our study period.

- all non-consenting young people aged 1 to 40 years.

We performed an exhaustive recruitment by including all patient files that met the selection criteria.

The variables were quantitative and qualitative and included epidemiological, clinical, paraclinical, therapeutic and evolutionary data.

Our difficulties are mainly related to :

- The pandemic in COVID 19 significantly reduced the number of people attending health facilities and the number of staff working in them;
- The difficult accessibility of the hospital, due to the roadworks leading to the CHU;
- The post-election instability in the country, which led to a period of disruption in the operation of the service during our investigation;
- The inability of most patients to specify the exact nature of the ametropia suffered by their parents who wear optical correction.

RESULTS

In our series, hypermetropes represented 46.7% of the population of young subjects aged 0 to40 years referred to the CADES/O of the Donka National Hospital during our study period; and among these, most had at least one risk factor.

The frequency of risk factor hyperopia varied in our series according to age group. It was highest in the 11–20-year age group and then gradually decreased until the 31–40-year age group. The mean age was 18.7 ± 8.5 years (CI = 95%) with extremes from 2 to 39 years.

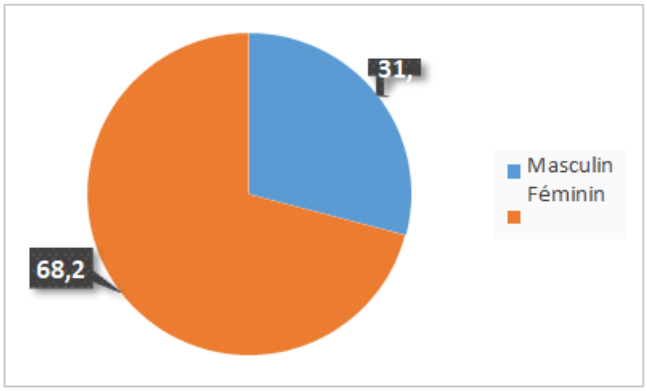

Figure I: Distribution of 170 hyperopic patients with risk factors at the Donka CADES/O according to gender.

Sex ratio M/F = 0.41

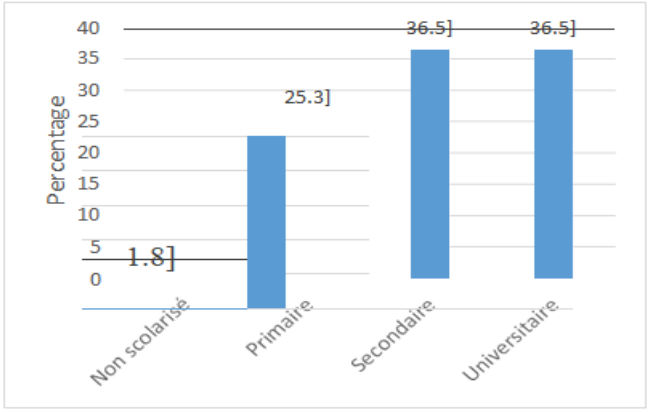

Figure 2: Distribution of 170 hyperopic patients with risk factors at the Donka CADES/O according to education level.

The majority of our patients were educated with a predominance of secondary and university levels of education; and the most represented occupation was that of pupils or students.

In terms of origin, most of our patients resided in urban areas.98% of our patients had no health insurance.

Table 1 Frequency of 170 hyperopic patients at the Donka CADES/O according to riskfactors.

Factors	Workforce	Percentage (%)
Genetic predisposition		
At least one parent wearing glasses before the age of 40		
- Yes	82	48,2
- No	88	51,8
Family history of strabismus		
- Yes	3	1,8
- No	167	98,2
Family history of amblyopia		
- Yes	4	2,1
- No	166	97,6
Outdoor activities		
- Yes	134	78,8
- No	36	21,2
Premature birth		
- Yes	13	7,6
- No	157	92,4
Recurrent conjunctival disorders		
- Yes	33	19,4
- No	137	80,6

Tableau III : Fréquence de 170 patients hypermétropes au Donka CADES/O selon les facteurs de risque

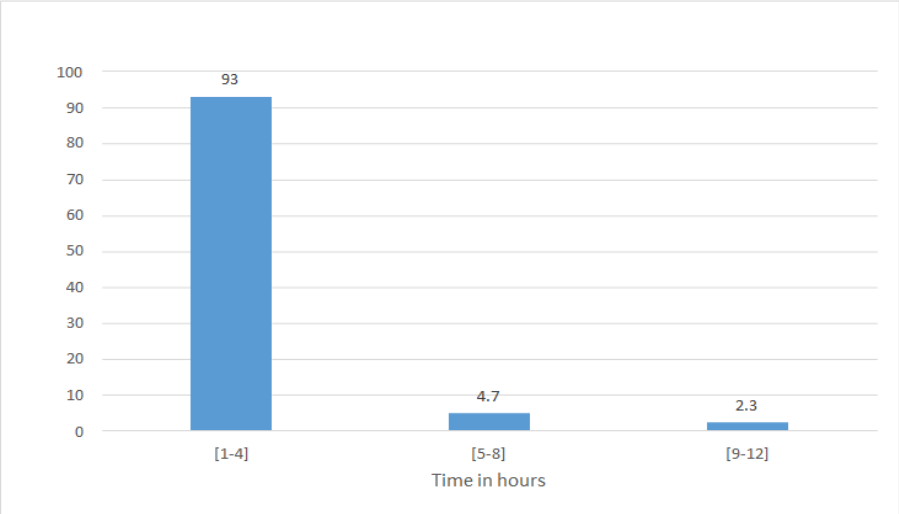

Figure 3: Distribution of hyperopic patients with risk factors at the Donka CADES/Oaccording to the time spent in outdoor activities (N = 128)

The most common ophthalmological history was the wearing of glasses by at least one of the parents, i.e. 32.4% of cases (n= 55).

Table 2: Frequency of 170 hyperopic patients with risk factors at the Donka CADES/O according to the reasons for consultation.

Reasons for consultation	Workforce	Percentage (%)
BAV	65	38,2
Feeling of visual blur	77	45,3
Photophobia	68	40,6
Watery eyes	62	36,5
Asthenopia	16	9,4
Headaches	81	47,6
Eye pain	50	29,4
Redness	7	4,1
Foreign body sensation	5	2,9
Pruritus	49	28,8
Changing glasses	31	18,2
Other reasons	9	5,3

Table 3: Distribution of 170 hyperopic patients with risk factors at the Donka CADES/O according to uncorrected distance visual acuity.

OD			OG	
AVSC	Workforce	Percentage	Workforce	Percentage (%)
≤ 1/10	6	3,5	11	6,5
2/10 - 4/10	31	18,2	25	14,7
5/10 - 7/10	25	14,7	26	15,3
8/10 - 10/10	106	62,4	106	62,4
Not measurable	2	1,2	2	1,2
Total	189	100%	189	100

Astigmatism was the most associated ocular pathology with 68.8% (n= 117) followed by conjunctivitis with 28.8% (n= 49).

The majority of our patients had mild hyperopia with 84.1% (n=143) in the right eye and 79.4% (n=135) in the left eye followed by moderate hyperopia with 12.9% (n=22) in the right eye and 13.5% (n=23) in the left eye. Severe hyperopia was rare with 2.4% (n= 4) in the right eye and 2.9% (n= 5) in the left eye.

All 170 patients received a prescription for optical correction with glasses.

Table 4: Distribution of 170 hyperopic patients with risk factors at the Donka CADES/O according to visual acuity gain.

	OD		OG	
AVAC	Workforce	Percentage	Workforce	Percentage **(%)**
2/10 - 4/10	1	0,6	2	1,2
5/10 - 7/10	3	1,8	5	2,9
8/10 - 10/10	107	62,9	105	61,8
>10/10	57	33,5	56	32,9
Not measurable	2	1,2	2	1,2
Total	179	100	179	100

The evolution was favourable in 96.5% of cases, marked by improved visual acuity with optical correction, regression of functional signs and improved quality of life.

Iconography

Figure 4: Refraction unit

Figure 5: Sciascope

Figure 6: Trying out corrective lenses

Figure 7: Refraction of a child

Discussion

This frequency of hyperopia is higher than that of **F. Gomez-Salazar et al.** [11] in their study of hospital refractive errors in Mexico in 2017 and that of **I. Sounouvou et al.** [12] in their study of school ametropia in Cotonou (Benin) in 2008, which reported a frequency of 21% and 16.1% of hyperopia respectively. On the other hand **Hashemi H et al.** [13] reported in their study on the prevalence of refractive errors in Tehran (Iran) in 2004, a higher frequency of 78.6% of hyperopia. These variations in results can be explained by the influence of genetic and environmental factors on the occurrence of hyperopia; as well as the lack of consensus on the definition of hyperopia between studies, the difference in the refractive methods used (with or without cycloplegia) and the variability of the study populations regarding age and selection criteria.

Chebil A et al [14] reported in Tunisia in their study on the epidemiological profile of hyperopia in 2014, a significant decrease in hyperopia with age. This variation in frequency with age could be related to the emmetropisation process resulting in a progressive decrease in the dioptric power of the lens.

Our results were comparable to those of **Dandona et al**. [15] who reported a 95% female predominance in their study of refractive errors in rural and urban settings in 2002. However, **Naidoo KS et al.** [16] found no significant difference in frequency between the sexes in their study of refractive errors and visual impairment in children in South Africa in 2003. This disparity in results could be explained by the fact that the frequency of hyperopia is not related to gender.

The majority of our patients were educated with a predominance of secondary and university levels of education; and the most represented occupation was that of pupils or students. This could be explained by the existence of a correlation between education level and hyperopia.

Our results differ from those of **VD Castagno et al.** [6] reported in 2014 in their meta-analysis of the prevalence and factors associated with hyperopia, that children aged 0 -15 years who lived in rural areas were more likely to be hyperopic than those living in urban areas, OR = 2.84 (95% CI 2.16-3.75) and OR = 1.50 (95% CI). The high frequency in urban areas in our study could be explained by the fact that CADES/O is located in an urban area, which

would favour consultation of the urban population.

As far as heredity is concerned, at least one parent of almost half of our hypermetropes, wore glasses before the age of 40. In Brazil in 2012 in their study on the prevalence of hyperopia and associated factors, **VD Castagno et al.** [17] had found 28.1% of hyperopic students with at least one parent wearing glasses before the age of 40.

Rose et al. [18] noted in their 2008 study on the impact of outdoor activities on the prevalence of refractive errors that children aged 6 and 12 years in Australia who spent more time per week in outdoor activities (outdoor sports, picnics and walking) were more hyperopic than those who spent less time in these activities. Similar results were reported by several studies cited in the meta-analysis by **Castagno VD et al.**[6] in 2014. However, the empirical evidence would appear to be insufficient to understand the relationship between environmental factors and hyperopia.

Functional signs were dominated in our series by headache. This result is comparable to that of

A. Jeddi Blouza et al. [7] who noted in their 2007 study on the management of hyperopia in children in Tunisia, a predominance of headaches as the main reason for consultation in 82% of cases. The predominance of headaches as the main reason for consultation could be explained by the phenomenon of permanent accommodation in hypermetropia, the first clinical consequences of which are asthenopic disorders manifested mainly by headaches.

The ophthalmological history was dominated by the previous wearing of glasses in our hypermetropes. This result could be explained by the fact that patients with an optical correction keep their annual appointment.

In our study, the majority of patients had an uncorrected visual acuity greater than 7/10th. Ourresults are superior to those of **Chebil A et al** [19] in Tunisia in 2014, who reported visual acuity greater than 7/10th in only 40% of their patients. Our results can be explained by the fact that young subjects generally have a sufficient level of accommodation to maintain a visual acuity close to normal when the degree of hyperopia is not high, and in the absence of other associated ocular pathology.

We had collected a total of 170 patients or 340 eyes in our study. Of these, 169 right eyes were hyperopic, compared to 163 left eyes. Low hyperopia was the most frequently observed degree, while high hyperopia was the least observed. This result is consistent with **Shiferaw A et al** [19] who reported in Ethiopia in their study on the prevalence and degree of hyperopia in Gondar University Hospital in 2016, a frequency of mild hyperopia of 86% followed by moderate hyperopia at 9.5% and severe hyperopia at 4.5%. Our data seem to be consistent with the epidemiology of hyperopia.

The vast majority of our hyperopic patients had other associated ocular pathologies. Astigmatism was the most common ocular condition associated with hyperopia in our series, followed by conjunctivitis and anisometropia.

Of the 170 hyperopic patients with risk factors in our study, very few had an unfavourable evolution towards complications. The low complication rate in our study could be explained by the fact that the vast majority of our patients have only low-grade hyperopia.

The correction of hyperopia plays an essential role in preventing the occurrence of complications. The visual rehabilitation of patients with hyperopia necessarily involves optical correction. This optical correction can be done with convergent corrective lenses or with contact lenses. All of our 170 hyperopic patients with risk factors had received a prescription for optical correction with glasses. Thus, thanks to optical correction, distance visual acuity was improved to $10/10^{e}$ and more with a frequency of 30.7% in the right eye and 30.2% in the left eye.

Conclusion

At the end of this prospective study on hyperopia in young people at the CADES/O of the Donka National Hospital, it emerged that weak hyperopia is a frequent refractive anomaly in ophthalmology with headaches and visual blur as the main symptoms. Hyperopia is most common in young people between the ages of 11 and 20 and is difficult to diagnose in children from an early age, both for parents and for doctors at due to the high accommodation capacity of children and their difficulty in expressing themselves. Several risk factors such as genetic predisposition and outdoor activities favour the onset of myopia. Screening and treatment are therefore essential to avoid complications, especially in schools, since the majority of our patients come from this environment.

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