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Ophthalmology Research

Refractive Errors and Optical Correction in Albinos in Lubumbashi (Democratic Republic of the Congo)

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ABSTRACT

Objective: *This study aimed to determine the most frequent types of refractive error among individuals with albinism in Lubumbashi and to evaluate the improvement in visual acuity after optical correction.*

Patients and Methods: *A descriptive cross-sectional study was conducted in two ophthalmology facilities in Lubumbashi from April 2024 to November 2025 (20 months). One hundred and one albino patients seen in consultation were included and underwent a complete clinical examination. The significance threshold for statistical tests was set at 0.05.*

Results: *Of the 101 patients included, 42 were male and 59 female (sex ratio 0.7). The mean age was 22.1 ± 12.2 years (range: 5-69 years). Type 2 oculocutaneous albinism was the most frequent form (91.1%). Reduced visual acuity and photophobia were the most commonly reported symptoms (100% and 57.4%, respectively). Myopic astigmatism was found in 47.5% of patients. Before optical correction, 44.6% of eyes were classified as blind; after correction, 45% were classified as having mild visual impairment. Improvement was observed in 87% of eyes after correction.*

Conclusion: *All albino patients in our series presented with refractive errors, with severe visual impairment in the absence of optical correction. Early screening and adequate optical correction can improve the quality of vision of this population.*

Keywords

Albinism, Ametropia, Refraction, Optical correction, Visual acuity, Lubumbashi, Democratic Republic of the Congo.

Introduction

Albinism is a genetic disorder related to a hereditary defect in the biosynthesis of melanin, the pigment produced by melanocytes of the skin, hair, and eyes (iris, choroid, retina) [1]. Two phenotypic forms are distinguished: oculocutaneous albinism (OCA), with absent or reduced melanin in the eyes, skin, and hair, and ocular albinism, in which the melanin deficit is limited to the eyes [2].

Albinism affects on average one person in 17,000 worldwide; it is more frequent among Black populations, with an estimated prevalence of one in 4,000 in sub-Saharan Africa, varying by region [3]. In the Democratic Republic of the Congo (DRC), data remain limited to a few hospital-based studies; Kasaï-Oriental province appears to be the main region of origin of affected individuals [4]. OCA is most often transmitted in an autosomal recessive pattern, with no difference between sexes; the most frequent mutation among Black populations is a 2.7-kilobase deletion in the OCA2 gene, found in approximately 82% of homozygous or heterozygous Congolese albinos [3].

The melanin deficit disrupts the development of the optic system and leads to various clinical manifestations: photophobia, nystagmus, strabismus, foveal hypoplasia, abnormal chiasmal decussation, and refractive errors [5], responsible for reduced

visual acuity from birth. Albinism accounts for 5 to 10% of visual impairment worldwide and approximately 20 to 30% of sensory nystagmus cases [6]. Correction of refractive errors should therefore be offered as early as possible, since wearing optical correction allows a relative improvement in visual acuity.

Visual impairment related to albinism constitutes a major public health problem in sub-Saharan Africa, where visual health resources remain limited; it is thought to contribute to a high rate of school failure, dropout, or unwanted career orientation, and to the progressive exclusion of this stigmatized population. In the absence of any publication addressing refractive errors in albinos in our setting, we undertook this work to contribute to the understanding of the impact of this genetic disorder on vision, addressing the following question: what is the impact of oculocutaneous albinism on refractive disorders in albinos?

This study aimed to describe refractive errors and the improvement in visual acuity in albino subjects in Lubumbashi.

Patients and Methods

Setting, type, and period of study

This was a descriptive cross-sectional study with prospective data collection, conducted in the ophthalmology departments of the University Clinics of Lubumbashi, the Jason Sendwe tertiary public referral hospital, and at the headquarters of the Organization for the Welfare of Albinos in Congo (OBEAC), in Haut-Katanga province (DRC), from April 1, 2024 to November 30, 2025, i.e., 20 months.

Study population

Sampling was a convenience sample, non-exhaustive, including any patient older than three years, clinically albino, who was seen in consultation during the study period and who provided informed consent (or that of their guardian for minors). Albinos presenting with an ocular condition likely to affect refraction measurement (corneal opacity, cataract, vitreous opacity, acquired retinal disease, eyelid skin disease) were not included.

Examinations performed

The diagnosis of OCA was based on the combination of cutaneous and hair depigmentation, iris transillumination, retinal hypopigmentation, and foveal hypoplasia. Distance visual acuity was measured using the Snellen and Lea charts, and near visual acuity using the Parinaud scale. Cycloplegia was performed in patients under 15 years of age (tropicamide 0.8% combined with phenylephrine 5.0%, or atropine 0.5% and 1% in cases of strabismus), followed by automated refractometry (Retinomax K-Plus 3) and then subjective refraction. Color vision was assessed with the Ishihara test, the anterior segment by biomicroscopy (Topcon slit lamp), and the fundus by direct and indirect ophthalmoscopy (90 D).

The stages of iris transillumination (1 to 4, from the most discrete to the most extensive), the character of the nystagmus (pendular or jerk; horizontal, vertical, oblique, or rotatory), and the type of strabismus (convergent or divergent) were classified according to standard criteria. Refractive errors were classified as simple spherical ametropias (myopia, hyperopia) graded by severity, as simple astigmatism, and as compound ametropias (myopic, hyperopic, or mixed astigmatism).

Statistical analysis

Qualitative variables were expressed as frequencies and percentages, and quantitative variables as mean ± standard deviation. The Chi-square and Student's t tests were used for bivariate analyses, with a significance threshold set at $p < 0.05$; relative risk with a 95% confidence interval was calculated for the analysis of visual acuity improvement according to type of ametropia, age, and educational level.

Ethical considerations

The study was approved by the Medical Ethics Committee of the University of Lubumbashi (No. UNILU/CEM/021/2024). Anonymity and confidentiality of data were maintained throughout the study, and each patient (or their guardian) signed a free and informed consent form.

Results

During the study period, 101 albino patients were included, representing 202 eyes examined.

Table 1: Sociodemographic and occupational characteristics.

Variable	Characteristic / Category	n	%
Sex	Female	59	58.4
	Male	42	41.6
Age group	5–10 years	19	18.8
	11–15 years	14	13.9
	16–20 years	11	10.9
	21–25 years	29	28.7
	26–30 years	9	8.9
	31–35 years	5	5.0
	> 35 years	14	13.9
Type of albinism	OCA type 2	92	91.1
	OCA type 3	9	8.9
Educational level	Secondary	46	45.5
	University	24	23.8
	Primary	22	21.8
	Preschool	6	5.9
	Illiterate	2	2.0
	Postgraduate	1	1.0
Occupation	Pupil / student	51	50.5
	Unemployed	28	27.7
	Trader	10	9.9
	Driver / mechanic	3	3.0
	Administration / marketing	3	3.0
	Civil servant	2	2.0
	Teacher	1	1.0
	Footballer	1	1.0
	Nurse	1	1.0
	Model / actor	1	1.0

Province of origin	Kasaï-Oriental	49	48.5
	Haut-Lomami	22	21.8
	Lomami	8	7.9
	Tanganyika	8	7.9
	Lualaba	3	3.0
	Equateur	3	3.0
	Kasaï Central	2	2.0
	Kongo Central	1	1.0
	Haut-Katanga	1	1.0
	Kwango	1	1.0
	Maniema	1	1.0
	Tshopo	1	1.0
	Outside the country (Cameroon)	1	1.0
Total	Whole cohort	101	100

Pupils and students, followed by the unemployed, accounted for 50.5% and 27.7% of patients, respectively.
Patients who had stopped schooling at the secondary level accounted for 45.5% of the sample.
Kasaï-Oriental province was the main region of origin of the patients (48.5%), followed by Haut-Lomami (21.8%).
The 21–25 year age group was the most represented, with 29 patients (28.7%).
Females predominated (58.4%), giving a male-to-female sex ratio of 0.7.
Type 2 OCA was largely predominant (91.1%).

Table 2: Clinical characteristics.

Variable / Parameter	Characteristic / Category	n	%
Functional signs	Reduced visual acuity	101	100
	Photophobia	58	57.4
	Diplopia	16	15.8
	Headache	15	14.9
	Asthenopia	10	9.9
	Tearing	9	8.9
	Ocular pain	7	6.9
	Foreign body sensation	3	3.0
	Itching	2	2.0
	Unilateral ptosis	1	1.0
History & follow-up	Family history of albinism	61	60.3
	Prior ophthalmological consultation	56	55.4
	Prior use of glasses	41	40.6
Nystagmus (character)	Horizontal	78	77.2
	Horizontal and rotatory	20	19.8
	Oblique	2	2.0
	Absent	1	1.0
Nystagmus (type)	Pendular	97	96
	Jerk	3	3.0
Strabismus (presence)	Present	32	31.7
	Absent	69	68.3
Strabismus (type, n=32)	Convergent	17	53.1
	Divergent	15	46.9
Foveal hypoplasia	Present	100	99
	Absent	1	1.0
Color vision	Normal	99	98
	Dyschromatopsia	2	2.0

Reduced visual acuity and photophobia were the most frequent symptoms, found in 100% and 57.4% of patients, respectively.

Albinism was present in the family of 60.3% of patients; 55.4% had previously consulted an ophthalmology service, and 40.6% had previously worn optical correction. Among those who had previously worn glasses, the mean age at first correction was 11–15 years (29.3% of cases), with a mean duration of wear of 16.3 ± 7.3 months (range: 6–36 months).

Nystagmus was present in 99% of patients, of simple horizontal character (77.2%) and pendular type (96%).
Strabismus was present in 31.7% of patients, convergent in 53.1% of cases.

Foveal hypoplasia was present in 99% of cases.
Color vision was normal in 98% of patients.
Nearly half of the patients (47.5%) read Parinaud print at 10 to 20 cm.

Table 3: Types of ametropia.

Type of ametropia and degree of severity	n	%
Astigmatism	121	59.9
— Myopic astigmatism	96	47.5
— Mixed astigmatism	13	6.4
— Hyperopic astigmatism	12	5.9
Myopia	70	34.7
— High myopia	52	25.4
— Simple (mild) myopia	12	5.9
— Moderate myopia	6	2.9
Hyperopia	11	5.4
— Simple (mild) hyperopia	9	4.4
— High hyperopia	2	0.9
Total	202	100

Astigmatism accounted for 59.9% of simple ametropias (Table 3). Taking severity into account, myopic astigmatism was the most frequent form (47.5%), followed by high myopia (25.4%) (Table 3).

Table 4: Improvement in visual acuity.

Variable / Characteristic	n	%
Visual acuity before correction	202	100.0
• Blindness	90	44.6
• Severe visual impairment	64	31.7
• Moderate visual impairment	43	21.3
• Minimal visual impairment	5	2.5
Visual acuity after correction	202	100.0
• Minimal visual impairment	91	45.0
• Moderate visual impairment	90	44.6
• Severe visual impairment	19	9.4
• Blindness	2	1.0

Before optical correction, 44.6% of eyes were classified as blind (Table 4). After correction, most eyes were distributed between mild (45.0%) and moderate (44.6%) visual impairment, and only

1.0% remained classified as blind.

An improvement in visual acuity was observed in 86.6% of eyes after optical correction.

After correction, all types of ametropia showed improvement, with no statistically significant difference between them.

All age groups showed improvement in visual acuity after correction, with no statistically significant difference (Chi-square = 6.534; p = 0.366).

Improvement in visual acuity was not statistically associated with educational level (Chi-square = 7.208; p = 0.206).

Discussion

Sociodemographic data

The mean age of our patients was 22.1 ± 12.2 years (range: 5–69 years), with a predominance of the 21–25 year age group (28.7%). This finding is comparable to that of Aboubakar et al. in Cameroon, who reported a mean age of 23.9 ± 12.9 years [6] and to that of Mukendi Nkesu in Mbujimayi (DRC), who found a mean age of 21.7 years [7]. In all cases, these were young subjects, which could be explained by the reduced life expectancy reported among albinos.

A slight female predominance was noted (sex ratio 0.7), similar to that reported by Koita et al. in Mali [8] and by Assoumou et al. in Gabon [9]. This finding, in an autosomal recessive disease whose gene is not carried on a sex chromosome, probably reflects random sampling variation rather than a true sex-related difference.

Pupils and students (50.5%), followed by unemployed individuals (27.7%), made up the bulk of our population, as in Koita et al. (67.1% pupils and students) [8] and in Mukendi Nkesu in Mbujimayi (44.2% unemployed) [7], reflecting the poor socio-occupational integration of albinos, related to stigmatization.

Kasaï-Oriental province was the main region of origin of our patients (48.5%), as already reported in Kinshasa by Kakiese et al. (28%) [4], suggesting a distinctive geographic distribution of albinism genes in the DRC, to be confirmed by an in-depth genetic study.

Clinical data

Reduced visual acuity (100%) and photophobia (57.4%) were the predominant functional signs, as reported by Mvogo et al. in Douala (photophobia 100%) [10]. These manifestations are explained by the foveal hypoplasia, retinal hypopigmentation, abnormal decussation of the optic fibers, and nystagmus characteristic of albinism.

Only 55.4% of our patients had previously consulted an ophthalmology service, and 40.6% had previously worn optical correction, proportions close to those of Koita et al. (54.5% and 35.7%) [8], probably related to unfavorable socioeconomic conditions and stigmatization, which delay consultation.

Nystagmus was present in 99% of patients, horizontal in 77.2% of cases and pendular in 96% of cases, results consistent with those of Aboubakar et al. (100% nystagmus, predominantly horizontal direction) [6].

Strabismus, present in 31.7% of patients, was convergent in 53.1% of cases, a result differing from those of Koita et al. and Libuku, who reported a predominance of divergent strabismus (57.6% and 67%, respectively) [8,11]; these variations might be related to oculomotor anatomical features specific to albinism.

Types of ametropia

Myopic astigmatism was the most frequent ametropia (47.5%), followed by high myopia (25.4%). This finding is consistent with that of Aboubakar et al. (52.9%) [12,13] and that of Eballe et al. in Cameroon (40%) for myopic astigmatism [13]. The high frequency of astigmatism in albinos is thought to be of corneal origin, related to corneal molding by the eyelids during nystagmic movements.

Visual acuity before and after correction

Before optical correction, 44.6% of eyes were classified as blind and 31.7% as severely visually impaired. After correction, most eyes were distributed between minimal (45.0%) and moderate (44.6%) visual impairment, with an overall improvement in 86.6% of eyes. These results are consistent with those of Nganga et al. in Congo-Brazzaville, who reported 53.1% minimal visual impairment after correction [14] and differ from those of Khanal et al. in Nepal, who found more moderate visual impairment before correction (38%) [15]. The residual visual deficit despite optical correction is explained by amblyopia related to high ametropia, but also by foveal hypoplasia, optic pathway abnormalities, nystagmus, and photophobia.

Conclusion

Reduced visual acuity, photophobia, nystagmus, and foveal hypoplasia, giving rise to amblyopia, explain the visual impairment observed in the vast majority of albinos in our series. Myopic astigmatism and high myopia were the most frequent refractive errors. Although albinos remain classified as visually impaired after correction, this correction allows a significant improvement in visual acuity and should be offered systematically and early to every patient with albinism. Albinism remains a major public health problem in the DRC, affecting young subjects of both sexes, whose refractive errors are often corrected late.

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References

1. Grønskov K, Ek J, Brondum-Nielsen K. Oculocutaneous albinism. Orphanet J Rare Dis. 2007; 2: 43.
2. Bhari AM, Bajracharya K, Thapa HB, et al. Effectiveness of refractive error correction for people with oculocutaneous albinism in Nepal. Asian J Med Sci. 2017; 8: 30-34.
3. Mavinga LM, Kakiese V, Ngole M, et al. Molecular genetic characterization of Congolese patients with oculocutaneous albinism. Eur J Med Genet. 2022; 65: 104611.
4. https://anafrimed.net/lesions-cutanees-observees-lalbinisme-oculo-cutane-resultats-dune-campagne-de-depistage-ville-province-de-kinshasa.
5. Healey N, Willoughby CE, McClelland JF. Albinism: What the GOS Optometrist Needs to Know. Optometry in Practice. 2010; 11: 57-76.
6. Aboubakar H, Dohvoma VA, Mvogo SE, et al. Les Caractéristiques du Nystagmus chez le Sujet Albinos Camerounais. Health Sci Dis. 2017; 18.
7. https://www.bibliosante.ml/handle/123456789/6310.
8. https://www.bibliosante.ml/handle/123456789/13830.
9. Assoumou PA, Dohvoma AV, Ebana SM, et al. Ocular Manifestations Encountered in Albinos Living in Libreville: Epidemiological and Clinical Aspects. Open J Ophthalmol. 2019; 09: 203-213.
10. Mvogo CE, Bella-Hiag AL, Ellong A, et al. [Visual problems in albinos: a hospital study carried out at the Douala General Hospital]. Sante. 1999; 9: 89-91.
11. LIBUKU R. Manifestations oculaires dans l'albinisme oculocutané à Kinshasa. Kinshasa. 2014.
12. Aboubakar H, Dohvoma VA, Ebana Mvogo SR, et al. [Correlation between refraction and axial length in Albinos]. J Fr Ophtalmol. 2024; 47: 104189.
13. Eballe A, Come E, Noche D, et al. Refractive errors in Cameroonians diagnosed with complete oculocutaneous albinism. Clin Ophthalmol. 2013; 7: 1491-1495.
14. Nganga Geraud Fredy NNC, Chantal M, Fene Samuel A, et al. Refractive errors in albino children in Brazzaville. New Front Ophthalmol. 2019; 5: 1-3.
15. Khanal S, Pokharel A, Kandel H. Visual deficits in Nepalese patients with oculocutaneous albinism. J Optom. 2016; 9: 102-109.

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