Prevalence and Size Distribution of Choroidal Nevi in a Predominantly Hispanic Population: A Retrospective Study

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Abstract

Introduction

Choroidal nevi are common, benign ocular lesions, yet their prevalence and size distribution may vary across populations and clinical settings.

Method

In this retrospective study, we evaluated the prevalence of choroidal nevi in a predominantly Hispanic patient population using standard fundus photography.

Results

Among 4,179 patients examined over a 12-month period, we identified 555 choroidal nevi, yielding a prevalence of 13.2%. Notably, 88% of nevi were smaller than the optic nerve head diameter, a size range that may escape detection during routine exams.

Conclusion

This high proportion of small lesions suggests that choroidal nevi may be frequently under-detected, particularly in settings where imaging capabilities are limited. These findings underscore the importance of careful documentation and highlight how imaging modality influences diagnostic sensitivity. Expanded clinical vigilance and improved imaging access may enhance detection and monitoring.

Keywords

choroid, choroidal nevus, melanoma

Suggested citation

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Choroidal nevi are melanocytic lesions of the choroid, often encountered by clinicians during routine ophthalmic examinations. Their presence can be confirmed using a red-free filter. Nevi typically disappear under red-free illumination due to their subretinal pigment epithelium location, whereas surface pigmented lesions remain visible. While typically benign, their potential for malignant transformation into choroidal melanoma, although rare, necessitates careful documentation and monitoring.

Previous studies have reported an overall prevalence rate of 2% to 8% in the general population of the United States. The rate is race-dependent and in some studies varies with age and sex.[1-5] The prevalence has been documented to be highest in the White population (about 5%) and lowest in the Black population (<1%), with the Hispanic population showing a prevalence of 2% to 3%.[6]

In this study, we aim to quantify the prevalence and size distribution of choroidal nevi in a predominantly Hispanic patient population and to assess whether smaller lesions are being under-detected in routine optometric practice.

Methods

We conducted this retrospective observational study in a primary care optometry practice serving a predominantly Hispanic population, ranging in age from 8 to 87 years. Standard fundus photographs were obtained using a non-widefield fundus camera (Topcon TRC-NW400) during routine comprehensive eye exams over 12 months. All patients imaged (n = 4,179) during this period were included, with no exclusion criteria applied.

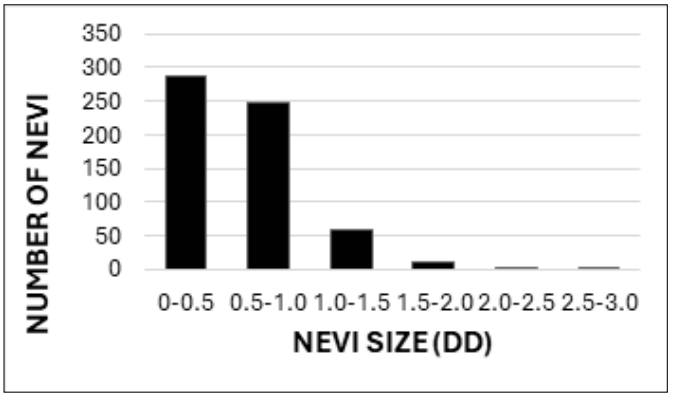
All images were reviewed and measured collaboratively by two authors (PI and CW), working simultaneously to identify and size each choroidal nevus. Measurements were made relative to the optic nerve head diameter, using a consistent protocol to ensure internal consistency. In this study, we aimed to assess the prevalence and size distribution of choroidal nevi in this population, with particular attention to lesions smaller than the optic nerve head.

Results

Out of 4,179 patients examined, we identified 555 choroidal nevi, yielding an overall prevalence of 13.3%. These findings corroborate the suspicion that choroidal nevi are more common than previously recognized, and their overall prevalence is higher than that reported in the literature.

Nevus sizes ranged from 0.08 to 2.9 times the optic nerve diameter (disc diameter, DD), with an average size of 0.62 ± 0.015DD (mean ± standard error, n = 555). Figure 1 presents a histogram of nevus size distribution in 0.5DD increments, while Figure 2 highlights lesions measuring less than 20% of the optic nerve diameter. Most (88%) lesions were smaller than the optic nerve, with a substantial proportion measuring less than 0.2DD.

Figure 1. Histogram showing the size distribution of 555 choroidal nevi identified in a predominantly Hispanic patient population



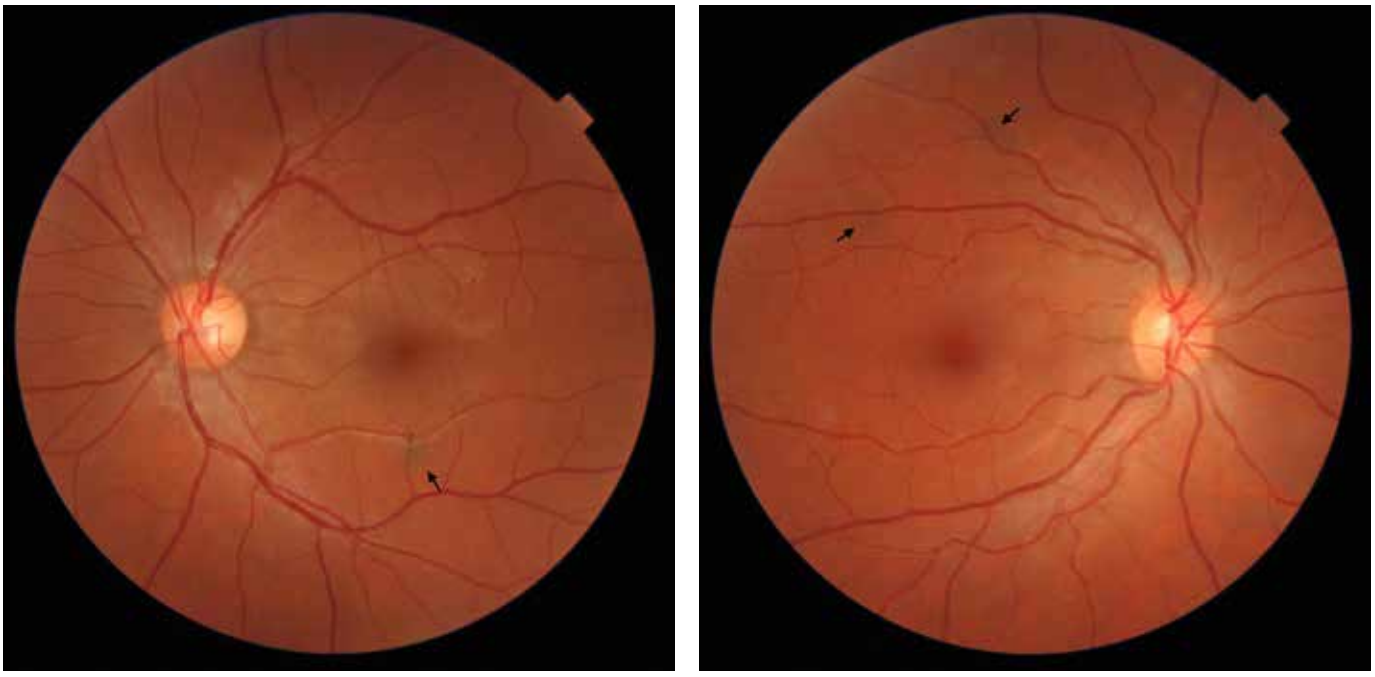
Nevus diameter is expressed in 0.5-disc diameter (DD) increments relative to the optic nerve head. Most lesions fall within the 0-0.5DD and 0.5-1.0DD ranges, with 88% measuring smaller than the optic nerve head. This distribution underscores the predominance of small nevi and supports the hypothesis that such lesions may be under-detected during routine clinical examinations.

Discussion

While previous studies have reported a choroidal nevus prevalence of 2% to 3% among Hispanics in the United States, our investigation revealed a substantially higher rate of 13.3% in a predominantly Hispanic population from southern Florida. This discrepancy likely reflects under-detection of smaller nevi during routine clinical exams, particularly those smaller than the threshold of textbook familiarity. Although the statistical significance is clear, clinical relevance depends on lesion characteristics, detection methods, and the tools available to practitioners, many of whom rely solely on standard fundus photography.

Our data show that most choroidal nevi are about half the diameter of the optic nerve, with many

Figure 2. Retinal photographs illustrating small choroidal nevi in two different patients



A: A single nevus located inferior to the macula at the juncture of an arterio-venous crossing (arrow).

B: Two small nevi situated beneath vessels of the superior arcade (arrows). These examples highlight the subtle appearance of small nevi, which may contribute to under-detection during routine clinical examinations.

measuring up to 80% smaller. Notably, about 15% of these smaller lesions were initially missed but later identified through retinal image analysis. This highlights the limitations of conventional examination techniques and underscores the role of retinal imaging in improving diagnostic sensitivity.

Multimodal imaging enhances diagnostic sensitivity and specificity. For example, enhanced depth imaging for optical coherence tomography (EDI-OCT) can reveal subtle elevation;[7] fundus autofluorescence (FAF) helps differentiate lipofuscin from drusen;[8] and near-infrared reflectance may aid in identifying amelanotic lesions.[9] These modalities complement colour photography and may be particularly useful in ambiguous cases. However, our practice is limited to standard fundus photography, reflecting the reality of many primary care settings where access to advanced imaging is not routine. Nonetheless, careful inspection and documentation of colour photographs remain valuable tools in identifying and monitoring choroidal nevi.

While the risk of malignant transformation from nevus to melanoma remains low,[10-13] melanomas are aggressive and carry significant metastatic potential. Early identification of suspicious nevi is essential to guide timely referral and intervention. Some risk factors associated with malignancy include large lesion size (>3 mm), proximity to the optic nerve (within 3 mm), presence of subretinal fluid, and pigmentary changes (Figure 3).[14-16]

Several diagnostic mnemonics exist to help clinicians evaluate risk features associated with choroidal nevi. Of note, Shields et al. developed the widely recognized mnemonic “To find small ocular melanoma using helpful hints daily” (TFSOM UHHD), which highlights key risk factors: thickness >2 mm, fluid (subretinal), symptoms (e.g., visual changes), orange pigment, margin near optic disc, ultrasonographic hollowness, halo absence, and drusen absence.[17-18] This framework has guided ocular oncology for decades and remains a cornerstone in early detection and referral.

Figure 3. Representative examples of suspicious choroidal nevi

A: A large nevus measuring 3.8 mm along the superior arcade.

B: A nevus in very close proximity to the optic nerve.

C: Subretinal fluid (arrows) partially overlying a nevus near the macular area with possible associated pigment. These features (size, location, fluid, and pigmentation) are commonly associated with increased risk of malignant transformation.

Table 1. Summary of risk features and MOLES criteria

Feature	Description	MOLES Component
Mushroom shape	Growth through Bruch's	M
Orange pigment	Lipofuscin presence	O
Large size	3 mm diameter	L
Enlargement	Growth over time	E
Subretinal fluid	Active lesion association	S

Summary of MOLES scoring criteria for assessing malignancy risk in choroidal nevi. Each feature, mushroom shape, orange pigment, large size, enlargement, and subretinal fluid, is assigned a score: 0 (absent), 1 (borderline), or 2 (present). Total scores range from 0 to 10, with scores ≥3 typically warranting referral to ocular oncology.

More recently, Flanagan et al. introduced the MOLES scoring system (mushroom shape, orange pigment, large size, enlargement, and subretinal fluid), designed specifically for optometrists and general eye care providers (Table 1).[19] MOLES offers a simplified, observation-based framework for risk stratification that can be applied in routine clinical settings without the need for specialized equipment. Scores ≥3 typically warrant referral.

Together, these tools provide clinicians with complementary strategies for assessing malignancy risk and guiding appropriate follow-up.

Although most choroidal nevi remain stable, malignant transformation can occur over months or years. Documented growth, emergence of orange pigment, or development of subretinal fluid often precede this shift. In primary care settings, low-risk lesions may be monitored annually with imaging and patient education, while higher-risk cases should prompt timely referral to ocular oncology.

Given the higher-than-expected nevi prevalence in our Hispanic cohort, further research is needed to explore potential ethnic variations in nevi behaviour and melanoma risk. Clinicians should also be

prepared to discuss nevi findings with patients, emphasizing the importance of follow-up without inducing undue alarm.

Limitations

This study is limited by its retrospective design and reliance solely on standard fundus photography. No widefield nor multimodal imaging modalities (e.g., EDI-OCT, FAF, Near-infrared reflectance) were available in our practice, which may have limited the detection of peripheral or subtle lesions.

Additionally, while two authors collaboratively conducted image review, no formal inter-rater reliability was assessed. As the study was conducted in a single practice, findings may not be generalizable to all Hispanic populations or clinical settings.

Future studies incorporating advanced imaging and broader reviewer panels may yield more comprehensive insights.

Conclusion

Our study demonstrates that most choroidal nevi are small, which likely contributes to their underdetection during routine ophthalmic examinations and the lower prevalence reported in the current literature. These findings emphasize the importance of identifying and documenting small nevi to improve diagnostic accuracy and awareness.

In addition, although the risk of malignant transformation remains low, it is essential to inform patients of a nevus' presence regardless of size to ensure appropriate monitoring and follow-up when warranted. Early recognition and continued observation are key to timely intervention should concerning features arise.

Finally, standard fundus photography remains a valuable tool in primary care settings, but expanded imaging access and clinical awareness are essential for improving detection and monitoring.

Disclosures

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