RESEARCH PAPER

When Myopia Refuses to Stop: Progression in Adult Eyes

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Abstract

Background: Myopia has traditionally been considered a condition that stabilizes after adolescence. However, emerging evidence suggests that myopia may continue to progress or even develop during adulthood, necessitating further investigation into its patterns and risk factors.

Aim: To determine the proportion of young adults exhibiting myopia progression, quantify changes in refractive error, and evaluate associated demographic and behavioral factors.

Methods: This ambispective observational study was conducted among 190 young adult myopes aged 18–30 years. Retrospective data from prior spectacle prescriptions were combined with prospective follow-up over 12 months. Comprehensive ophthalmic evaluation, including visual acuity, refraction, spherical equivalent, axial length measurement, and fundus examination, was performed at baseline and follow-up. Myopia progression was defined as a change in spherical equivalent of ≥ -0.50 diopters (D). Statistical analysis included paired *t*-test/Wilcoxon signed-rank test and logistic regression, with $p < 0.05$ considered significant.

Results: A total of 22.1% of participants demonstrated myopia progression, with 5.3% showing progression ≥ -1.00 D. The mean spherical equivalent showed a progressive myopic shift from -1.85 ± 1.02 D to -2.28 ± 1.24 D. A statistically significant increase in axial length was observed ($p = 0.001$). Near-work exposure ($p = 0.041$) and occupation ($p = 0.024$) were significantly associated with progression, while gender showed no significant association ($p = 0.38$).

Conclusion: Myopia progression in young adults is a clinically significant phenomenon. Regular monitoring and early identification of at-risk individuals are essential to reduce long-term ocular complications.

Keywords
Myopia progression; Young adults; Axial length; Near-work; Refractive error; Spherical equivalent; Risk factors; Adult myopia

Introduction

Myopia is a common refractive disorder characterized by excessive axial elongation of the eyeball, leading to the formation of images anterior to the retina. Traditionally, myopia has been regarded as a condition that develops during childhood and stabilizes by late adolescence, coinciding with the cessation of ocular growth. This long-standing belief has shaped clinical practice, with most screening and intervention strategies primarily targeting pediatric populations.

However, recent evidence has challenged this conventional understanding, suggesting that myopia may continue to progress or even newly develop during adulthood (1,2). Longitudinal studies have demonstrated that a considerable proportion of individuals experience ongoing refractive changes beyond the age of 18 years. It has been reported that nearly 25% of individuals continue to show myopic progression at 18 years, and approximately 10% may still progress at 21 years (1). These findings indicate that refractive stability in adulthood is not universal and that adult myopia progression represents a clinically relevant phenomenon.

Adult myopia can manifest either as the progression of pre-existing juvenile-onset myopia or as new-onset myopia after adolescence. Grosvenor proposed a classification system distinguishing juvenile, early adult-onset, and late adult-onset myopia, emphasizing the heterogeneity of this condition (3). Continued myopic progression in adulthood contributes to an increased cumulative myopic burden over a lifetime, thereby elevating the risk of vision-threatening complications such as retinal detachment, myopic maculopathy, and glaucoma.

Despite its clinical significance, adult myopia progression remains relatively underexplored compared to pediatric myopia. Most existing studies are retrospective or rely on questionnaire-based data, which may lack accuracy and objective longitudinal measurements (4). Furthermore, modern lifestyle factors, particularly increased digital screen exposure and prolonged near-work activities among young adults, may contribute to ongoing myopic changes, highlighting the need for updated clinical evidence.

In this context, there is a growing need to systematically evaluate myopia progression in young adults using robust study designs. Understanding the extent of refractive changes and identifying associated risk factors are essential for improving clinical monitoring and developing targeted preventive strategies. Therefore, the present study aims to determine the proportion of young adults exhibiting myopia progression, quantify changes in spherical equivalent over time, and assess the association between myopia progression and demographic factors.

Materials & Methods

This study was designed as an ambispective observational study conducted in the Department of Ophthalmology at Meenakshi Medical College Hospital and Research Institute, Kanchipuram. The study duration was one year, with a follow-up period of 24 months. Ethical clearance was obtained from the Institutional Ethics Committee prior to commencement of the study, and all participants provided informed consent.

Study Population and Sample Size

The study included young adult myopic patients attending the ophthalmology outpatient department. A total of 190 participants were enrolled. The sample size was calculated using Cochran's formula, assuming a 12.7% prevalence of adult myopia progression, with a 95% confidence level, 5% precision, and an additional 10% allowance for non-response (4).

Eligibility Criteria

Participants aged between 18 and 30 years with a spherical equivalent of −0.50 diopters (D) or more were included. Availability of a previous spectacle prescription approximately one year prior to enrollment and willingness for follow-up were mandatory inclusion criteria. Patients with pathological myopia, prior refractive surgery, or associated ocular comorbidities were excluded from the study.

Data Collection and Follow-up

Data collection included both retrospective and prospective components. Retrospective data were obtained from previous spectacle prescriptions recorded approximately one year prior to baseline. Prospective follow-up was conducted with two visits: baseline (at enrollment) and at 12 months. At each visit, participants underwent comprehensive ophthalmic evaluation including measurement of visual acuity, objective and subjective refraction, calculation of spherical equivalent, axial length measurement, and fundus examination. These standardized assessments ensured objective evaluation of refractive changes over time.

Outcome Measures

The primary outcome measure was the proportion of participants demonstrating myopia progression, defined as a change in spherical equivalent of ≥ -0.50 D over the follow-up period. Secondary outcomes included the mean change in spherical equivalent and the association between myopia progression and demographic factors such as age, gender, occupation, and near-work exposure.

Statistical Analysis

Data were analyzed using appropriate statistical methods. Descriptive statistics were used to summarize demographic and clinical characteristics. Changes in refractive error over time were assessed using paired *t*-test or Wilcoxon signed-rank test, depending on data distribution. Binary logistic regression analysis was performed to identify factors associated with myopia progression. A *p*-value of <0.05 was considered statistically significant.

Results

Table 1: Demographic Characteristics of Study Participants

Variable	Category	Percentage (%)
Gender	Male	54.2%
	Female	45.8%
Occupation	Students	58.9%
	IT professionals	13.7%
	Office/clerical workers	10.5%
	Machine-related work	9.5%
	Tailors	7.4%

The study population consisted predominantly of males, with a slight gender difference. A majority of participants were students, indicating a younger, academically engaged cohort with potentially higher near-work exposure.

Figure 1: Gender distribution among the patients

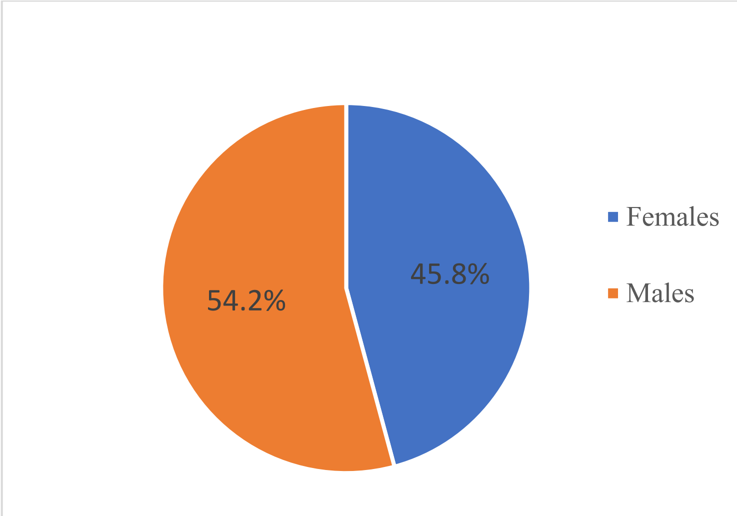

Table 2: Myopia Progression at 24 Months

Refraction Change	Number (n)	Percentage (%)
Stable <- 0.50 D	148	77.9%
Progression ≥ −0.50 D	42	22.1%
Progression ≥ −1.00 D	10	5.3%

Approximately one-fifth (22.1%) of participants demonstrated clinically significant myopia progression over the follow-up period, while the majority remained stable. A smaller proportion (5.3%) showed higher progression (≥ −1.00 D), indicating that although progression is common, rapid progression is less frequent.

Table 3: Mean Spherical Equivalent at Different Time Points

Time Point	Mean Spherical Equivalent (D)
Retrospective (pre-baseline)	−1.85 ± 1.02
Baseline	−2.10 ± 1.15
1-year follow-up	−2.28 ± 1.24

There is a progressive myopic shift over time, as evidenced by increasing negative spherical equivalent values from retrospective records to follow-up. This trend indicates ongoing refractive progression even before clinical presentation and continuing during the study period.

Table 4: Comparison of Demographic Factors with Myopia Progression

Variable	Category	Progression ≥ −0.50 D n (%)	No Progression n (%)	p-value
Gender	Male (n = 103)	25 (24.3%)	78 (75.7%)	0.38
	Female (n = 87)	17 (19.5%)	70 (80.5%)	
Occupation	Students (n = 112)	30 (26.8%)	82 (73.2%)	0.024*
	IT professionals (n = 26)	6 (23.1%)	20 (76.9%)	
	Office/clerical (n = 20)	3 (15.0%)	17 (85.0%)	

Variable	Category	Progression ≥ −0.50 D n (%)	No Progression n (%)	p-value
	Machine-related (n = 18)	2 (11.1%)	16 (88.9%)	
	Tailors (n = 14)	1 (7.1%)	13 (92.9%)	
Near-work exposure	High (n = 138)	36 (26.1%)	102 (73.9%)	0.041*
	Low (n = 52)	6 (11.5%)	46 (88.5%)	

No statistically significant association was found between gender and myopia progression ($p = 0.38$). However, occupation showed a significant association ($p = 0.024$), with students demonstrating the highest progression rates. Similarly, high near-work exposure was significantly associated with myopia progression ($p = 0.041$), suggesting that prolonged near activities may be an important modifiable risk factor.

Table 5: Mean Axial Length at Different Time Points

Time Point	Mean Axial Length (mm)	p-value
Baseline	24.62 ± 0.91	0.001
12 months	24.71 ± 0.93	

A statistically significant increase in axial length was observed over the follow-up period ($p = 0.001$). This supports the finding of progressive axial elongation as an underlying structural basis for myopia progression.

Discussion

The present study demonstrated that 22.1% of young adults exhibited myopia progression ≥ −0.50 D, with 5.3% showing higher progression ≥ −1.00 D, indicating that refractive changes continue beyond adolescence. These findings are consistent with growing evidence that myopia progression persists into early adulthood, as highlighted in studies on adult-onset and progression patterns (1,2).

Compared to previous literature, our study reports a relatively higher progression rate. For instance, Manoharan MK et al. (2025) (4) observed a progression rate of 12.7% among individuals aged 18–30 years, which is notably lower than the 22.1% reported in our cohort. This difference may be attributed to variations in study design, sample size, follow-up duration, and environmental factors such as increased near-work exposure in our population. Similarly, Wu H et al. (2025) (7) reported a progression rate of 18.6% in high myopes aged 18–25 years, which is comparable but still slightly lower than our findings, suggesting variability based on baseline refractive status and population characteristics.

In terms of refractive change, our study demonstrated a mean myopic shift from −1.85 D to −2.28 D, supporting the concept of continued refractive progression in adulthood. This is in agreement with Bullimore MA et al. (2023) (1), who reported that myopia can progress by approximately −1.00 D between 20 and 30 years. Furthermore, Brennan NA et al. (2024) (2) showed that cumulative progression of nearly −1.00 D between ages 20 and 50 is possible, emphasizing that even small annual changes can result in clinically significant long-term progression.

Regarding prevalence, our finding that approximately one in five young adults experience myopia progression is supported by recent epidemiological studies. Kong K et al. (2024) (8) reported that approximately 11% of adults progress annually, with higher rates observed in younger adults. Additionally, large cohort analyses from European populations (9) have documented progression rates of up to 23.4% in individuals aged 18–24 years, closely aligning with our observed rate of 22.1%. These findings collectively reinforce that adult myopia progression is not uncommon and may be underestimated.

A key observation in our study was the significant association between near-work exposure and myopia progression (p = 0.041). This aligns with evidence from Inooka T et al. (2025) (10), who reported that prolonged near-work and higher educational demands are significantly associated with axial elongation and refractive progression. The predominance of students and individuals engaged in visually intensive occupations (e.g., IT professionals) in our study population further supports the role of environmental and behavioral risk factors.

In contrast, gender was not significantly associated with myopia progression (p = 0.38) in our study. This finding is consistent with Khan HA et al. (2025) (11), who reported no significant gender-based differences in adult myopia progression. However, variability across studies suggests that demographic and ethnic differences, as well as study methodologies, may influence these outcomes.

Our study also demonstrated a statistically significant increase in axial length (p = 0.001), indicating structural changes underlying refractive progression. This is consistent with Zhang S et al. (2024) (12), who reported axial elongation rates ranging from 0.02 mm/year in stable cases to 0.38 mm/year in rapidly progressing individuals. Similarly, Kong K et al. (2024) (8) reported an average axial elongation of 0.03 mm/year, supporting the biological basis of continued eye growth in adulthood.

Overall, the findings of this study reinforce that myopia progression in young adults is an active and clinically significant process, particularly among individuals with high near-work demands. Compared to existing literature, our study demonstrates slightly higher progression rates, likely reflecting real-world exposure patterns and occupational influences. These results highlight the importance of regular monitoring, early detection, and implementation of preventive strategies, even in adulthood a stage traditionally considered stable in terms of refractive error.

Conclusion

The present study highlights that myopia progression in young adults is a clinically significant and ongoing process, with 22.1% of participants demonstrating meaningful progression (≥ -0.50 D), thereby challenging the traditional notion of refractive stability after adolescence. A consistent myopic shift in spherical equivalent, along with a statistically significant increase in axial length (p = 0.001), confirms continued structural and refractive changes during early adulthood. The study further identifies near-work exposure and occupation, particularly among students and IT professionals, as significant risk factors, while gender showed no association with progression. These findings emphasize the need for regular refractive monitoring and early identification of adult progressors to reduce long-term ocular complications.

Conflict of Interest: Nil

Source of Funding: Nil

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