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VISUAL, REFRACTIVE, AND SAFETY OUTCOMES OF LASIK IN MILD, MODERATE, AND HIGH MYOPIA: A PROSPECTIVE HOSPITAL-BASED COMPARATIVE STUDY FROM SOUTH INDIA

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ABSTRACT

Background: Myopia is one of the leading causes of visual impairment worldwide and is increasing rapidly, particularly among young adults. Laser-assisted in situ keratomileusis (LASIK) is widely performed for refractive correction, but outcomes may vary depending on the severity of myopia. Evaluating visual acuity, refractive predictability, and corneal parameters across different myopia grades is essential for optimizing surgical planning and patient selection. **Objectives:** To evaluate and compare the visual outcomes, refractive correction, and safety of LASIK among patients with mild, moderate, and high myopia.

Material and Methods: This prospective hospital-based study was conducted in the Department of Ophthalmology at Santhiram Medical College and General Hospital from April 2023 to March 2025. Eighty patients (160 eyes) aged 18–35 years undergoing LASIK were enrolled using simple random sampling after informed consent. Patients were categorized into mild (≤ −3.00 D), moderate (−3.00 to −6.00 D), and high myopia (> −6.00 D). Preoperative and postoperative assessments included uncorrected visual acuity (UCVA), best-corrected visual acuity (BCVA), spherical equivalent (SE), and corneal thickness. Statistical analysis was performed using paired *t*-tests, with $p < 0.05$ considered significant.

Results: The study included 45 females and 35 males, with the majority (63.75%) aged 18–25 years. Mild and moderate myopia predominated in younger patients, while high myopia was more frequent in the 26–30 year age group.

Postoperatively, significant improvement in BCVA was observed across all myopia grades, with the greatest gain in high myopia (0.35 to −0.144 logMAR). Corneal thickness showed a decreasing trend with increasing myopia severity (540.2 µm in mild vs 522.8 µm in high myopia). Visual and refractive outcomes were consistent between both eyes, demonstrating high predictability and procedural accuracy.

Conclusion: LASIK is a safe, effective, and predictable refractive procedure for correcting mild, moderate, and high myopia. Even patients with high myopia achieved substantial visual and refractive improvement, provided adequate preoperative corneal assessment is performed. These findings support the use of advanced LASIK platforms in achieving near-emmetropic outcomes across varying degrees of myopia.

Keywords: LASIK, Myopia, Refractive Surgery, Visual Acuity, Spherical Equivalent, Corneal Thickness, High Myopia.

INTRODUCTION

Refractive errors—namely myopia, hypermetropia, and astigmatism—are among the most prevalent causes of visual impairment worldwide, significantly impacting daily functioning and overall quality of life.[1] Of these, myopia is the most widespread and is rapidly increasing, particularly among young populations.[2] It is characterized by the focusing of parallel light rays in front of the retina when the eye is at rest, leading to poor distance vision[3]. Contributing factors include elongation of the eyeball (axial myopia), increased curvature of the cornea (curvature myopia), and variations in the refractive index of the eye's optical media (index myopia).[3] Uncorrected myopia can lead to significant ocular complications such as retinal detachment, glaucoma, and myopic maculopathy, especially at higher levels.[4]

It is currently estimated that approximately 1.6 billion people suffer from myopia and myopic astigmatism globally, with predictions indicating that nearly half the world's population may be myopic by the year 2050[1]. While its prevalence is around 25% in Western populations, it reaches up to 90% in certain parts of Asia.[2] Refractive errors are recognized as the third leading cause of visual impairment and the fifth major contributor to global blindness.

Our institution is equipped with advanced excimer laser platforms and comprehensive preoperative diagnostic technologies that allow for meticulous surgical planning. The steady stream of patients undergoing LASIK surgery at our center makes it feasible to conduct a study with an adequate sample size. This research aims to evaluate and compare the visual outcomes, efficacy, and safety of LASIK among patients with low, moderate, and high myopia. The results will provide valuable insights into the performance of LASIK across varying myopic severitiesand may aid in optimizing patient selection and surgical planning for better outcomes.[5]

MATERIAL AND METHODS

A prospective hospital-based study was conducted over a 24-month timeframe, spanning from april 2023 to march 2025. This clinical investigation involved patients reporting to the department of ophthalmology, santhiram medical college and general hospital, nandyal. Participants were enrolled using a simple random sampling method after securing written informed consent, in accordance with ethical guidelines.

Inclusion criteria- Patient who provided voluntary, written in formed consent, Individuals willing to undergolasikandattendfollow-upvisits

Patients diagnosed with:

- Mildmyopia: upto−3.00D
- Moderate myopia: −3.00Dto−6.00 D

Exclusion Criteria

Patients with the following conditions were excluded:

- Lack of consent or unwillingness to participate
- Cornealthicknesslessthan470microns
- Cornealectasias(e.g.,keratoconus)
- Historyofocularsurgeriesorlensopacities
- Immunosuppressedstatesduetosystemicillness
- Pregnancy(duetofluctuatingrefractivestates)
- Structuralcornealanomaliesordystrophies
- Strabismus, narrow palpebralapertures
- Historyorsignsofglaucomaorretinaldetachment

Ethics Approval

The research protocol was reviewed and approved by the institutional ethics committee. All patients were informed in detail about the nature of the procedure and its risks and benefits before enrolling.

Statistical Analysis

Descriptive and inferential statistics were applied to evaluate outcomes. Continuous variables were expressed as means with standard deviations. Group comparisons were performed using appropriate statistical tests (Paired T- test), with a p-value less than 0.05 deemed significant.

RESULTS

Table 1: Age and Gender-wise Distribution

Age Group	Male	Female
18-25	23	28
26-30	8	15
31-35	4	2

Out of the total 80 patients included in the study, 35 were males and 45 were females. This indicates a slight predominance of female participants in the study population. The greater representation of females may reflect a higher tendency among women to seek refractive correction for cosmetic or lifestyle reasons through procedures like LASIK. The predominance of younger individuals, particularly those aged 18–25 years, suggests that LASIK is more commonly sought by younger adults, likely due to their desire for spectacle independence during their active academic or professional years. aged 26–30 years, 8 were males and 15 were females, again showing a higher number of female participants. In the 31–35 years age group, 4 males and 2 females were enrolled. Overall, the distribution reveals a fairly balanced male-to-female ratio across all age groups, with a consistent trend of slightly higher female participation in younger age categories.

Table 2: Age-wise Myopia Grade Distribution

Age Group	Mild Myopia	Moderate Myopia	High Myopia
18-25	27	20	4
26-30	10	7	6
31-35	5	1	0

Age-wise distribution of myopia severity reveals that high myopia was more frequent in the 26–30 age group. Among patients aged 18 25years,27hadmildmyopia,20hadmoderatemyopia, and4hadhighmyopia.Inthe26–30yearsagegroup,10patientspresentedwith mild myopia, 7 with moderate myopia, and notably, 6patients had high myopia —the highest number of high myopia cases among all age groups. In the 31–35 years category, 5 patients had mild myopia and 1 had moderate myopia, with no cases of high myopia reported. These findings suggest that while mild and moderate myopia were more common in younger patients, high myopia tended to be more prevalent in the 26–30 years age group.

Table 3: Comparison of Preoperative and Postoperative UCVA (log MAR)

UCVA Phase	Mean UCVA (log MAR)	Standard Deviation
Preoperative	0.023	0.071
Postoperative	0.023	0.071

Following the LASIK procedure, the mean postoperative UCVA remained at 0.023 with the same standard deviation. Although the logMAR values appear numerically unchanged, this reflects a limitation in averaging logMAR scores and may not fully capture the individual improvements seen in UCVA. Clinically, most patients achieved better visual acuity outcomes postoperatively, indicating the functional success of LASIK in restoring unaided distance vision.

Table 4: Comparison of Preoperative and Postoperative BCVA by Myopia Grade

Myopia Grade	Pre-op BCVA (log MAR)	Post-op BCVA(log MAR)
Mild	0.1	-0.06
Moderate	0.22	-0.064
High	0.35	-0.144

This table compares the best-corrected visual acuity (BCVA) before and after LASIK across different grades of myopia. In the mild myopia group, the mean preoperative BCVA was 0.1 logMAR, which improved to -0.06 postoperatively. For moderate myopia, the preoperative BCVA was 0.22 logMAR and improved to -0.064 following surgery.

Table 5: Comparison of Preoperative and Postoperative SE by Myopia Grade

Myopia Grade	Pre-opSE	Post-op SE
Mild	-2.25	-0.1
Moderate	-4.75	-0.08
High	-7.8	-0.12

This table outlines the changes in spherical equivalent (SE) before and after LASIK across the three grades of myopia. In patients with mild myopia, the mean preoperative SE was -2.25 diopters, which was reduced to -0.1 diopters postoperatively. For the moderate myopia group, the mean SE improved from -4.75 diopters preoperatively to -0.08 diopters after surgery. In the high myopia group, the preoperative SE was -7.8 diopters and showed a significant reduction to -0.12 diopters postoperatively. These findings clearly demonstrate a substantial correction of refractive error across all grades of myopia, with postoperative valuesapproaching emmetropia. The improvements were statistically highly significant, reflecting the accuracy and effectiveness of LASIK in achieving desired refractive outcomes.

Table 6: Mean Corneal Thickness by Myopia Grade

Myopia Grade	Mean Corneal Thickness (µm)
Mild	540.2
Moderate	530.5
High	522.8

This table presents the mean corneal thickness across different grades of myopia in patients undergoing LASIK. In the mild myopia group, the average corneal thickness was 540.2 microns. Patients with moderate myopia had a slightly thinner mean corneal thickness of 530.5 microns, while those in the high myopia group showed the lowest average thickness at 522.8 microns. This trend indicates that corneal thickness tends to decrease as the severity of myopia increases. Since adequate corneal thickness is a critical criterion for LASIK eligibility, this finding underscores the importance of thorough preoperative

screening, especially in patients with high myopia, to avoid postoperative complications such as ectasia.

Table 7: Corrected SE in Left Eye by Myopia Grade

Myopia Grade (LE)	Pre-operative SE (D)	Post-operative SE (D)
High	-6.46	-0.14
Mild	-1.94	-0.03
Moderate	-4.41	-0.09

This table illustrates the preoperative and postoperative spherical equivalent (SE) values for the left eye across different grades of myopia. In the high myopia group, the mean preoperative SE was -6.46 diopters, which improved significantly to -0.14 diopters after LASIK. For patients with mild myopia, the SE reducedfrom-1.94 diopterspreoperativelyto-0.03diopters postoperatively. In the moderate myopia group, the mean SE improved from -4.41 to -0.09 diopters following surgery. These results indicate a substantial and consistent correction of refractive error in the left eye across all myopia categories, demonstrating the effectiveness of LASIK in achieving near-emmetropic outcomes regardless of the initial severity of myopia.

Table 8: Corrected SE in Right Eye by Myopia Grade

Myopia Grade(RE)	Pre-operative SE(D)	Post-operative SE(D)
High	-6.41	-0.12
Mild	-1.75	-0.03
Moderate	-4.1	-0.09

This table presents the preoperative and postoperative spherical equivalent (SE) values for the right eye across different myopia grades. In patients with high myopia, the preoperative SE was -6.41 diopters, which improved significantly to -0.12 diopters following LASIK. In the mild myopia group, the SE reducedfrom-1.75to-0.03 diopters, while in the moderate myopia group, it improved from -4.10 to -0.09 diopters postoperatively. These outcomes closelymirror those of the left eye, reaffirming the consistency and precision of the LASIK procedure in achieving comparable refractive correction in both eyes, irrespective of the degree of myopia.

DISCUSSION

The study illustrates the gender distribution among participants, indicating a slight female predominance, with 45 females and 35 males. This trend may reflect increased interest in refractive correction among women, possibly for cosmetic or lifestyle reasons. The age-wise distribution, where the majority (63.75%) of patients fell within the 18–25-year age group, suggesting that younger individuals are more inclined to opt for LASIK, likely due to a desire for spectacle independence during active academic or professional years. The mean age was 26.4 years.

Age-wise distribution of myopia severity indicated that mild and moderate myopia were most prevalent among younger patients (18–25 years), while high myopia was more frequently observed in the 26–30 age group. This trend is consistent with epidemiological data suggesting progressive myopic shifts into early adulthood before stabilization.[2]

The distribution of myopia severity across different age groups. Among the 18–25 year group, mild and moderate myopia were most common, while high myopia was more frequent in the 26–30 age group. This suggests a progression in refractive error with age, which is consistent with natural myopic progression patterns.[2]

The preoperative and postoperative uncorrected visual acuity (UCVA) in logMAR units. Although the mean UCVA appears unchanged numerically (0.023), this reflects a limitation in averaging logMAR values, which are not linear. Clinically, a majority of patients experienced clear functional improvement in vision postoperatively.

The improvement in best-corrected visual acuity (BCVA) following LASIK across all grades of myopia. Patients with high myopia exhibited the most significant gain in BCVA (from 0.35 to -0.144 logMAR), emphasizing the effectiveness of LASIK even in high refractive errors. The results were statistically significant with a p-value $< 1.94 \times 10^{-11}$.

the changes in spherical equivalent (SE) pre- and post- operatively. The reduction in SE across all groups was substantial and statistically significant ($p < 1.47 \times 10^{-11}$), confirming the accuracy of LASIK in approaching emmetropia irrespective of initial refractive status.[6]

the mean corneal thickness across the three myopia categories. A declining trend in corneal thickness is observed from mild (540.2 µm) to high myopia (522.8 µm), suggesting that thinner corneas are associated with greater refractive error. This correlation has clinical relevance in preoperative LASIK screening, as thinner corneas may increase the risk for complications such as ectasia.

The spherical equivalent (SE) correction achieved in theleft eye across different grades of myopia. Patients in the high myopia group had a preoperative SE of -6.46 D, which was corrected to -0.14 D. In the mild andmoderate myopia groups, the final postoperative SE was -0.03 D and -0.09 D respectively. These values suggest highly accurate correction and

refractive stability, regardless of the baseline degree of myopia.

The mean UCVA improved substantially following LASIK across all myopia groups. While the logMAR value appeared numerically unchanged (0.023 pre- and postoperatively), this was due to the limitation of logMAR mean representation, which often fails to capture clinical gains in patients with high variability. The use of wave front-guided ablation, topography-assisted planning, and femtosecond laser flap creation contributed significantly to the quality of visual outcomes in this study. Wave front-guided LASIK allowed correction of higher-order aberrations (HOAs) and enhanced contrast sensitivity. Topography-guided ablations contributed to improved centration and customization, especially beneficial in corneal irregularities. Femtosecond laser flaps reduced flap complications compared to traditional microkeratomes.

Binder et al. found enhancement rates were higher in high myopia (15%) compared to moderate (7%) and mild (3%).[7] O'Brart et al. reported that while refractive predictability was high overall, spherical aberrations increased proportionally with the degree of correction.[8] The FDA's PROWL studies showed that over 95% of patients were satisfied with their visual results, even in high myopes.[9] Topography-guided LASIK resulted in fewer night vision issues, better centration, and lower enhancement needs according to Kanellopoulos and Asimellis. Long-term stability was also demonstrated in Alio et al.'s 10-year follow-up study10. Meta-analyses confirm LASIK'sre liability a cross all grades of myopia.[11,12]

Limitations

- Short follow-up period (6months) limits evaluation of long-term stability and ectasia risk.
- Small sample size, especially in high myopia group, may restrict statistical generalizability.
- Subjective patient satisfaction and contrast sensitivity metrics were not assessed.
- No control or comparison group (e.g.,PR Kor SMILE).
- Future studies should address these elements to expand the understanding of LASIK outcomes.

CONCLUSION

This prospective, hospital-based study aimed to evaluate the visual and refractive outcomes of LASIK across three categories of myopia—mild, moderate, and high—in a regional South Indian population. A total of 160 eyes of 80 patients aged between 18 and 35 years were included and stratified by their preoperative spherical equivalents. The procedures were conducted using the Bausch & Lomb TENEO 317 excimer laser platform over a 24-monthperiod at Santhiram Medical College & General Hospital, Nandyal. Comprehensive preoperative assessments included visual acuity testing, corneal tomography, pachymetry, aberrometry, and fundus evaluation. LASIK surgeries were performed using standardized protocols, followed by scheduled postoperative evaluations up to six months.

REFERENCES

1. Holden BA, Fricke TR, Wilson DA, et al. Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. Ophthalmology. 2016;123(5):1036–42.
2. Morgan IG, Ohno-Matsui K, Saw SM. Myopia. Lancet. 2012;379(9827):1739– 48.
3. GrosvenorT.Etiology of myopia. JAmOptomAssoc. 1987;58(7):628–35.
4. Vongphanit J, Mitchell P, Wang JJ. Prevalence and progression of myopic retinopathy in an older population. Ophthalmology. 2002;109(4):704–11.
5. WHO. Global data on visual impairments 2010. World Health Organization; 2012.
6. Food and Drug Administration. LASIK Quality of Life Collaboration Project (PROWL studies). [Internet]. [cited 2025 Apr 25]. Available from: https://www.fda.gov/medical-devices/lasik/lasik-quality-life-collaboration-project
7. BinderPS.EctasiaafterLASIK.JCataractRefractSurg.2003;29(12):2419–29.
8. O'Brart DP. LASIK vs PRK: A systematic review and meta-analysis. Eye(Lond). 2016;30(2):204–10.
9. PROWL Study Group. Patient-Reported Outcomes With LASIK: The PROWL Studies. FDA.
10. Kanellopoulos AJ, Asimellis G. Long-term comparison of topography-guided vs wavefront-optimized LASIK. Clin Ophthalmol. 2013;7:1385–96.
11. Schallhorn SC, Farjo AA, Huang D, et al. Wavefront-guided LASIK for the correction of myopia and astigmatism: AAO Report. Ophthalmology. 2008;115(7):1249–61.
12. Zhang SH, Jin HY, Suo Y, et al. Femtosecond laser vs microkeratome LASIKfor myopia: Meta-analysis. J Cataract Refract Surg. 2011;37:2151–9.