Impact of Refractive Error on Quality of Life among Paramedical Science Students of Teerthanker Mahaveer University

Mr Anand Kumar Gautam (D. Orthoptics, B.Optom, M.Optom)[1], Ms Poonam Choudhary (B.Optom, M.Optom)[2], Mr Divyam Saxena (B.Pharma, M.Pharma)[3]

Rimt University, India

DOI: https://doi.org/10.51244/IJRSI.2026.13010164

Received: 22 January 2026; Accepted: 28 January 2026; Published: 11 February 2026

ABSTRACT

The goal is to evaluate how refractive error affects paramedical science student's quality of life. Methods: 161 students (322 eyes) participated in a descriptive cross-sectional study.

Refractive status and quality of life were evaluated using clinical refraction and a validated questionnaire. Chi-square and ANOVA tests were used to analyze the data.

Findings: The most common conditions were myopia (34.2%), hyperopia (7.5%), and astigmatism (34. 8%), with 23.6% being emmetropic. Females had a considerably higher prevalence of astigmatism (p = 0.01).

Astigmatism had the lowest quality of life scores, followed by myopia and hyperopia (ANOVA, p = 0. 04).

Conclusion: Astigmatism has the biggest detriment al impact on paramedical students' quality of life du e to refractive errors.

INTRODUCTION

When a patient has refractive error, they are unable to see clearly without glasses or contact lenses. Refractive error can be caused by a variety of conditions, including myopia (shortsightedness), hypermetropia (longsightedness), and presbyopia (physiological changes in the eye's lens as an individual ages). Refractive error, which includes both shortsightedness and longsightedness, has been shown in numerous studies to raise the risk of certain eye disorders and lower the quality of life associated with vision in school-age children, adults, and the elderly. According to earlier studies, untreated refractive error is associated with reduced economic productivity, a worse quality of life, and missed possibilities for employment and education (1,2).

Additional symptoms of refractive error include headaches, eyestrain, and double vision. According to one study, there were between one and two billion people with refractive error worldwide. Geographically, the rate varied, with approximately 25% of Europeans and 80% of Asians infected (3). The typical condition is myopia (4). Elderly people and young children are typically affected by hyperopia (5,6). Presbyopia affects most persons at age 35 (7).

According to one study, 660 million people (10 per 100) had uncorrected refractive error in 2013; of those, 9.5 million were reported to be blind as a result of refractive error (8). One of the most frequent causes of blindness is refractive error. In both general practice and specialty eye clinics, decreased vision and headaches are typically presentations linked to visual impairment and refractive error (9,10). A worldwide public health concern that affects people of all ages is myopia. Disparities within and between nations have been reported in a few epidemiological papers (11).

Out of 688 samples, 466 (68%) had nearsightedness and 22 (3%) had farsightedness, according to one cross-sectional study; myopia was a distinct risk factor for low sight-related quality of life for both near and far vision (12).In India, the prevalence of refractive error is 8.0% in children and 10.8% in schools, with myopia accounting for 5.3%, hyperopia for 4.0%, and astigmatism for 5.4%. A qualitative study revealed that the

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

median age was 49 years (min: 22 years, max: 76 years). Interviews were recorded on audio, written down, categorized, and subjected to thematic analysis. The majority of them were female (29:59%), and the most prevalent conditions among them were myopia (36:75%), nearsightedness (12:25%), astigmatism (23 participants), and presbyopia (47.9%).

The majority (39:81.3%) wore spectacles, 17 (35.4%) had contact lenses, and 17 (35.4%) had undergone refractive surgery. The study's conclusions advance knowledge of the main issues impacting refractive error patients. According to meta-analysis data on the quality of life for those with refractive error, everyday tasks are difficult, and dealing with life is unpleasant (13).

The most common cause of vision impairment and a significant contributor to blindness globally is uncorrected refractive error (14). These days, the only beneficial and trouble-free methods to concentrate eyesight are glasses and contact lenses. (15)

To comprehend the problems that people with uncorrected refractive error actually confront. In order to gauge the quality of life, it still had to assess its burden. The researcher emphasized that by recommending therapeutic approaches and monitoring successful treatment, quality-of-life associated health assessment can enhance clinical management and offer useful information about various exposures on children's health. (16) By creating a questionnaire to analyze one's own stated health profile and functioning, symptoms, and expectations in a person with refractive error, the refractive status and visual profile are evaluated. (17)

Young people who wear soft contact lenses as opposed to those who wear uniocular vision spectacles have shown a significant improvement in quality of life related to visual functioning, particularly in areas related to limitations in sports, activities, attractiveness, and satisfaction with the suggested correction. (18) Children in East Asian countries are not yet encouraged to wear contact lenses for daytime vision correction, with the exception of rare circumstances in which uniocular eyewear is unable to significantly improve vision correction, such as in cases of severe astigmatism or anisometropia. (19) In ophthalmic research, quality of life assessments play a significant role in improving our comprehension of the patient's visual profile and supporting the clinical examination that is utilized for evaluation. (20)

Age groups are impacted by refractive error, particularly school-age children. (21) Refractive error is more common in white people than in black people, and it affects more women than men. (22) Refractive error also results in visual impairment if left untreated and blindness if left untreated for an extended period of time. Additionally, the brain rejects the poorer eye's vision and suppresses the blind eye, making room for Tropias (squint: outward or inward deviation of the eye). (23)

If left untreated for an extended period of time, refractive error also results in poor vision. (24) According to the NPCB (National Programme of Control Blindness), low vision occurs when visual acuity is less than 6/60 (1.0 in logmar) after the best correction and a visual field of vision limitation of less than 20 degrees. (25) Uncorrected myopia can result in divergent squint, which is an outward deviation of the eye, while uncorrected hypermetropia can result in convergent squint, which is an inward deflection of the eye. (26) Refractive error is also categorized by grades, which are low, moderate, and high; the table is provided in the study's data gathering process. (27)

Refractive errors have been linked to a wide range of diseases, including lattice degeneration, tessellated fundus, posterior staphyloma, myopia maculopathy or myopia macular degeneration, glaucoma (open angle), retinal detachment, vitreous detachment, and chorioretinal atrophy. (28) If medication or surgery are not used to correct these conditions, a patient may become completely blind. High myopia can also result from cataracts, which can have three different morphologies: cortical, nuclear, and posterior subcapsular. (29) Variations in the axial length of the eye, variations in the refractive index of the lens, and variations in the curvature of the cornea or crystalline lens all contribute to refractive error. (30)

High-grade myopia or myopic astigmatism is caused by keratoconus, keratoglobus, and anterior staphyloma. Patients with posterior staphyloma also have choroidal thinning. (31) Excessive divergence tends to cause myopia, whereas excessive convergence tends to cause hyperopia. (32) Myopia required under correction, while hyperopia required full correction. (33) It is the examiner's responsibility to review the theoretical

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

guidelines because myopia with overcorrection uses their excessive accommodation and hyperopia with under correction does not relax their accommodation, despite clinical observations that patients do not accept these guidelines. Myopia accepts overcorrection, while hyperopia accepts under correction (34). Refractive defects can be corrected with a variety of refractive operations. Every refractive procedure has both major advantages and possible post-operative problems.(35)

A steady refractive error, central corneal thickness, and corneal topography are recommended preprocedure exams for patients undergoing refractive procedures. (36) The refractive procedures will be determined following these tests; if the results are unstable, the surgeries will be delayed and the patient will be instructed to follow up. (37) Refractive surgeries employ a variety of laser types, including femtosecond, solid state UV, and excimer lasers. Additionally, many techniques are employed for each type of refractive error, including LASIK, radial keratotomy, keratomileusis, and photorefractive keratectomy. Phakic refractive lenses, corneal lenticular extraction, epi-LASIK, CLASIK, laser sub-epithelial keratomileusis, and refractive lens exchange. (38)

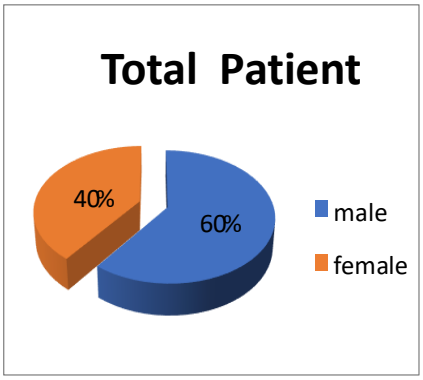
Thermal keratoplasty, conductive keratoplasty, corneal stromal collagen reduction techniques, incisional refractive operations, and laser refractive surgeries are all used to treat hyperopia. For astigmatism, laser-based surgery, relaxing incisions, and astigmatism brought on by PK. (39) Refractive procedures are not recommended for some eye disorders, such as corneal ectasia, keratoconus, Herpes keratitis, dry eyes, persistent blephritis, Large pupils, long-term use of antimetabolites or steroids in autoimmune diseases, Pregnancy, blepharophimosis, diabetes mellitus, uveitis, corneal abberations from contact lens use, and glaucoma. (40)

Methods

- **Design:** Cross-sectional, descriptive.
- **Population:** 161 paramedical students, aged 18–28 years.
- **Procedures:** Visual acuity, retinoscopy, subjective refraction, slit lamp, ophthalmoscopy, and questionnaire.
- **Statistical analysis:**
- Frequencies and percentages.
- Chi-square test for gender differences.
- ANOVA for QOL differences among refractive error groups.
- $p < 0.05$ is considered statistically significant.

RESULTS

- **Gender distribution:** Males 59.6%, Females 40.4%.



ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

Figure 1: Showing gender wise distribution

Refractive error prevalence: Myopia

34.2%, Hyperopia 7.5%, Astigmatism 34.8%, Emmetropia 23.6%.

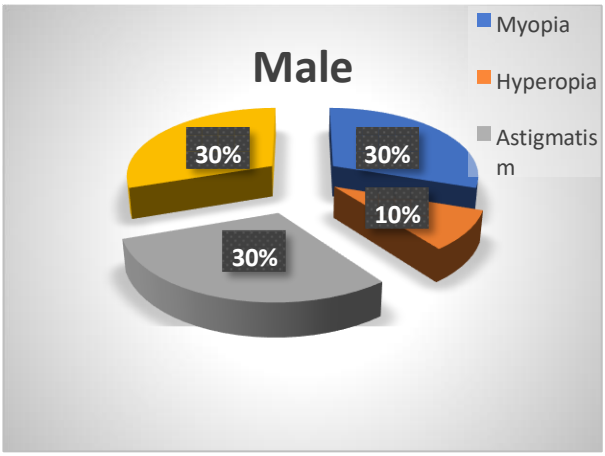


Figure 2: Refractive error-wise distribution in males

• **Gender comparison:** Astigmatism is higher in females (41.5%) than males (30.2%) ($\chi^2 = 6.12$, $p = 0.013$).

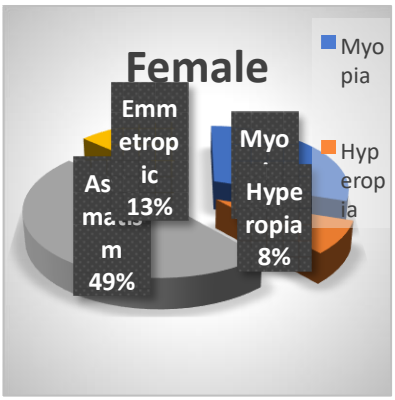


Figure 3: Refractive error-wise distribution in females

• **Grades:** Myopia (low 60%, moderate 34%, high 6%), Hyperopia (low 62%, moderate 38%, none high), Astigmatism (low 31%, moderate 46%, high 23%).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

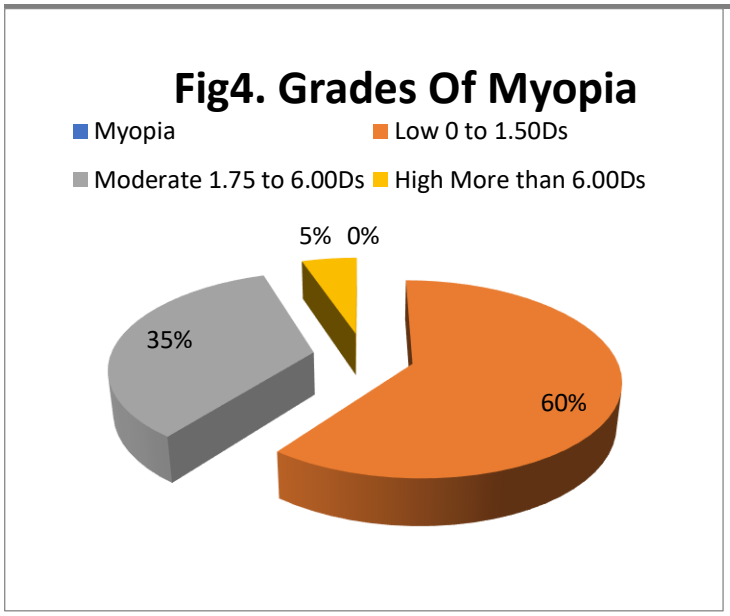


Figure 5: Grades of Hyperopia

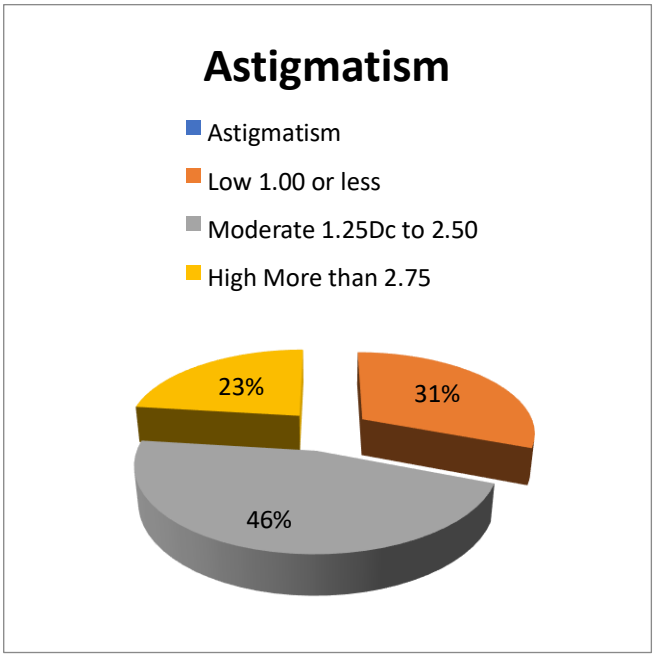


Figure 6: Grades of Astigmatism

• **QOL scores:** Mean QOL significantly worse in the astigmatism group vs myopia and hyperopia (ANOVA, p = 0.04).

DISCUSSION

QOL is lowered by refractive defects, particularly astigmatism, which causes visual distortion. Our results align with those of Rose et al. (2000) and Kumaran et al. (2017).

Consequences: It is crucial to screen students early.

CONCLUSION

Young individuals' quality of life is severely compromised by refractive problems. Academic performance and well-being can be enhanced by awareness campaigns and early intervention. This study concluded the Alternate hypothesis.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue I January 2026

REFERENCE

1. Smith TS, Frick KD, Holden BA, Fricke TR, Naidoo KS. Potential lost productivity resulting from the global burden of uncorrected refractive error. Bulletin of the World Health Organization. 2009;87:431-7, doi:10.2471/BLT.08.055673
2. Kandel H, Khadka J, Shrestha MK, Sharma S, NeupaneKandel S, Dhungana P, Pradhan K, Nepal BP, Thapa S, Pesudovs K.
3. Uncorrected and corrected refractive error experiences of Nepalese adults: a qualitative study. Ophthalmic epidemiology. 2018 Mar 4;25(2):147-61.
4. Mohammed Dhaiban TS, Ummer FP, Khudadad H, Veettil ST. Types and Presentation of Refractive Error among Individuals Aged 0–30 Years: HospitalBased Cross-Sectional Study, Yemen. Advances in Medicine. 2021 Jul 5;2021.
5. Foster PA, Jiang Y. Epidemiology of myopia. Eye. 2014 Feb;28(2):202-8.
6. Castagno VD, Fassa AG, Carret ML, Vilela MA, Meucci RD. Hyperopia: a metaanalysis of prevalence and a review of associated factors among school-aged children. BMC Ophthalmology. 2014 Dec;14(1):1-9.
7. Grosvenor TP. Primary care optometry. Elsevier Health Sciences; 2007.
8. McBrien NA, Barnes DA. A review and evaluation of theories of refractive error development. Ophthalmic and Physiological Optics. 1984 Jul;4(3):201-13.
9. Vos T, Barber RM, Bell B, Bertozzi-Villa A, Biryukov S, Bolliger I, Charlson F, Davis A, Degenhardt L, Dicker D, Duan L. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. The Lancet. 2015 Aug 22;386(9995):743-800.
10. Gil-Gouveia R, Martins IP. Headaches associated with refractive errors: myth or reality?. Headache: The Journal of Head and Face Pain. 2002 Apr;42(4):256-62
11. Mohammed Dhaiban TS, Ummer FP, Khudadad H, Veettil ST. Types and Presentation of Refractive Error among
12. Individuals Aged 0–30 Years: HospitalBased Cross-Sectional Study, Yemen. Advances in Medicine. 2021 Jul 5;2021.Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS , Sankaridurg P, Wong TY, Naduvilath TJ, Resnikoff S. Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. Ophthalmology. 2016 May 1;123(5):1036-42
13. Hsieh MH, Lin JC. Association of refractive error with vision-related quality of life in junior high school students. Taiwan journal of ophthalmology. 2016 Mar 1;6(1):32-5.
14. Kandel H, Khadka J, Goggin M, Pesudovs K. Impact of refractive error on quality of life: a qualitative study. Clinical & experimental ophthalmology. 2017 Sep;45(7):677-88.
15. Kumaran SE, Balasubramaniam SM, Kumar DS, Ramani KK. Refractive error and visionrelated quality of life in South Indian children. Optometry and Vision Science. 2015 Mar 1;92(3):272-8.
16. Steinberg EP, Tielsch JM, Schein OD, Javitt JC, Sharkey P, Cassard SD, Legro MW, Diener-West M , Bass EB, Damiano AM, Steinwachs DM. The VF-14: an index of functional impairment in patients with cataract. Archives of Ophthalmology. 1994 May 1;112(5):630-8.
17. De Civita M, Regier D, Alamgir AH, Anis AH, FitzGerald MJ, Marra CA. Evaluating health-related quality-of-life studies in paediatric populations. Pharmacoeconomics. 2005 Jul;23(7):659-85.
18. Vitale S, Schein OD, Meinert CL, Steinberg EP. The refractive status and vision profile: a questionnaire to measure vision-related quality of life in persons with refractive error. Ophthalmology. 2000 Aug 1;107(8):1529-39.
19. Walline JJ, Gaume A, Jones LA, Rah MJ, Manny RE, Berntsen DA, Chitkara M, Kim A, Quinn N. Benefits of contact lens wear for children and teens. Eye & contact lens. 2007 Nov 1;33(6):317-21.
20. Yang B, Ma X, Liu L, Cho P. Vision-related quality of life of Chinese children undergoing orthokeratology treatment compared to single vision spectacles. Contact Lens and Anterior Eye. 2021 Aug 1;44(4):101350.
21. Nichols JJ, Mitchell GL, Saracino M, Zadnik K. Reliability and validity of refractive error–specific quality–of–life instruments. Archives of Ophthalmology. 2003 Sep

a

22. Pi LH, Chen L, Liu Q, Ke N, Fang J, Zhang S, Xiao J, Ye WJ, Xiong Y, Shi H, Yin ZQ. Refractive status and prevalence of refractive errors in suburban school-age children. International journal of medical sciences. 2010;7(6):342.
23. Sperduto RD, Seigel D, Roberts J, Rowland M. Prevalence of myopia in the United States. Archives of Ophthalmology. 1983 Mar 1;101(3):405-7.
24. Resnikoff S, Pascolini D, Mariotti SP, Pokharel GP. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004. Bulletin of the World Health Organization. 2008;86:63-70.
25. Berhane Y, Worku A, Bejiga A, Adamu L,Alemayehu W, Bedri A, Haile Z, Ayalew A, Adamu Y, Gebre T, Kebede TD. Prevalence and causes of blindness and low vision in Ethiopia. Ethiopian Journal of Health Development. 2007;21(3):204-10.
26. Murthy G, Johnson GO. Prevalence, incidence and distribution of visual impairment. The epidemiology of eye disease. 2012 Mar 13:3-61.
27. Abdi S. Asthenopia in schoolchildren. KarolinskaInstitutet (Sweden); 2007. Michaeline I, Sheriff A , Bimbo A. Paediatric refractive errors in an eye clinic in Osogbo, Nigeria. Ethiopian journal of health sciences. 2016 Mar 30;26(2):147-54
28. Cho BJ, Shin JY, Yu HG. Complications of pathologic myopia. Eye & contact lens. 2016 Jan 1;42(1):9-15..
29. Prokofyeva E, Wegener A, Zrenner E. Cataract prevalence and prevention in Europe: a literature review. Acta Ophthalmologica. 2013 Aug;91(5):395-405.
30. Kaštelan S, Gverović-Antunica A, Pelčić G, Gotovac M, Marković I, Kasun B. Refractive changes associated with diabetes mellitus. InSeminars in Ophthalmology 2018 Nov 17 (Vol. 33, No. 7-8, pp. 838-845). Taylor & Francis.
31. Anderson JR, Parsons JH. Hydrophthalmia or congenital glaucoma. Cambridge University Press; 2013 Oct 31.
32. Charman WN. Aberrations and myopia. Ophthalmic and Physiological Optics. 2005 Jul;25(4):285-301.
33. Vasudevan B, Esposito C, Peterson C, Coronado C, Ciuffreda KJ. Under-correction of human myopia–Is it myopigenic?: A retrospective analysis of clinical refraction data. Journal of Optometry. 2014 Jul 1;7(3):147-52.
34. Kushner BJ, Kowal L. Diplopia after refractive surgery. Arch Ophthalmol. 2003;121:315-21.
35. Piñero DP, Espinosa MJ, Alió JL. LASIK outcomes following multifocal and monofocal intraocular lens implantation. Journal of Refractive Surgery. 2010 Aug 1;26(8):569-77.
36. Alió JL, Del Barrio JL, El Zarif M, Azaar A, Makdissy N, Khalil C, Harb W, El Achkar I, Jawad ZA, De Miguel MP. Regenerative surgery of the corneal stroma for advanced keratoconus: 1-year outcomes. American journal of ophthalmology. 2019 Jul 1;203:53-68.
37. Gimbel HV, van Westenbrugge JA, Penno EE, Ferensowicz M, Feinerman GA, Chen R. Simultaneous bilateral laser in situ keratomileusis: safety and efficacy. Ophthalmology. 1999 Aug 1;106(8):1461-8.
38. Cs F. Refractive surgery: the future of perfect vision?. Singapore Med J. 2007;48(8):70919.
39. Vestergaard AH. Past and present of corneal refractive surgery: a retrospective study of long-term results after photorefractive keratectomy and a prospective study of refractive lenticule extraction (Doctoral dissertation).
40. Hori-Komai Y, Toda I, Asano-Kato N, Tsubota K. Reasons for not performing refractive surgery. Journal of Cataract & Refractive Surgery. 2002 May 1;28(5):795-7.
41. Salmon JF. Kanksi's Synopsis of Clinical Ophthalmology-E-Book. Elsevier Health Sciences; 2022 Mar 16.

a