ORIGINAL ARTICLE

FREQUENCY OF CORRECTION OF REFRACTIVE ERROR THROUGH REFRACTIVE SURGERIES AMONG MEDICAL STUDENTS OF PESHAWAR

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ABSTRACT

Objectives: Visual impairment due to refractive error (RE) affects a global population of approximately 2.2 billion individuals. Contact lenses and refractive surgeries (RS) exist for correction, but the most accessible and non-invasive choice remains glasses. Although the factors for not opting for RS remain a mystery. This study examines the frequency of correction of RE through RS among medical students of Peshawar and the reasoning behind medical students not opting for RS.

Materials & Methods: This cross-sectional study was conducted among undergraduate medical students in Peshawar. A total of 202 students were recruited through purposeful sampling. Students from the first year to the final year who consented to participate were included. Data were collected using a self-validated questionnaire.

Results: The study revealed that 128 students had a refractive error (RE) in 202, of which 25% of students with RE considered refractive surgery (RS) ($p=0.026$, $q=0.319$), with LASIK being the most common procedure at 46.8%. Regarding institutional affiliation, the consideration for RS was significantly higher among private institutions (25.8% vs. 9.3%, $p=0.026$). Barriers to RS included satisfaction with eyeglasses (41.6%).

Conclusion: The high prevalence of RS consideration signifies a strong trust and preference for permanent correction. Advancements in surgical techniques, increased awareness, and a heightened sense of aesthetics may be contributing factors.

Keywords: Refractive error, Refractive Surgery, Eyesight.

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INTRODUCTION

Refractive error is among the most common preventable causes of visual impairment worldwide. The World Health Organization says nearly 2.2 billion people suffer from uncorrected vision impairment around the world, and about half go untreated in lower- and middle-income countries. People with RE experience reduced vision because light rays fail to reach their proper focus point on the retina, producing a cloudy image. [1] The eye develops such distortion when its optical power and axial length do not align properly, resulting in blurred vision. [2] Four types of refractive errors commonly exist: myopia, hyperopia, astigmatism, and presbyopia. [3] Refractive errors affect young adults as their main vision disability, creating notable educational problems for students. Unaddressed RE remains the primary cause of vision deterioration. [4, 5] For correction of RE, the following methods are practiced: Glasses, Contact Lenses, and RS.

Correction of visual impairment with spectacles is the most cost-effective intervention for improving eye care and thus productivity and functionality in children. Spectacles represent several benefits because they provide simple implementation as well as affordability, alongside being non-invasive. [6] Contact lenses deliver a complete visual spectrum with the caution that poor maintenance poses risks for eye infections. [7] Currently, the use of RS stands as a solution to reduce reliance on contact lenses and glasses for eye refraction correction. [8]

RS is defined as the surgical correction of RE. Ophthalmologists now have a multiplicity of surgical methods at their disposal for the individualized correction of RE. Surgical operations for RE help patients reach near-perfect visual acuity through specific corrective procedures.

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Laser RS, PRK, LASIK, LASEK, and SMILE have now been established as fairly safe procedures that produce excellent visual outcomes for patients with low- to moderate amounts of ametropia. One Iranian study showed that 82.5% of participants knew RS could enhance their visual acuity. [10] The proven positive results from RS benefit most patients, although some patients do not qualify as candidates. Ongoing research strives to improve RS efficacy while enhancing long-term results and decreasing complications. A solution to the uncontrolled RE problem calls for a combination of awareness campaigns and increased medical services and caregiver availability.

MATERIALS AND METHODS

This cross-sectional study was conducted to assess the prevalence of consideration of RS (refractory surgeries) among medical students of different government and private medical colleges in Peshawar, including the following,

Khyber medical college 2) Khyber college of dentistry 3) Rehman medical college 4) Rehman college of dentistry 5) Jinnah medical college 6) Northwest medical college 7) Khyber Girls medical college 8) Peshawar medical and dental college 9) Pak international medical college.

The duration of the study was six months, starting from May 2024 till December 2024.

The inclusion criteria consisted of all students from the 1st to the final year who had undergone RS and consented to the questionnaire. The exclusion criteria were based on those students who had undergone other ocular surgeries and incomplete questionnaires.

A self-administered questionnaire was used, which was formulated after careful evaluation of previous literature, and a pilot test was run on 20 responses to cross-check the efficacy of the questionnaire. The questionnaire consisted of 18 questions split into different sections. The first section consisted of demographic details, while the second section had questions regarding the presence of refractive error and the type of refractive error. The third section was based on the type of corrective measure used for visual impairment, and the fourth section assessed the prevalence of consideration of RS among medical students. Finally, the last portion had questions related to the type of RS availed, the reasoning behind not opting for RS, and the attitude toward this surgical technique.

A sample size of 202 subjects was calculated through the OpenEpi sample size calculator using a confidence limit of 5% (as +/- percent of 100), a design effect of 1.0, population size of 6000 participants (this number is a rough estimate of medical students studying in public and private colleges of Peshawar by adding the number of students per class in all the Medical colleges. [11, 12] Lastly, an anticipated frequency of 16.2% was taken out from a study done in the Aseer region of Saudi Arabia. [13]

The questionnaire was distributed among all class groups through Google Forms, and the responses were stored in the form of Google Sheets. Responses were collected anonymously without any personal identifiers. The questionnaire had closed-ended, multiple-choice, and open-ended questions.

The data was analyzed using IBM SPSS V.24. The qualitative data was presented in frequencies, and the quantitative data was presented in mean and standard deviation. A chi-square test of significance was applied to find the association between independent and dependent variables. A p-value of <0.05 was considered statistically significant.

RESULTS

202 medical students from 1st year through 5th year of government and

The association between gender and RE showed that among the male respondents, 33 suffered from myopia,11 had hypermetropia, while 64 female respondents reported having myopia, while reported having hypermetropia. This data revealed that in female participants, myopia was more prevalent relative to men; in contrast, hypermetropia was more prevalent among the male participants. (see Table 2 and Figure 1 for details)

The study findings indicate that a majority of participants (101 out of 116) have used eyeglasses as a corrective measure for vision improvement. The chi-square test demonstrated a statistically significant relationship between the experience of corrective measurement and the type of corrective eyewear used ($p= 0.000$). However, it is worth noting that some expected counts in the chi-square test were lower than recommended (less than 5), which may slightly affect the reliability of the results. Despite this, the findings strongly support the link between corrective eyewear usage and vision correction experiences.

The study revealed a clear connection between the type of RE and the likelihood of considering RS ($p=0.004$). Students with myopia were more inclined towards considering RS in contrast to those with hypermetropia.

33.3% of cells in the chi-square test had expected counts below 5, slightly affecting the reliability of the results. Students with myopia were more likely to consider refractive surgery compared to those with hypermetropia. The consideration of the RS by institutions showed that RS was considered by 9.3% of students from government institutions compared to 23.2% from private institutions. , with a P value of <0.026.

The motivation behind opting for RS by undergraduate medical students was multifactorial and varied

significantly between genders.

Among the students who either chose or were subjected to RS, the most prevalent procedure was LASIK,

Table No 1: Demographic Characteristics of Study Participants

Characteristic	Category	Frequency (n)	Percentage (%)
Total Participants		202	100
Gender	Male	75	37.1
	Female	127	62.8
Age (years)	Range	18–26	-
	Mean (SD)	21.6 (1.67)	-
Institution Type	Government	107	53.0
	Private	95	47.0
Academic Year	1st Year	43	21.3
	2nd Year	38	18.8
	3rd year	45	22.3
	4th Year	36	17.8
	Final year	40	19.8

Table No 2: Prevalence of Refractive Errors among Students

Characteristics	Category	Frequency (n)	Percentage (%)
Refractive Errors (RE)	Present	128	63.4
	Absent	74	36.6
Types of Refractive Errors	Myopia	97	75.7
	Hypermetropia	27	21.0

Table No 3: RS Consideration among Students with RE

Category	Frequency (n)	Percentage (%)
Considered Refractive Surgery	32	25.0
Did Not Consider RS	96	75.0
Breakdown by Refractive Error		
Myopia	23	71.8
Hypermetropia	9	28.1
Breakdown by Gender		
Male	14	43.75
Female	18	56.25

Table No 4: Association between RE Type and Likelihood of Considering RS

Refractive Error	Considered RS (n)	Did Not Consider RS (n)	Total (n / %)
Myopia	23	74	97 (23.7%)
Hypermetropia	9	18	27 (33.3%)
Chi-Square Test			p = 0.004

Table No 5: Motivations for Considering RS by Gender

Motivation	Male (n=14)	Female (n=18)	Total (n=32)	Percentage of Total (%)
Discomfort with current correction	3 (21.4%)	8 (44.4%)	11	34.3%
Avoiding glare and halos	6 (42.8%)	4 (22.2%)	10	31.2%
Aesthetic concerns	4 (28.5%)	2 (11.1%)	6	18.7%
Other reasons	3 (21.4%)	4 (22.2%)	7	21.8%

Table No 6: Student Satisfaction with Refractive Surgery Outcomes

Satisfaction Level	Number of Students (n)	Percentage (%)
Satisfied	27	84.3
Dissatisfied	5	15.6
Total	32	100.0

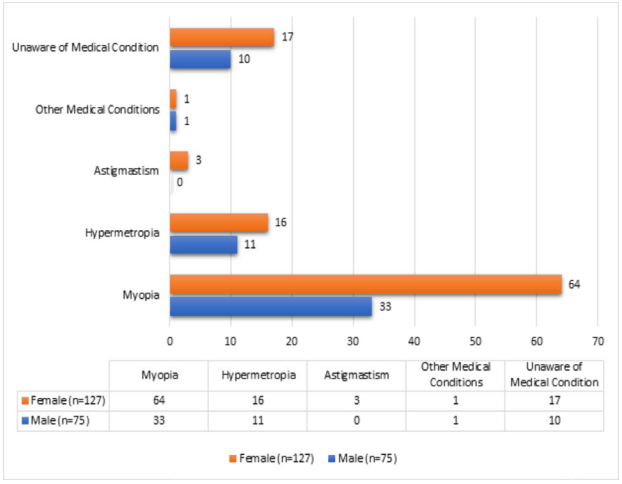

Fig 1: Association between Gender and Refractive Errors

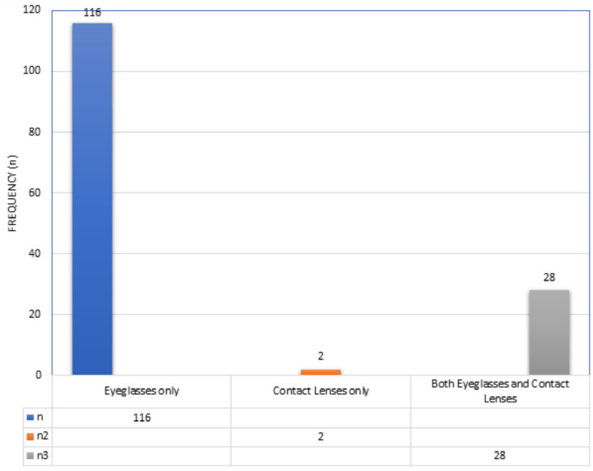

Fig 2: Sight Correction Methods among Students with Refractive Errors

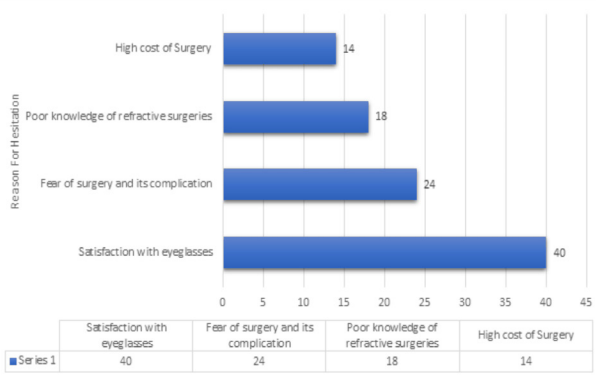

Fig 3: Reasons for Hesitation to Consider Refractive Surgery among Medical Students

considered by 15 students (48.8%) among those who considered or underwent RS, who chose LASIK, making it the most prevalent among the students. Eight students (25%) opted for LASEK, making it the second most common procedure. Five students (15.6%) chose PRK, while 4 students (12.5%) preferred SMILE.

DISCUSSION

Our findings inferred that out of 202 medical students from both private and government medical institutions in Peshawar, 128 students (63.4%) were suffering from Refractive errors. These findings align with the study carried out on undergraduate students of Akhtar Saeed Medical and Dental College, which revealed an estimate of 67.7% of medical students with refractive errors[14]. Comparably, another study conducted in Jordan revealed a refractive error prevalence of 75% among medical students. [15] A study conducted in India projected a similar higher prevalence of refractive errors (70.7%). [16]

The higher prevalence of refractive errors among medical students could be derived from enhanced knowledge, awareness, and vigilant screening. However, it is unfortunate that our country lacks proper screening programs, and consultation is only considered when people face problems with their vision.

The above-mentioned studies deduce a widespread prevalence of refractive errors among medical students. High academic pressure, lack of outdoor exposure, prolonged near work, use of digital devices, and irregular sleep patterns can be some contributing factors to this trend.

Within the various refractive anomalies, myopia was the most common type present in 97 students (75.5%), These findings match with a study conducted in India, which revealed that out of 420 students, 54% had refractive errors, with myopia being the most prevalent (77.7%). [17]

Another study showed comparable results, with myopia being the most frequent type of refractive error, reported by 37% of students. [18]

Our study revealed that eyeglasses are the most extensively utilized form of corrective measure (90.6%) for refractive errors. A cross-sectional study conducted in King Abdul Aziz Hospital, Jeddah, Saudi Arabia, reported comparable results (45.8%). [19]

There is an accelerated rise in worldwide awareness regarding various possible treatment options for visual correction. Our study aimed to evaluate the prevalence of different surgical techniques preferred by medical students of both private and government medical institutions.

This study demonstrated that out of 128 students, 32 students (9.3%), comprising 22 students from private medical institutions and 10 students from government medical institutions, chose to opt for refractive surgeries. A similar study carried out at Qassim University College of Medicine, Saudi Arabia reported that only 10 students (9.6%) out of the total 104 participants had undergone refractive surgery. [20] A corresponding study conducted at Dow revealed that only 1.6% of the total student population considered surgery. [21] Likewise, a similar study conducted in Brazil showed a 6% positive response. [22]

The results of our study highlight a positive trend in students' preference for refractive surgeries in contrast to comparable national and international studies. Our findings suggest an advancement in technology and new modalities in keratin RS with fewer complications, good prognosis, and early rehabilitation.

The trend of greater prevalence of refractive surgery preference in our study could stem from the greater number of private medical students favoring refractive surgery, which can be attributed to these students belonging to high-income groups who are capable of bearing the cost of the surgery.

LASIK was the most popular choice among the RS students (47%) from private and government institutions combined, with LASEK (25%), PRK (16%), and SMILE (13%), following as the next preferred options. In a study conducted in Jalandhar, India[23], LASIK emerged to be the most favored option (44.4%). The study also revealed that fewer than half of students (47.4%) were willing to undergo RS themselves, however, 63.2% of students would suggest it to family and friends. This study, however, only focused on the inclination to RS and did not address the actual prevalence of students electing to undergo RS.

In our study, 96 students (75%) elected not to opt for RS, a figure that may be linked to the limited medical facilities and financial constraints due to Pakistan's classification as a low-income country. A related study in Baghdad showed that 57.8% of medical students refrained from

undergoing refractive surgery. [24] The most frequently cited factors in our study behind the reluctance of the students with RE towards RS included: satisfaction with eyeglasses (41.6%), and fear of surgery (25%) were common. In contrast, a comparable study in Baghdad 24 identified fear of complications (42%). [24]

A separate study conducted in Pakistan[25] outlined the primary deterring factors to be the fear of outcomes (25.6%) and lack of knowledge (15.6%).

All these findings suggest that students in Pakistan are thoroughly knowledgeable about RS as a corrective intervention, however, a considerable number remain reluctant, with fear of surgical risks and affordability being the primary barriers.

Being a novel study in the Peshawar region, it emphasizes the knowledge, awareness, and practical approach of RS. With technological evolution, the acceptance of new options in the form of RS is not limited, and this is evident from the results of our study.

The limitation of our study is that all the participants were from one region with a narrow age range, so the results cannot be generalized. The method of data collection was an online questionnaire, which can lead to response bias, sampling issues, and the chance of survey errors. Our study does not explore the reasoning behind why people opted for LASIK as compared to LASEK, SMILE, and other techniques.

The spectrum of satisfaction from the type of RS could not be covered in the study, as well as the outcome in the context of the improvement in refractive correction from different types of surgery could not be documented. Therefore, there is room for improvement to fill these limitations and gaps in our study.

CONCLUSION

The prevalence of RS is at par with the rest of developed countries, reflecting the trust and preference for permanent correction of vision over traditional methods such as glasses and contact lenses. Advancements in surgical techniques, more awareness, and aesthetic sense are important factors. Further studies with larger sample sizes and long-term follow-ups are recommended to assess the reasons behind opting for RS, satisfaction, and potential complications associated with these procedures among medical students.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Malik MA	✓	×	✓	×	✓	×
Rahil N	✓	✓	×	✓	✓	×
Yousaf S	×	✓	×	×	✓	×
Khan MA,	✓	✓	✓	×	✓	✓
Khan HA,	✓	×	✓	×	✓	×
Arif A	✓	✓	×	✓	✓	×
Shayan A	×	✓	×	×	✓	×
Iftikhar B	✓	✓	✓	×	✓	✓

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No.231/DME/KMC.

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