



## Cross-sectional Study

## Attitude toward refractive error surgery and other correction methods: A cross-sectional study

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## ABSTRACT

**Background:** Refractive errors are the most common vision problem and prove to be a significant health issue. There are several methods for correction of refractive errors including spectacles, contact lenses and refractive surgery. Nowadays, the reliance on contact lenses and glasses is decreased by means of refractive eye surgery. Our study aimed to determine the awareness of refractive surgery among undergraduate medical students and their preferred method of refractive error correction.

**Method:** This was a cross-sectional study that was conducted among a sample size of 374 medical students at King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia in June–August 2020. Data were collected through a questionnaire which consisted of 20 questions to assess the demographics, awareness about refractive surgery and preferred method of correction. The data were entered using Microsoft Excel 2016 and analyzed by SPSS version 21.

**Results:** Our results showed that 177 of participants had refractive errors. Most participants complained of myopia (66.7%) and the most preferred correction method was spectacles (45.8%). Among users of spectacles, 53.7% found the spectacles comfortable due to ease of use. Majority of the students (92.1%) were aware of refractive surgery and 73% of them were willing to undergo refractive surgery. Many obtained their information regarding these procedures from family and friends (55.1%). The remaining refused to undergo surgery and the primary reason was fear of the complications of the procedure (14.1%).

**Conclusion:** Though corrective refractive surgery is a commonly performed procedure, extensive knowledge regarding this correction method and its complications is poor among medical students. The results showed that the majority have heard of refractive surgery, however, fear of undergoing surgery was still present. We suggest that refractive error correction surgery be taught by physicians during Ophthalmology rotations so that knowledge may be gained from more reliable sources.

## 1. Background

The World Health Organization (WHO), states that the most common vision problem is refractive error. It occurs when the shape of the eye keeps light from focusing correctly on the retina. Refractive error proves to be a significant health issue as it is the most common cause of visual deterioration and the second leading cause of vision-loss globally [1]. Moreover, a person's vision-related daily activities may become difficult with refractive errors [2]. Hence, it is important to decrease the prevalence of visual impairment by emphasizing refractive error correction [3].

We focused on three common types of refractive errors, nearsightedness (myopia), farsightedness (hyperopia), and astigmatism [1].

Individuals with higher education are more apparent to have refractive error [4]. A high risk of myopia has been reported among medical students for their many-year intensive study routine [5].

There are several options available to correct refractive errors dividing into optical and surgical methods. The preferred correction method of refractive errors in all age categories are glasses and contact lenses [6]. Spectacles are more accessible and safer. Whereas, contact lenses provide full range vision but offer an increased risk of eye infection if proper maintenance is not ensured [7]. Nowadays, the reliance on contact lenses and glasses is reduced by the presence of refractive eye surgery, which enhances eye refraction [8].

Various surgical procedures, such as intraocular lenses and intra-corneal implants, are performed to correct ametropic eyes. Laser-

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Assisted in Situ Keratomileusis (LASIK) is the commonly performed procedure among the surgical options [9]. With newly emerging refractive procedures, there is both anticipation and apprehension amongst the target population, people aged between their 20s and 40s with refractive errors, regarding the procedure and its results [10].

A study in Arar city showed refractive errors to be the second leading cause of visual impairment in Saudi Arabia [11]. In 2019, a study conducted to evaluate the awareness about refractive surgery in the Western region of Saudi Arabia demonstrated a moderate level of perception about the operation. The study also showed that the most participants knew about the procedure through family and friends, noting that the city, age, sex, and education were factors that played a role in the level of knowledge [7]. Another study conducted among Saudi female students showed a high level of awareness of refractive surgery. However, many refused to undergo surgery because they were worried about its complications and lacked information regarding the procedure [12]. Similarly, one Iranian study showed that 82.5% of participants were unaware that refractive surgery could enhance their visual acuity [13].

To the extent of our knowledge, there are no studies estimating the awareness of refractive surgery among undergraduate medical students in King Abdul-Aziz University, Saudi Arabia. Appropriate knowledge of student perception will allow for better plans to raise awareness and correct misconceptions.

Our study aims to estimate the awareness of refractive surgery among undergraduate medical students and determine their favored method of refractive correction.

## 2. Methods

### 2.1. Study design and setting

This is a descriptive cross-sectional study. The benefit to this approach is data readiness at a specific point in time, and it permits several variables to be studied simultaneously. It was conducted at King Abdulaziz University Hospital, Jeddah, Saudi Arabia during the year 2020. All medical students from the second to the sixth academic year were included. Students with missing data were excluded from the study. This work has been reported in line with the STROCSS criteria [14]. This research has been registered at the Research Registry with the identifying number (IUN): researchregistry7382 [15].

### 2.2. Sample size and sampling procedure

According to the number of medical students at King Abdulaziz University (population = 2127), a sample of up to at least 326 was calculated for 95% confidence level and a margin of error of 5%, the calculations were made using the Raosoft sample size calculator [16]. We used a random sampling technique. All medical students attending King Abdulaziz University Hospital (KAUH) during the data collection period were asked to fill out the survey. A total of 374 online questionnaires were submitted.

### 2.3. Data collection instruments

A questionnaire was assigned using Google forms and was filled by medical students. The questionnaire was based on previous reports in literature [7,12,17,18] to allow for generalizability and comparison with other studies. It consists of 20 questions divided into four parts: the first part was to seek the consent of the participant. The second part was about the personal information of the participant, including gender, age, medical year and whether they had a refractive error or not. Then, the third part inquired about refractive errors; we asked about their preference for eye correction methods and factors that influenced their decisions. The last part was to assess the perception of medical students towards refractive surgery.

### 2.4. Analysis

Microsoft Excel 2016 was used for data entry, and statistical analysis was performed using IBM® SPSS® Statistics version 21 (IBM® Corp., Armonk, NY, USA). Categorical variables, including primary variables, were described using frequencies. Normally distributed continuous variables were described using mean and Std. Univariate analysis was conducted for a categorical variable using the Chi-square test. Logistic regression was used to assess the relations in the study. The prevalence was given in percentage with a 95% confidence level. Tests with a P-value < 0.05 were considered significant.

### 2.5. Research ethics

This study was approved by Institutional Review Board (IRB) of the biomedical ethical committee at KAUH (Ref: 611–20). All participants were notified about the study objectives and response confidentiality, and we took their consent. All their data remained confidential and was accessed by the research team members only. Furthermore, no names or ID numbers were taken to complete the data collection form.

## 3. Results

### 3.1. Demographics

This study aimed to determine the perception of refractive surgery among undergraduate medical students and their preferred method of refractive correction. A total of 374 responses were submitted, 67 males and 306 females, 177 of which had refractive error (RE). Mean age was  $22.04 \pm 1.39$  years. 7.2% of the participants were first year medical students, 37% from second year, 17.2% from third year, 18.5% from fourth year, and 20.1% from fifth year. The leading cause of refractive error was myopia followed by astigmatism and finally hyperopia with 66.7%, 35.6%, 31.1% respectively.

### 3.2. Types of correction methods

Spectacles were the most common correction method used (45.8%), followed by both spectacles and contact lenses. 14.7% had already done refractive surgery as shown in Fig. 1. 53.7% of students found they were comfortable with spectacles and the main reason was ease of use (50.8%). The remaining participants found them uncomfortable mainly because they found them to be not aesthetically pleasing (22.6%). 45.8% found contact lenses comfortable, mainly due to cosmetic reasons (42.9%) (Refer to Table 1).

### 3.3. Awareness of refractive surgery

Participants showed high awareness of refractive surgery, 92.1% of the participants were aware and 69.5% were willing to undergo surgery. However, when inquiring about their main reason for not wanting to undergo the surgery; it was the fear of the complications (14.1%).

Accordingly, from several types of refractive surgery, the most known surgery among the participants was LASIK (62.1%), others are listed in Fig. 2.

### 3.4. Source of information and awareness of refractive surgery

Most of the participants reported that family and friends were their main source of knowledge (54.8%). More than half of the participants (57.6%) thought that the surgery's complications were simple and the majority (79.7%) did not think that the surgery was dangerous. 50.3% students wondered why ophthalmologists used glasses instead of doing refractive surgery.

When asked whether they thought that vision weakness may return after a refractive surgery procedure, 72.9% believed that it was a

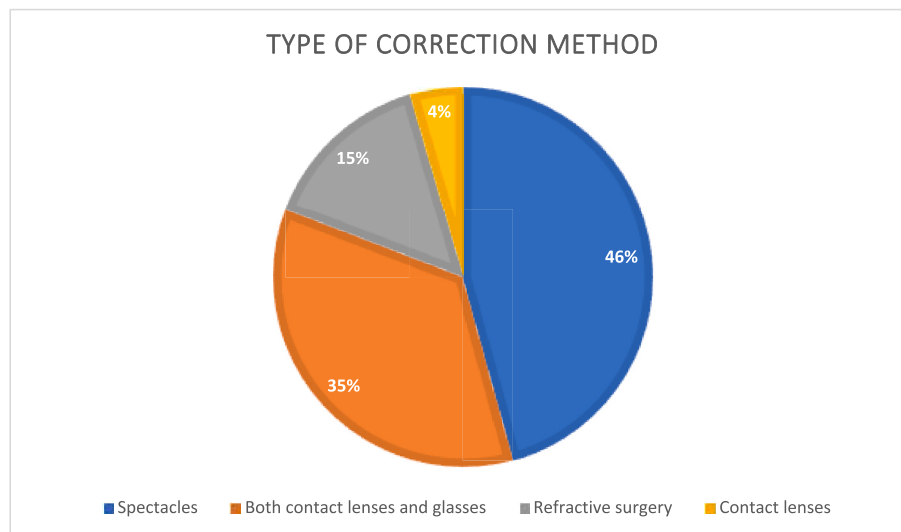


Fig. 1. Type of correction method.

**Table 1**  
Refractive Errors among King Abdulaziz University medical students.

Refractive Errors among King Abdulaziz University medical students	
	Total (n = 177)
Are you comfortable with spectacles?	
Yes	95 (53.7%)
No	82 (46.3%)
If yes, why are spectacles comfortable to you?	
Ease of use	90 (50.8%)
Maintenance free	4 (2.3%)
Cost	2 (1.1%)
Not applicable	79 (44.6%)
If no, why are spectacles not comfortable?	
Require more maintenance	9 (5.7%)
Limiting effects on daily life (e.g. swimming)	42 (23.7%)
Cosmetic reasons	40 (22.6%)
Not applicable	78 (44.1%)
Are you comfortable with using contact lenses?	
Yes, I am comfortable using contact lenses	81 (45.8%)
No, I have tried contact lenses and do not find them comfortable	49 (27.7%)
I have not used contact lenses but would consider doing so in the future	19 (10.7%)
I have not used contact lenses and would not consider doing so in the future	28 (15.8%)
If yes, why are you comfortable with contact lens use?	
Cosmetic purposes	76 (42.9%)
Maintenance	16 (9%)
Not applicable	85 (48%)

possibility.

Majority of student were aware of the procedure, but there was no significant relationship between students' medical year and their awareness of refractive surgeries ( $p = 0.317$ ).

Table 2 shows the responses to these questions.

#### 4. Discussion

The aim of this study is to estimate the awareness of refractive surgery among undergraduate medical students and to determine their selected method of refractive error correction.

The Ministry of Health of the Kingdom of Saudi Arabia has placed great importance in raising and increasing public awareness on a variety of health issues [19]. Considering the rise in the standard of living, people are now more concerned with their health issues, and the health services they receive, especially among those who are highly educated

[12]. Health information is now obtained through a variety of means with the expansion of social media, nonetheless, some of these sources are unreliable. It is important to raise awareness on common procedures such as corrective refractive surgery so that those who receive such services know about them from valid sources.

Out of the 374 medical students, a little under half of the students (47.5%) reported having refractive error. Likewise, other studies have also demonstrated the high prevalence of among university students [7, 20]. Refractive errors have been found to be more prevalent among those in higher education [21,22]. The long duration of studying among such students leading to strain may also contribute to this higher prevalence [23].

Our results showed that among those with refractive error, most of them had myopia followed by astigmatism and finally hyperopia at 66.7%, 35.6%, and 31.1% respectively. Studies conducted on the prevalence of refractive errors consistently show myopia to be prevailing refractive error [7,12,17,20,21]. Myopia, in particular, has been shown to have a strong association with educational level [21].

Spectacles, contact lenses, refractive surgery are available choices for refractive errors correction [24]. Most of the respondents were using spectacles (45.8%) for refractive error correction followed by using both spectacles and contact lenses (35%), 14.7% had already performed refractive surgery, finally, the least common method was the use of contact lenses alone (4.5%). Similar results were found in a study done in the Western region of Saudi Arabia [7]. Though contact lenses and refractive surgery are becoming increasingly popular, this did not affect the usage of glasses. They remain the most common form of refractive correction used [25–28].

Our results indicated that more than half the students (53.7%) found glasses comfortable, and the main reason was ease of use (50.8%). This is in concordance with another study in Saudi Arabia where respondents also believed that glasses were easily accessible and increased their quality of life [7].

The main cause for glasses discomfort was their limiting effect on daily activities (23.7%), that they were not aesthetically pleasing (22.6%), and required more maintenance (5.1%). Many studies claimed similar hindrances to spectacle wear as our study, stating that spectacles were a hassle and did not appeal to the participants cosmetically [29, 30]. 45.8% were comfortable with contact lenses, and attributed their comfort to cosmetic reasons, ease of use and convenience, in agreement with other studies [31–33].

Awareness in this research meant that the participant had simply heard of it before and does not encompass full knowledge of the

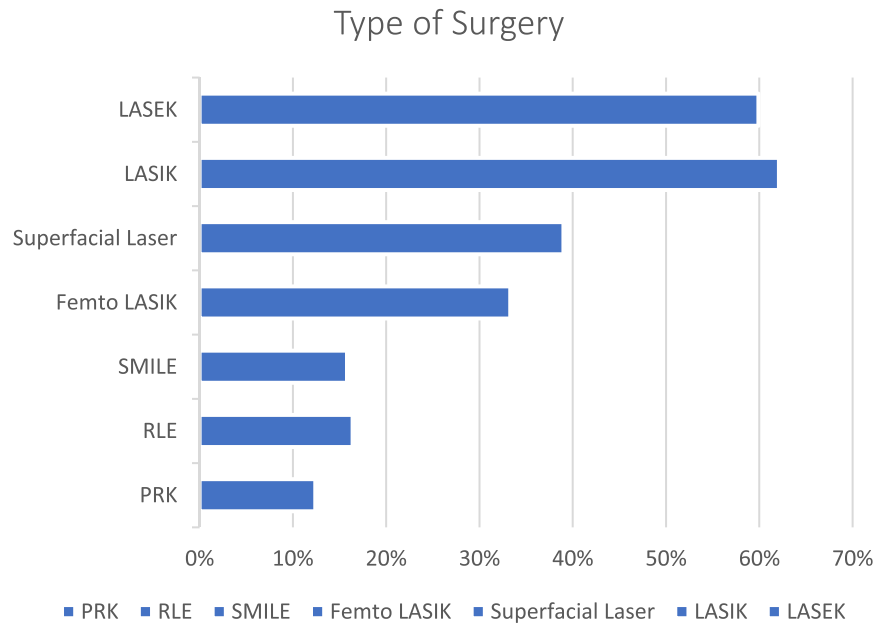


Fig. 2. Type of Surgery.

**Table 2**  
Awareness of Refractive Surgery among King Abdulaziz University medical students.

Awareness of Refractive Surgery among King Abdulaziz University medical students	
	Total (n = 177)
Are you aware of surgical procedure for refractive error correction?	
Yes	163 (92.1%)
No	14 (7.9%)
If yes, would you be willing to undergo that procedure?	
Yes	123 (69.5%)
No	37 (20.9%)
Not applicable	17 (9.6%)
If no, state the most likely reason	
Cost of procedure	5 (2.8%)
Fear of complications	25 (14.1%)
Lack of information	9 (5.1%)
Chance that spectacles may be necessary in future	7 (4%)
Not applicable	119 (67.2%)
I know about refractive surgery from	
Family and friends	97 (54.8%)
Social media	19 (10.7%)
Physician	30 (16.9%)
Lectures or course	21 (11.9%)
I do not know	9 (5.1%)
Do you expect refractive surgeries to be dangerous?	
Yes	36 (20.3%)
No	141 (79.7%)
Complications of refractive surgeries are	
Simple	102 (57.6%)
Advanced	14 (7.9%)
I do not know	61 (34.5%)
Have you ever wondered why an ophthalmologist uses glasses and did not perform refractive surgery?	
Yes	89 (50.3%)
No	88 (49.7%)
Do you think vision weakness comes back after a period of laser procedure?	
Yes	129 (72.9%)
No	48 (27.1%)

procedure. We found that 92.1% of the participants had awareness of the refractive correction surgeries. This percentage of awareness resembled studies done among students in medical schools in India (92.51%) [34] and Brazil (92.8%) [35]. This result was expected since our participants were medical students and refractive surgery is a common procedure. However, about 69.5% of the students were keen to perform the surgery compared to a lower percent of 36.66% in Indian students [34]. These findings firmly suggest that there is a high level of awareness and enthusiasm to undergo surgery among medical students.

Those who did not find refractive surgery desirable stated that the main obstacle was fear of complications (14.1%). This is an unexpected result, considering that most participants also believed that the complications of this surgery were simple (57.6%) and not dangerous (79.7%). These results are comparable to another Saudi study in 2019 [12]. The remaining stated that they were satisfied with their current correction method (6.8%), and some contributed their reluctance to lack of information (5.1%), and the chance that spectacle use may be necessary again in the future (4%). Contrary to most other studies, the cost of the procedure was the least mentioned inhibiting factor (2.8%) [12,17,33].

With regards to the type of surgeries they had heard about before, the most known type of surgery was LASIK and LASEK at 62.1% and 59.9% respectively. A previous study conducted in Saudi Arabia among the general population showed that less than half of individuals knew LASEK (45.7%) [7].

We found no significant relationship between the academic year and the level of awareness. This may be attributed to the finding that their knowledge and understanding of these procedures stemmed mainly from what they heard from their families and friends. This also indicates that our respondents gathered their information from unreliable sources rather than from licensed eye care authorities or their medical rotations [13]. The Ophthalmology rotation in Saudi medical schools is not given much importance in the curriculum and is a relatively short rotation.

The limitation of this study includes a significantly unequal male to female ratio, as females were more willing to participate in the survey and an unequal ratio between medical years. These limitations should be considered in the interpretation of the results, which cannot be overcome.

## 5. Conclusion

Though corrective refractive surgery is a commonly performed procedure, proper knowledge regarding this correction method is poor among medical students. This study aimed to assess awareness of refractive correction surgeries among undergraduate medical students at King Abdulaziz University Hospital. The results of our study demonstrate that most students are aware of refractive surgery but there is still a moderate willingness to undergo refractive surgery mostly due to fear of complications.

The source of information was largely from family and friends. Therefore, we recommend refractive surgical correction methods be introduced by physicians in Ophthalmology rotations during medical school and provide students with more information about the safety and efficacy of these surgeries. These students will then become doctors that must provide educated responses to questions from patients regarding this common surgical procedure.

### Author's contributions

First Author: Dr. Nizar Alhibshi.

Study concept or design, writing and overseeing the paper, supervision and editing.

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### Availability of data and materials

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### Ethics approval and consent to participate

This study was approved by Institutional Review Board (IRB) of the biomedical ethical committee at KAUH (Ref: 611–20). All participants were notified about the study objectives and response confidentiality, their consent was obtained.

### Registration of research studies

Name of the registry: Not applicable

Unique Identifying number or registration ID: Not applicable

Hyperlink to your specific registration (must be publicly accessible and will be checked): Not applicable to this study.

### Consent for publication

Consent for publication was obtained from King Abdulaziz University research committee department.

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None.

### Disclosure of any conflicts

None.

### Provenance and peer review

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### Guarantor

Yumna F. Kamal.

Dr. Nizar Alhibshi.

### Declaration of competing interest

There is no conflict of interest.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2021.103104>.

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