

# Prevalence of laser refractive surgery among ophthalmologists in Saudi Arabia

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## Abstract:

**PURPOSE:** The primary aims of this study are to assess the prevalence of excimer laser refractive surgery among ophthalmologists in Saudi Arabia, evaluates the satisfaction rates among ophthalmologists who have undergone laser refractive surgery and whether they would recommend the procedure to their immediate family members.

**METHODS:** A cross-sectional study surveyed ophthalmologist irrespective of specialty or subspecialty in Saudi Arabia. A self-reported survey tool has been used for data collection. Candidates were contacted by email and WhatsApp messages that introduced the nature of the study and an online link to a survey was included. For those who did not respond to the digital contact, direct survey interviews were conducted at an Ophthalmology conference in Riyadh, Saudi Arabia, 2018.

**RESULTS:** The final study sample was comprised of 183 ophthalmologists. Most of them 107 (58%) reported that they currently are performing laser refractive surgery. There were 73 (39.89%) ophthalmologist who self-reported that they are emmetropic, 110 (60.11%) self-reported themselves as ametropic, not including presbyopia. Of the 110 ophthalmologists with refractive errors, 52 (47.27%) were candidate for laser refractive surgery for myopia, hyperopia or astigmatism. Most of non-candidates attributed the non-candidacy to non-specific reasons and dry eye. Of the 52 participants who reported themselves as candidates for laser refractive surgery, 20 (38.46%) reported that they had undergone laser refractive surgery, and 32 (61.54%) had not. Most of them (50%) reported that they "like to wear glasses or contact lenses. In general, 14 (70%) reported complete satisfaction with the postoperative outcome. Of all ophthalmologists participated in the study, 94% would advise laser refractive surgery to their first-degree relatives.

**CONCLUSION:** Excimer laser vision correction among ophthalmologists in Saudi is much higher than the market penetration in the general population reported in other countries. Most of the ophthalmologists who underwent the procedure were satisfied with the outcome.

## Keywords:

Laser, ophthalmologists, refractive, Saudi Arabia, vision correction

## INTRODUCTION

Excimer laser surgery, such as photorefractive keratectomy (PRK) and laser in situ keratomileusis (LASIK), are the most common refractive surgery procedures worldwide. Several studies have reported patient satisfaction rates as high as 95% after laser refractive surgery.<sup>[1-5]</sup> A recent meta-analysis of FDA studies reported that modern excimer lasers have significantly improved patient-reported visual outcomes after LASIK.<sup>[1]</sup> In United States, the prevalence of

refractive errors amendable to laser refractive surgery in the general population is about 42%, and around 13% of the eligible persons has had the surgery.<sup>[6]</sup>

Despite the relative popularity of excimer laser surgery in ophthalmology, there is a relative paucity of data on prevalence of PRK and LASIK among ophthalmologists. To our knowledge only one study has reported the prevalence of laser refractive surgery among US refractive surgeons.<sup>[7]</sup> However there are no data on prevalence in the Middle East. The primary aim of this study is to assess the prevalence of excimer laser refractive surgery among

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ophthalmologists in Saudi Arabia. This study also evaluates the satisfaction rates among ophthalmologists who have undergone laser refractive surgery and whether they would recommend the procedure to their immediate family members.

## METHODS

### Study design

A cross-sectional study surveyed ophthalmologist in Saudi Arabia.

### Study population

The study targeted ophthalmologists who are practicing in Saudi Arabia irrespective of specialty or subspecialty.

### Eligibility of participation

All ophthalmologists were eligible for participation in the study.

### Sampling size calculation and sampling technique

Sample size was calculated by Epi-Info program, version 6.02. Using an anticipated prevalence of Laser vision correction among ophthalmologists of 28%<sup>[6]</sup> and with an absolute precision of 5% at 95% confidence, the estimated sample size for the study was 190 ophthalmologists.

According to the Saudi ophthalmological society, the total number of registered ophthalmologists in society in 2018 was 486. All registered ophthalmologists were invited to participate in the study. A convenience sample of 190 ophthalmologists who agreed to share in the study and responded to the online questionnaire were included in the study

### Survey tool

A self-reported survey tool has been used for data collection. It has been previously described by Kezirian *et al.*<sup>[7]</sup> The survey was comprised of 22 questions that incorporated logic into the survey. The logic based algorithm allows the presentation of questions based on responses to the previous questions. The five broad categories surveyed with this instrument were, study eligibility, demographics, whether the subject was a refractive surgery candidate, history of refractive surgery and satisfaction.<sup>[7]</sup> Although, Kezirian *et al.* questionnaire was not validated, it was properly designed to obtain required data in an unbiased way. The included questions were well structured, to the point and could achieve the objectives.

Candidates were contacted by email and WhatsApp messages that introduced the nature of the study and an online link to a survey was included. For those who did not respond to the digital contact, direct survey interviews were conducted at an Ophthalmology conference in Riyadh, Saudi Arabia, 2018. Communications requested the participants to complete a survey about their personal experience with refractive surgery.

### Data analysis

The survey outcomes are reported as raw scores and percent values. Data were collected on the type of surgery, type of excimer laser, optical zone and enhancements. Statistical

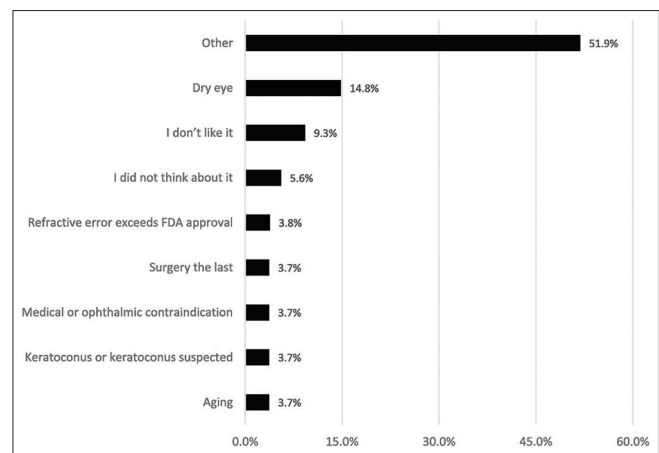
analysis was carried out using Statistical Package for Social Sciences software version 22.0 (IBM, SPSS, Chicago, IL, USA). Categorical data were presented as number and percentage. Chi-square test ( $\chi^2$ ) was used to test the associations between self-laser vision correction, and the participants' characteristics. A P value less than 0.05 was considered statistically significant.

## RESULTS

Out of 190 Ophthalmologist, seven were excluded because they did not complete the survey. Hence the final study sample was comprised of 183 ophthalmologists. Of whom, 150 (82%) were males, and 33 (18%) were females. Most of them 107 (58%) reported that they currently are performing laser refractive surgery. The most commonly used excimer laser platform was Schwind Amaris reported by 37 (35%) surgeons, followed by 29 (27%) surgeons who used the Wavelight, and 23 (22%) who used the Nidek, and 18 (16%) used the Visx.

There were 73 (39.89%) ophthalmologist who self-reported that they are emmetropic, 110 (60.11%) self-reported themselves as ametropic, not including presbyopia. Myopia was the most common error reported by 79 (43.17%) participants, 23 (12.57%) reported they are hyperopic and only 8 (4.37%) reported they had astigmatism.

Of the 110 ophthalmologists with refractive errors, 52 (47.27%) answered "Yes" to the question "Are you a candidate, or have you even been a candidate for laser refractive surgery for myopia, hyperopia or astigmatism?". Fifty-eight (52.73%) answered "No." Figure 1 presents the reasons that some participants were not candidates for laser refractive surgery. Of the 52 participants who reported themselves as candidates for laser refractive surgery, 20 (38.46%) reported that they had undergone laser refractive surgery, and 32 (61.54%) had not undergone the procedure. Table 1 presents the reasons that 32 surgeons did not undergo laser refractive surgery. Most of them (50%) reported that they "like to wear glasses or contact



**Figure 1:** Reasons that some ophthalmologists were not candidates for laser refractive surgery

lenses,” 4 (12.5%) reported other causes and three reported age as a factor.

Table 2 presents the types of procedure and types of lasers used for the study sample. Fifty percent of patients underwent LASIK, and 45.5% underwent PRK [Table 2]. Thirty percent of patients underwent surgery with the Alcon laser, 15% with the Nidek laser and up to 50% of the subjects could not recall the type of laser [Table 2]. Optical zone varied from 6.10 mm to 7.00 mm [Table 2].

According to Table 3, most of ophthalmologists who had undergone refractive surgery were male (75%) and complaining of myopia (75%).

**Table 1: Reasons that ophthalmologists who were candidates for refractive surgery did not undergo the procedure**

Cause	n	%
Worry about complication	10	31.3
Waiting for alternative technology	1	3.13
Like to wear glasses or contact lenses	16	50%
Cost too much	1	3.13
Others	4	12.5

n denotes the number of individuals; % denotes the percentage of the study sample

**Table 2: Type of surgery and surgical data for ophthalmologists who underwent refractive surgery in Saudi Arabia**

Refractive surgery data		No	%
Procedure	LASIK	10	50.00%
	PRK	9	45.00%
	Epi-LASIK	1	5.00%
Type of excimer laser	Nidek	3	15.00%
	Visx	1	5.00%
	Wavelight	6	30.00%
	Did not know or cannot recall	10	50.00%
Optical zone	6.1-6.5 mm	4	20.00%
	6.6-7 mm	2	10.00%
	Did not know or cannot recall	14	70.00%
Enhancement required	Yes	4	20.00%
	No	16	80.00%

In general, 14 (70%) of the 20 ophthalmologists who had the procedure reported to be better off postoperatively. Also, 14 (70%) reported complete satisfaction with the postoperative outcome, 5 (25%) were mostly satisfied, and 1 (5%) was neutral about the outcome. No one was dissatisfied with the results of the procedure. Of the 6 (30%) participants who were not completely satisfied with their results, 2 (33.3%) reported problems with visual quality, 2 (33.3%) reported that they regret eliminating their myopia now that they are presbyopic, 1 (16.7%) experienced problem with the refractive results and 1 (16.7%) had a corneal complication (data were not tabulated).

All the participants in the study were asked “Do you advise laser refractive surgery for one of your first-degree relatives (parents, sibling, husband or wife, children) who are candidates for it?”, 87 (47.54%) responded “Yes, at any time possible,” 85 (46.45%) responded “Yes, in certain conditions” and 11 (6.01%) answered “No” to the question. One hundred and twenty-seven (69.4%) participants responded that one of their first-degree relatives had undergone laser refractive surgery, while 56 (30.6%) responded that their relatives had not undergone the procedure (data were not tabulated).

**DISCUSSION**

To our knowledge, this is the first study to report the prevalence of excimer laser refractive surgery and satisfaction among ophthalmologist in Saudi Arabia. This study survey 190 ophthalmologists about the history of their refractive surgery. Our finding shows that, of the 52 (47.27%) subjects who indicated they were candidates for LVC, only 37.7 % reported that they had corneal LVC according to their response. This result less than the previously reported (62.6%) by Kezirian and his colleagues<sup>[7]</sup>. This could be related to the cross-sectional nature of this study which included all ophthalmologists regardless of their specialty or subspecialty, and they are practicing laser refractive surgery or not. However, the previous study<sup>[7]</sup> enrolled laser refractive surgeons only, a group that would be more motivated to undergo the procedure given the nature of the specialty. A high proportion (42.7 %) of participants who reported they had refractive errors considered themselves none-candidates for refractive surgery.

**Table 3: Distribution of refractive surgery history with ophthalmologist data**

Characteristics	Total Have you undergone laser refractive surgery?				P	
	Yes n=20		No n=90			
	n	%	n	%		
Gender	Male	14	70.00%	72	80.00%	0.327
	Female	6	30.00%	18	20.00%	
Are you at the present practicing laser refractive surgery?	Yes	8	40.00%	45	50.00%	0.418
	No	12	60.00%	45	50.00%	
Complaining of the conditions that require vision correction either by glasses, contact lens, or refractive surgery?	Hyperopia	4	20.00%	19	21.10%	0.897
	Myopia	15	75.00%	64	71.10%	
	Astigmatism	1	5.00%	7	7.80%	
Are you a candidate, or have you even been a candidate for laser refractive surgery for myopia, hyperopia or astigmatism?	Yes	20	100.00%	32	35.60%	0.001*
	No	0	0.00%	58	64.40%	

\*Significant (P<0.05)

Nearly (69.4%) ophthalmologist in this study reported that one of their first-degree relatives had LVC, this result approximately comparable to the previous report (63.4%).<sup>[6]</sup> Almost 94% of the ophthalmologist recommend LVC for their first degree relative and only 6% answered “No” to the question. This is aligned well with the previous report.<sup>[7]</sup>

In contrast, 62.2 % of the candidates for LVC had not undergone the procedure for different subjective reasons. Most of them (50%) reported they prefer glasses or contact lenses and only 31% worry about complications.

In the current study, 95% of the ophthalmologists who underwent laser vision correction were satisfied with the procedure. This compares well with the previously reported satisfaction rates for LVC between a refractive surgeon (97%) and general physicians (95%).<sup>[7]</sup>

This study has some limitations that should be considered. The study ophthalmologists were recruited by convenient sampling through online survey. The extent to which the studied ophthalmologists can be considered representative of all ophthalmologists in Saudi Arabia is not known due to the probability of selection bias.

In conclusion, excimer laser vision correction among ophthalmologists in Saudi Arabia is much higher than the market penetration in the general population reported in other

countries. Most of the ophthalmologists who underwent the procedure were satisfied with the outcome.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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