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Ophthalmologist perceived effect of COVID-19 related lockdown on ophthalmic practice and patient care in Saudi Arabia

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ABSTRACT

Purpose: To review the ophthalmologist-perceived impact of the COVID-19 pandemic on eye care and its determinants in Saudi Arabia. *Methods*: A web-based survey of ophthalmologists working in Saudi Arabia was conducted in September 2020 using the Google platform. The ophthalmologists' demography, perceptions about the risk for COVID-19 contraction, and practice patterns during lockdown were collected. Both consultation- and surgery-related details were analyzed and associated with the demography. *Results*: Of the 106 surveyed ophthalmologists, 72 (67.9%) were male, 68 (64.2%) were consultants, and 54 (50.9%) were from the western region. During the pandemic and lockdown, 92 [86.8% (95% CI 79.9; 93.7)] were offering consultancy services, while 82 (77.3%) were attending ophthalmic surgeries. The risk of contracting COVID-19 while practicing ophthalmology was perceived as high, equal, and low compared to other health workers by 34 [32.1% (95% CI 16.4; 47.8)], 65 [61.3% (95% CI 49.5; 73.2)] and 5 (4.7%) participants, respectively. Although 54 (52.8%) ophthalmologists were unsure about resuming surgical work, 42 (42.5%) recommended the resumption of elective surgeries immediately but with the utmost preventive measures in place. The regional variation in risk perception for contracting COVID-19 was significant ($\chi 2 = 15$, Df = 6, P = 0.02). The risk among those who were not practicing was less than that of those who were both operating and consulting ($\chi 2 = 97$, Df = 4, P < 0.001). *Conclusions*: The pandemic seems to have negatively impacted both clinical and surgical eye services in the Kingdom of Saudi Arabia. The ophthalmologists perceived that the starting of eye surgeries should be gradual and with care to reduce the risk of COVID-19.

Keywords: Eye care; COVID-19; ophthalmic surgeries; ophthalmic consultations.

1. INTRODUCTION

More than nine months have passed since the beginning of the COVID-19 pandemic. Nearly 4.2 million people worldwide have tested positive and 1.2 million have died as of the end of October 2020 (Worldometer, 2020). The transmission of COVID-19 within the healthcare environment has resulted in more than seven thousand deaths of healthcare providers (Amnesty International, 2020). Among the 1,716 healthcare workers in China who had been infected with COVID-19, 6 died, and 3 were ophthalmologists. For instance, Dr. Li Wenliang contracted COVID-19 while treating an asymptomatic glaucoma patient (Who, 2020; Parrish et al., 2020). Ophthalmologists are at higher risk given their close physical contact with their patients during examination (van Doremalen et al., 2020). To limit the spread of infection, international professional bodies have recommended a preferred pattern of practice for ophthalmologists (Starr et al., 2020; Safadi et al., 2020; Sengupta et al., 2020).

The government of Saudi Arabia declared a total lockdown across the country as part of its efforts to control the spread of the disease. The restrictions came into force on 9 March 2020. All outpatient departments across hospitals and clinics in Saudi Arabia were shut down, and all elective surgeries were deferred, but emergency healthcare services continued (Barry et al., 2020; Hassan et al., 2020). Ophthalmologists ceased their clinical practice temporarily but provided emergency eye care after the lockdown was lifted; ophthalmic practice resumed, but clinical services and surgeries varied by subspecialty. A number of studies reviewed the negative impact of the COVID-19 pandemic on eye care services in different countries (Starr et al., 2020; Dascalu et al., 2020; Sanjay et al., 2020). They found that the pandemic mainly affected elective surgeries but barely affected emergency surgeries (Wickham et al., 2020). While young ophthalmologists had less risk compared to older ophthalmologists because of stronger immune systems and less systemic comorbidities, they were more impacted by the lack of surgical training, such as cataract surgery training using an operative microscope (Aggarwal et al., 2020; El-Saied & Salah Eddin Abdelhakim, 2020).

In the absence of a vaccine against COVID-19, the impact of the pandemic on healthcare workers' mental health is a major concern. Their feedback and concerns were studied in Saudi Arabia, and the study revealed that preventive steps need to be taken to isolate the care of COVID-19 patients in special hospitals (Spoorthy et al., 2020). The mental health of Saudi ophthalmologists was surveyed and found to be negatively affected by the COVID-19 pandemic (Abolfotouh et al., 2020). The ophthalmologists' views on their practice in the future are vital to strengthen national ophthalmic services. The literature shows that such feedback was reviewed mostly through cross-sectional surveys (Almater et al., 2019; Jammal et al., 2019; Nair et al., 2020). We present the ophthalmologists' perceptions on the impact and risks of the COVID-19 lockdown on the ophthalmic practice and patient care as well as their suggestions to work ahead in their practices in Saudi Arabia.

2. METHODS

The study was approved by the ethical committee of the King Fahad Hospital of the Armed Forces, Jeddah, Saudi Arabia in 24/11/2020 with ethical approval code: 392. The ophthalmologists living and working in Saudi Arabia during the COVID-19 pandemic were the study population. Those who had given written consent to participate were included in this web-based survey. We assumed that 80% of the ophthalmologists perceived the negative impact of the COVID-19 pandemic on the ophthalmic practice. To achieve a 95% confidence interval and a 10% acceptable error margin with a clustering factor of 2, we randomly selected at least 116 ophthalmologists to participate. We used the Open Epi software to estimate the sample size (Dean et al., 2020).

The investigators were ophthalmologists of different subspecialties. A questionnaire to generate information on the ophthalmologist-perceived impact of COVID-19 and the related lockdown was adopted, piloted, and used for this study. Their demographic information included their gender, the region in which they worked their designation, their subspecialty, and their work pattern during lockdown. The information on practice patterns during lockdown was used to calculate the rate of current ophthalmic practice. The participants responded to questions about the modes of giving appointments to eye patients, the types of eye surgeries they undertook during this period, and the platforms used for web-based consultation. They provided feedback on the level of risk they had faced of contracting COVID-19 in their ophthalmic practice as well as information on the precautions and protection they had used when they performed eye surgeries. They also suggested precautions for ophthalmic services in the future in the kingdom.

The survey tool was piloted on the five ophthalmologists of our institution, and their responses were not included in this study (Appendix 1). A WhatsApp group based on the ophthalmic society was used to increase the participation of different regions. The Google platform was used to create the web-based questionnaire. Single options to respond were given for the participant to click and register their response. Until the final submission of responses, the participant had the option of changing his/her response.

The data were transferred into a spread sheet of the Statistical Package for Social Sciences (SPSS 25) (IBM, NY, USA). The responses were categorical and were presented as numbers and percentages. Their main responses regarding their perceptions of the impact of COVID-19 on the ophthalmic practice were used to estimate the 95% confidence interval of the percentage. The

impact level was associated with different demographic- and work-related variables. For two subgroups, regarding the ODDs ratio, its 95% confidence interval and two-sided P values were estimated. For more than two subgroups, their responses were analyzed using chi-square values, degrees of freedom, and two-sided P values. A P value of less than 0.05 was considered as statistically significant.

3. RESULTS

A total of 106 ophthalmologists completed the survey; 72 (67.2%) were male, 68 (64.2%) were consultants, 23 (21.7%) were specialist-grade ophthalmologists, and 15 (14.2%) were fellows under subspecialty training and ophthalmic residents. The distribution based on the regions of their ophthalmic practice is given in Figure 1.

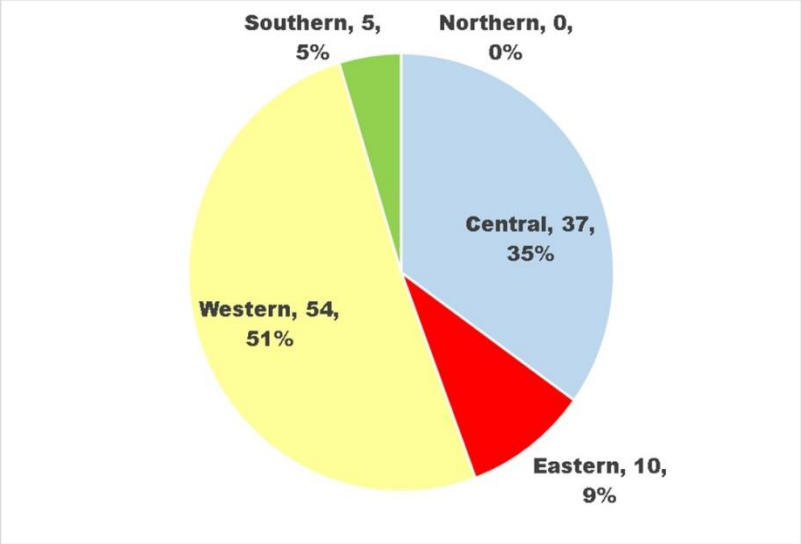

Figure 1 Distribution of Ophthalmologists participating in the survey by regions of Saudi Arabia

None of the ophthalmologists from the northern region of Saudi Arabia participated in this study. During the COVID-19 lockdown, 61 (57.5%) were full-time service providers, 42 were part-time service providers, and 3 (2.8%) did not practice ophthalmology. Their subspecialties related to eye services are shown in Figure 2.

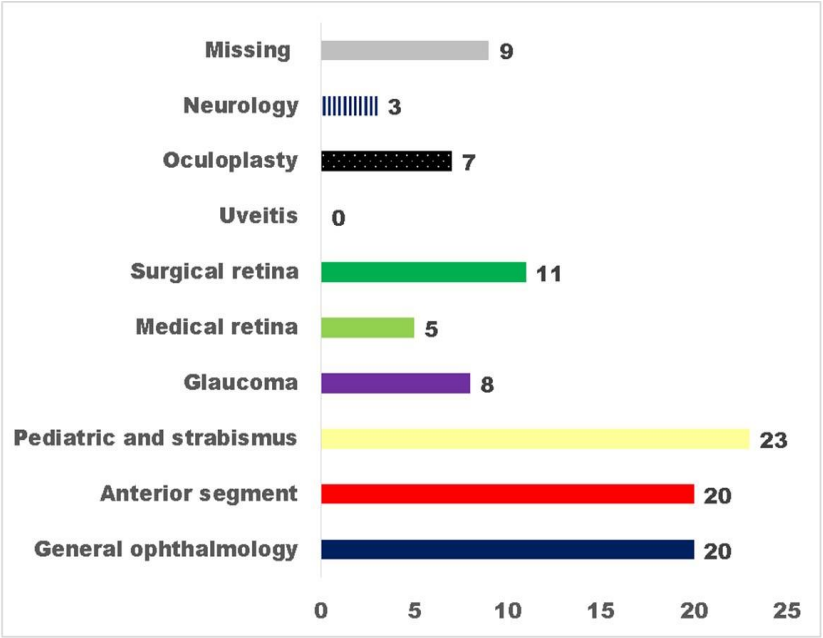

Figure 2 Distribution of ophthalmologists participating in the survey by subspecialty

The main participant groups comprised general ophthalmologists, pediatric ophthalmologists, and anterior segment specialists; 92 (95% CI 79.9; 93.7) out of the 106 ophthalmologists were practicing ophthalmology (both consultation and surgeries) during the COVID-19 pandemic, while 82 ophthalmologists (77.3%) were involved in ophthalmic surgeries. Of the 106 surveyed ophthalmologists, 34 [32.1% (95% CI 16.4; 47.8)] regarded the risk of contracting COVID-19 via ophthalmic practice during the pandemic as high, and 65 [61.3% (95% CI 49.5; 73.2)] perceived this risk as equal to that among other medical practitioners. Meanwhile, five (4.7%) participants perceived the risk as lower for ophthalmologists compared to other practitioners. The pattern of consultation and surgery practice during the COVID-19 pandemic and the perceived risk of contracting COVID-19 by the determinants were reviewed (Table 1).

Table 1 Ophthalmic practice pattern and risk for COVID among ophthalmologists in Saudi Arabia

		Practicing			Risk for corona			
		Yes	No	Validity	Higher	Equal	Lower	Validity
Gender	Male Female	62 30	10 4	1.2 (-1.0; 1.4) P =0.8	22 12	45 21	4 1	χ^2= 0.2 Df = 5 P = 0.7
Region	Central Eastern Western Southern	35 6 46 5	2 4 8 0	χ^2=0.7 Df =3 P = 0.4	10 7 31 2	26 3 18 3	1 0 4 0	χ^2=15 Df =6 P = 0.02
Type	Consultant Specialist Fellow/resident	59 21 12	9 2 3	χ^2=0.3 Df =3 P = 0.6	24 7 3	40 14 12	4 1 0	χ^2=3 Df =4 P = 0.6
Practicing pattern	Consultation only Surgery + consultation None	-	-	-	6 25 0	2 53 0	0 0 5	χ^2=97 Df =4 P <0.001

The regional variation in the perception of risk grade for contracting COVID-19 among ophthalmologists, was significant ($\chi 2$ = 15, DF = 6, P = 0.02). The level of risk for contracting COVID-19 among non-practicing ophthalmologists was minimal compared with that of both operating and consulting ophthalmologists ($\chi 2$ = 97, Df = 4, P < 0.001). The method of undertaking ophthalmic consultations by the participating ophthalmologists is given in Table 2.

Table 2 Mode of ophthalmic consultation scheduling during COVID 19 Pandemic in Saudi Arabia

	Number	Percentage
Any emergency	28	26.4
Patients With appointment after calling	21	19.8
Specific percentage of patients with a previously booked appointment	19	17.9
All booked patients	24	22.6
Not seeing patients	14	13.2

As many as 14 (13.2%) ophthalmologists had not seen any eye patients. More than one-fourth of the participants entertained patients only as emergency cases. The types of ophthalmic surgeries carried out by the participants during the COVID-19 pandemic in Saudi Arabia are given in Table 3.

Table 3 Types of ophthalmic surgeries performed during COVID pandemic by participating ophthalmologists in Saudi Arabia

Ophthalmic surgeries	Number	Percentage
All emergencies	45	54.2
Intravitreal injection	7	8.4
Glaucoma/VR procedures	5	6.0
Refractive surgeries	4	4.8
Lid surgeries	0	0.0
Strabismus surgeries	3	3.6

Congenital cataract	3	3.6
Adult cataract	5	6.0
Combinations of above	9	10.8

Twenty-three ophthalmologists did not operate during the pandemic. Emergency ophthalmic surgeries were attended by more than half of the remaining ophthalmologists. Web consultations were carried out by 81 (76.4%) ophthalmologists. Only 25 participants replied to the survey regarding their modes of consultation; 11 (44%) of them used phone and video calls to consult with their eye patients. The ophthalmologists also suggested modes of resuming ophthalmic practice once the lockdown is over. Five ophthalmologists responded that they had resumed surgeries but only following the COVID-19 screening of the eye patients. As many as 54 (52.8%) ophthalmologists were not sure of how and when to resume surgical work, while 42 (42.5%) recommended the immediate resumption of ophthalmic surgeries.

The ophthalmologists also recommended utmost care and precautions while resuming ophthalmic practice in the future. Their recommendations and dilemmas in this regard are given in Table 4. Nearly one-third of the participants sought guidelines for dealing with positive COVID-19 cases with ophthalmic issues requiring eye care.

Table 4 Recommendations by ophthalmic surgeons to resume ophthalmic work

Proposal for elective ophthalmic surgeries	Number	Percentage
Not sure when to start elective surgeries	56	52.8%
Restart elective surgeries immediately	45	42.5%
I back already to elective surgery without screening for COVID19 in asymptomatic patients	5	4.7%
Precautions recommended before ophthalmic surgery		
Screened all cases for COVID-19 pre-op	43	40.6%
Unsure, awaiting guidelines	27	25.5%
Both pre-op screening and PPE	21	19.8%
Unsure, awaiting guidelines for suspected cases only	5	4.7%
Use additional PPE in all cases	10	9.4%

4. DISCUSSION

In this survey, ophthalmologists of different subspecialties provided their feedback about their consultation and surgical work–related activities during the lockdown caused by the COVID-19 pandemic in Saudi Arabia. The risk of contracting COVID-19 from ophthalmic practice was felt by most of them. One in ten ophthalmologists had discontinued their ophthalmic consultations, while one in five had discontinued ophthalmic surgeries. Apart from emergencies, most of the surveyed ophthalmologists had not done elective surgeries. Subsequent to the lifting of the lockdown, some ophthalmologists have resumed consultation but are unsure of how to resume surgical work. The responses had significant regional variations. The discontinuation of ophthalmic practice was significantly associated with the pattern of perceiving the risk of contracting the infection while undertaking such practice.

This study has provided the insights of ophthalmologists under different subspecialties during the COVID-19 pandemic in both the lockdown and post-lockdown periods, but none suggested solutions to combat this pandemic. A fair representation of participants of different levels of seniority, both genders, and various regions of the kingdom permits us to safely extrapolate the findings of this study to the ophthalmic practice in the kingdom during this challenging time. Seven out of eight ophthalmologists continued ophthalmic consultation, and three-fourths continued ophthalmic surgeries during the pandemic. In contrast, in a large survey in India, three-fourths of the participating ophthalmologists discontinued treating eye patients (Nair et al., 2020). Hardly 9% of the total surgeries performed in India were elective surgeries. This difference could mean that a large proportion of Indian ophthalmologists were working in the private sector. In Saudi Arabia, the majority of ophthalmologists work in government hospitals, and their work during the pandemic were based on the government guidelines for the hospitals.

In our study, more than 90% of the ophthalmologists felt at risk of contracting COVID-19 during their practice, although the risk was perceived as higher than and equal to that of other healthcare providers by one-third and two-thirds of the participants, respectively. This was much higher than that reported by Indian ophthalmologists (60%), (Nair et al., 2020). In the case of stopping practice, the superior economic situation of Saudi ophthalmologists compared to those in India, especially in the private sector, could have resulted in the varied perceptions of the risk posed by COVID-19 if ophthalmic practice is continued. While comparing

ophthalmic surgery to other branches of surgery, the literature shows the impact of the pandemic to the extent of the closure of otology units and the reduction of surgical work by 80% in Italy (Mannelli et al., 2020).

Half of the participating ophthalmologists in Saudi Arabia were unsure of when and how to resume their surgical ophthalmic practice after the lifting of the lockdown, especially surgical work. Their confusion matched with that of the surveyed ophthalmologists in India (Nair et al., 2020). Evidence-based information to ophthalmologists about the risk of contracting viral infection and precautions to minimize such risk during consultation and surgeries will help to build confidence among ophthalmologists globally to resume their elective surgeries. A survey of ENT doctors suggested that since they deal with the sinuses and pharynx, where the coronavirus is located in most of their patients, the risk to them while practicing is the highest (Krajewska et al., 2020). Although the subsample of subspecialty participants was not planned in the survey, the trends suggest that urgency related to medical retina, pediatric ophthalmology, and ocular trauma prompted the ophthalmologists of these subspecialties to undertake surgeries so as to avoid irreversible visual disabilities in eye patients. Elective cataract surgeries were mostly delayed by anterior segment ophthalmic surgeons, but one must understand the possible risk of the rising backlog of un-operated cataracts in the coming years given this reduced cataract surgery rate.

Few limitations were observed in our study. The information of ophthalmologists working in private versus for the government was not collected. The effects of closure and less work in the ophthalmic practice were significantly different in private versus government hospitals in the United States as well as in India (Abolfotouh et al., 2020; Nair et al., 2020). No ophthalmic oncology–related surgeries were reported in our study during the study period; they may have been included in either emergencies or the pediatric ophthalmology subspecialty. Globally, special emphasis is given to the emergency management of cancer patients, even in the COVID-19 pandemic (Indini et al., 2020).

The present study had few limitations. It was with small sample size. Therefore, we have recommended other survey in the Middle Eastern countries to obtain a large sample or conduct a meta-analysis. Ophthalmologists opted mainly for telephonic consultations. The use of telemedicine was less common in this study. In countries such as Hong Kong, where national tele-DR screening was established in 2014, ophthalmologists considered it a good avenue to screen for DR during the COVID-19 pandemic (Gangwani et al., 2016; Shih et al., 2019). In spite of barriers and challenges, the policymakers of Saudi Arabia are committed to implementing a telemedicine network in the kingdom within the Vision 2030 national plan (Alaboudi et al., 2016; Qaffas et al., 2020; Al Sanad & Zemirli, 2015). Perhaps the current pandemic will accelerate the initiation of such a network, especially for time-tested screening using telemedicine, such as diabetic retinopathy.

5. CONCLUSION

The study found that the pandemic negatively impacts both consultative and surgical eye care in the Kingdom of Saudi Arabia, and ophthalmologists perceived that the resumption of eye surgeries should be gradual and with the utmost precautions in the future to minimize the risk of COVID-19 both to the provider and to the patients.

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Author Contributions

Mareyah: Planning, data collection, draft of manuscript
Wejdan: Planning, data collection, draft of manuscript
Rawan: Planning, data collection, draft of manuscript
Ola: Literature review, data collection, draft of manuscript
Rahman: Planning, data collection, draft of manuscript
Ashjan: Planning, guiding the field part, data management, manuscript writing

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Ethical approval

The study was approved by the ethical committee of the King Fahad Hospital of the Armed Forces, Jeddah, Saudi Arabia in 24/11/2020 with ethical approval code: 392

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Appendix 1

The survey questionnaire to review ophthalmologists perceived impact of Covid 19 pandemic on ophthalmic services in Saudi Arabia.

Personal information:	
Gender	Male Female
Where do you work as ophthalmologist in Saudi Arabia?	Eastern province Western province North province Central province South province
What is your position as an ophthalmologist?	Ophthalmologist resident/fellow Ophthalmologist specialist Ophthalmologist consultant Ophthalmologist serves
What is your employment status during COVID-19 outbreak?	Full time Part-time Don't work at all
if you are a consultant or specialist what is you are subspecialty?	General ophthalmologist Anterior segment Pediatric and strabismus Glaucoma Medical retina Surgical retina Uveitis Oculoplasty Neurology

Effect of COVID-19 related lockdown on ophthalmic practice and patient care in Saudi Arabia.	
Are you currently seeing/ operating patients?	Yes No
What kind of patient are you seeing?	Any emergency Patients With appointment after calling Specific percentage of patients with a previously booked appointment All booked patients
What cases are you currently operating?	All emergencies Intravitreal injection Glaucoma/VR procedures Refractive surgeries Lid surgeries Strabismus surgeries Congenital cataract Adult cataract Congenital glaucoma Not operating

	other
Have you started telephonic/web consultations?	No Yes
If yes (you may choose more than one option)	Phone Email, watsapp, telegram Video calls others
From what information that is available what is your opinion regarding the risk that ophthalmologist faces with regards to COVID-19?	Lower risk Higher risk Equal risk
Upon easing of the COVID-19 related restrictions what would be your plan regarding electives surgeries?	Restart elective surgeries immediately Not sure when to start elective surgeries back already to elective surgery with out screening for COVID19 in asymptomatic patients back already to elective surgery with screening for COVID19 in all patients
Regarding surgeries that would be planned after resumption of clinical duty, what would be your preferred approach?	Screened all cases for COVID-19 pre-op Use additional PPE in all cases Both pre-op screening and PPE Unsure, awaiting guidelines for suspected cases only

Data and materials availability

All data associated with this study are present in the paper.

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