

## Psychological Impact of COVID-19 on Ophthalmologists in Iran

Masomeh Kalantarion<sup>1,2\*</sup>, MS; Zhale Rajavi<sup>3,4\*</sup>, MD; Hamideh Sabbaghi<sup>2, 5</sup>, PhD; Bahareh Kheiri<sup>6</sup>, MS; Mohammad Hasan Shahriari<sup>7</sup>, MS; Farinaz Fatahi Mozafar<sup>8</sup>, MS

<sup>1</sup>Department of Medical Education, Virtual School of Medical Education and Management, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>2</sup>Ophthalmic Epidemiology Research Center, Research Institute for Ophthalmology and Vision Science, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>3</sup>Negah Aref Ophthalmic Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>4</sup>Department of Ophthalmology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>5</sup>Department of Optometry, School of Rehabilitation, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>6</sup>Ophthalmic Research Center, Research Institute for Ophthalmology and Vision Science, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>7</sup>Department of Electrical Engineering, Faculty of Computer Engineering, University of Isfahan, Isfahan, Iran

<sup>8</sup>Department of Psychology, Kish International Branch, Islamic Azad University, Kish Island, Iran

\*These two authors equally contributed to this work.

### ORCID:

Masomeh Kalantarion: <https://orcid.org/0000-0003-4778-3973>

Zhale Rajavi: <https://orcid.org/0000-0002-4078-3017>

Hamideh Sabbaghi: <https://orcid.org/0000-0002-2627-7222>

### Abstract

**Purpose:** To identify the psychological impact of coronavirus disease on ophthalmologists practicing in Iran between August and December 2020.

**Methods:** In this cross-sectional online survey, a standard Patient Health Questionnaire-9 (PHQ-9) was completed by 228 ophthalmologists who were practicing in Iran. The PHQ-9 questionnaire was revised by adding two additional questions specifically applicable for the assessment of the psychological impact of coronavirus disease on the Iranian ophthalmologists. An organized classification regarding the assessment of different depression severities identified as no (0–4), mild (5–9), moderate (10–14), or severe (15–21) was then considered for data analysis.

**Results:** The mean age of our participants was  $49.0 \pm 15.61$  years and the majority of them (67.1%) were male. Depression was discovered in 73.68% ( $n = 168$ ) with different severities ranging from mild ( $n = 61$ , 26.75%), moderate ( $n = 63$ , 27.63%), and severe ( $n = 44$ , 19.3%). It was found that participants with depression were older as compared to those without depression ( $P = 0.038$ ). Higher percentages of severe depression were noticed in the high-risk regions contaminated with corona virus as compared to the other low-risk regions ( $P = 0.003$ ). Based on multivariable models, we determined that ophthalmologists who were somewhat concerned about their training/ profession (OR: 0.240; 95% CI: 0.086–0.672;  $P = 0.007$ ) and those with no concerns about their income had lower association with depression (OR: 0.065; 95% CI: 0.005–0.91;  $P = 0.042$ ).

**Conclusion:** High prevalence of depression was observed among older aged Iranian ophthalmologists living in high-risk contaminated regions who possessed serious concerns with respect to their training/profession and income. It is recommended that the health policymakers of Iran pay more attention to the ophthalmologists who experience the aforementioned factors.

**Keywords:** Coronavirus Disease; Iran; Ophthalmologists; Psychological Impact

## INTRODUCTION

Coronaviruses (CoVs) are the known types of viruses affecting both birds and mammals, which developed into a pandemic following the outbreak of the COVID-19.<sup>[1]</sup> This was first identified in Wuhan, China at the end of 2019 and was later announced as the Public Health Emergency of International Concern by the World Health Organization (WHO) on January 30, 2020.<sup>[2-5]</sup> In terms of gender incidence, the disease was more prevalent in males with an estimation of 54.3% and a median age of 56 years in Wuhan, China.<sup>[3]</sup>

Both physical and psychological complications have been reported in patients with COVID-19 virus.<sup>[6-9]</sup> In terms of psychological concerns, the medical staff and healthcare workers showed acute stress reactions during the COVID-19 pandemic through emotional, cognitive, physical, and social reactions.<sup>[8]</sup> Corona-phobia is a public concern which is mostly observed in the majority of healthcare professionals who are in direct contact with quarantined patients in hospitals.<sup>[7]</sup> Medical workers such as doctors, nurses, and paramedical staff are currently in a stressful working environment due to the lack of suitable protection which makes them at high risk for infection, caring for patients while experiencing negative emotions, working for long hours, and isolation from family and loved ones.<sup>[7]</sup>

Numerous mental disorders attributed to the COVID-19 pandemic have been reported among the healthcare workers. These include increased depression/depressive symptoms, anxiety, psychological distress, and poor sleep quality.<sup>[7]</sup> These psychological problems such as stress, depressive symptoms, insomnia, denial, anger, fear would result to decreasing the quality

of life. These findings were also reported among Chinese medical workers and Italian general practitioners.<sup>[10,11]</sup>

In the current pandemic, due to the ocular manifestations, ophthalmologists have also encountered a high referral rate of patients with COVID-19 virus.<sup>[12]</sup> They have a potentially high risk of contracting coronavirus infections via transmission of the virus through droplets due to the close proximity needed for examination and the direct contact with patients' lids and ocular surfaces.<sup>[13-15]</sup> These possibilities illustrate that they are working in a highly stressful conditions. Noticeable transient mental health problems including depression, anxiety, and stress were reported among the training and practicing ophthalmologists as well as the ophthalmic surgeons in India.<sup>[14]</sup> The current pandemic also had an adverse effect on the mental health of the highest record of ophthalmology residents (70.5%) in Saudi Arabia.<sup>[16]</sup>

Due to the prevalence of the COVID-19 epidemic in Iran as well as the increased referral rate of patients to the eye centers, we decided to identify the psychological impact of COVID-19 on ophthalmologists practicing in Iran.

## METHODS

In this cross-sectional online survey, a standard Patient Health Questionnaire-9 (PHQ-9) was distributed to our target population of ophthalmologists who were practicing throughout Iran. The current study was conducted between August and December 2020.

This study was approved by the Ethics Committee of the Ophthalmic Research Center, Shahid Beheshti University of Medical Sciences (Approval No.: IR.SBMU.ORC.REC.1399.016). A brief explanation regarding our study objectives and the instructions about how to complete the questionnaire were distributed to our target

### Correspondence to:

Hamideh Sabbaghi, PhD. Ophthalmic Research Center, Research Institute for Ophthalmology and Vision Science, Shahid Beheshti University of Medical Sciences, 23 Paidar Fard, Bostan 9, Pasdaran Ave., Tehran 16666, Iran.

**Email:** sabbaghi.opt@gmail.com

Received: 09-02-2021 Accepted: 28-12-2021

### Access this article online

**Website:** <https://knepublishing.com/index.php/JOVR>

**DOI:** 10.18502/jovr.v17i2.10795

**How to cite this article:** Kalantarion M, Rajavi Z, Sabbaghi H, Kheiri B, Shahriari MH, Mozafar FF. Psychological Impact of COVID-19 on Ophthalmologists in Iran. *J Ophthalmic Vis Res* 2022;17:233-241.

This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

population – all registered ophthalmologists in the Society of Ophthalmology – either by email or via various social media platforms. To ensure adequate and timely feedback from participants they were also sent three reminders. We assured our participants that their information was kept anonymous and confidential.

### Patient Health Questionnaire-9 (PHQ-9)

Data were collected using a standard questionnaire as previously applied in the study by Khanna et al.<sup>[13]</sup> A Persian version of this questionnaire with the sensitivity of 73.8% and specificity of 76.2% was applied in the present study.<sup>[17]</sup>

In addition to the nine specific questions regarding the assessment of depression, sociodemographic characteristics such as gender, age, marital status, duration of practice, last degree, and type of services offered were also recorded on the questionnaire. The PHQ-9 questionnaire was revised to include three additional questions that were specific to the purpose of this study. Two questions focused on the ophthalmologists' concerns about their training/profession and their income and another question was introduced to clarify the association of the current situation with depression.

Afterward, this was presented to an expert panel including ophthalmologists, psychologists, biostatisticians, and research methodologists to assess its content validity.

The questionnaire was accessible by all participants through the link address: [https://docs.google.com/forms/d/e/1FAIpQLSfpcIV5xi7dZEkRgX\\_wAwjTh\\_mdyVoTd5rXFf3x3M6C7GSFkA/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSfpcIV5xi7dZEkRgX_wAwjTh_mdyVoTd5rXFf3x3M6C7GSFkA/viewform?usp=sf_link).

An organized classification representing different depression severities of no (0–4), mild (5–9), moderate (10–14), or severe (15–21) were then considered for data analysis.<sup>[18, 19]</sup> The prevalence of depression was also reported based on the severity of the COVID-19 contamination in different regions of Iran which were reported by the Iranian National Headquarter for the Control of COVID-19 Epidemic in December 2020.<sup>[20]</sup>

### Statistical Analysis

To analyze the data, we used frequency (%), mean  $\pm$  SD, median and range. To evaluate the difference

between the two groups of the ophthalmologists who had depression and those without it, we used *t*-test, Mann–Whitney, Chi-Square, and Fisher's Exact test. We used binary logistic regression to calculate the OR and effect of each associated factor. The correlation of all considered factors with depression was analyzed based on both univariate and multivariable models, in which all assumptions were considered. A *P*-value  $< 0.05$  was considered as statistically significant. All statistical analyses were performed by SPSS software (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.).

### RESULTS

In this cross-sectional online survey, a PHQ-9 questionnaire was completed by 228 ophthalmologists (response rate: 16.9%) with a mean age of  $49.0 \pm 15.61$  years (median, 40.0; range, 31–85) where the majority of the study participants (67.1%) were male.

Depression was assessed in 73.68% ( $n = 168$ ) of the participants with severities ranging from mild ( $n = 61$ , 26.75%), moderate ( $n = 63$ , 27.63%), and severe ( $n = 44$ , 19.3%) among our studied subjects. It was revealed that depressed ophthalmologists were older as compared to those without depression ( $P = 0.038$ ). Additionally, an increased prevalence of depression was identified among ophthalmologists who had either a previous psychological problem ( $P = 0.047$ ) or considerable concerns regarding their training, profession ( $P < 0.001$ ), and their income ( $P = 0.002$ ). Regarding the other sociodemographic factors presented in Table 1, no statistically significant difference was observed between the ophthalmologists with depression versus those without depression.

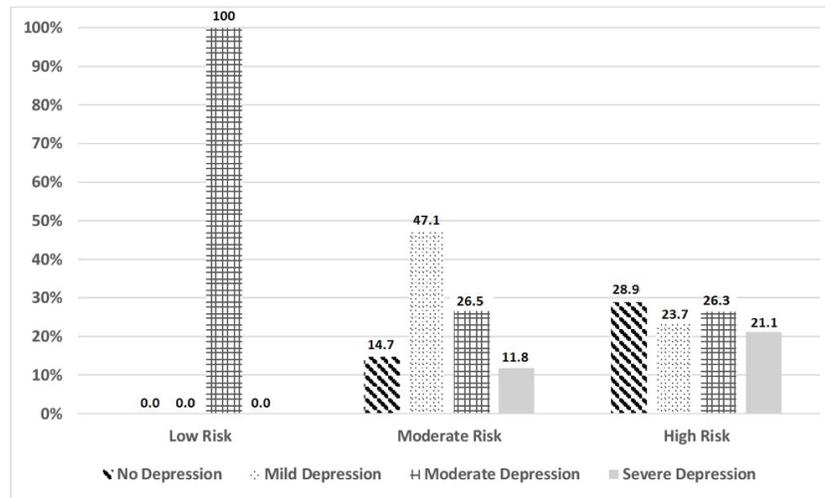
Figure 1 illustrates the frequency of varied severities of depression in different residential regions of Iran classified based on the level of contamination with the COVID-19 virus. As shown, 42.11% of ophthalmologists practicing in the low- or moderate-risk regions had mild depression, while the higher percentage of the severe depression was found in the high-risk regions as compared to the other regions ( $P = 0.003$ ).

The univariate model shows that ophthalmologists in vitreoretinal fellowship had lower frequency of depression as compared to general ophthalmologists (OR: 0.415; 95%

**Table 1.** Sociodemographic characteristics of the study population regarding depression

Factors	Level	Total	Depression		P-value	
			No (n = 60)	Yes (n = 168)		
Gender (%)	Male	153 (67.1%)	41 (68.3%)	112 (66.7%)	0.874	
	Female	75 (32.9%)	19 (31.7%)	56 (33.3%)		
Age (yr)	Mean ± SD	49 ± 15.61	51.7 ± 10.68	66.25 ± 10.11	0.038	
	Median (Range)	40 (31 to 85)	51.5 (31 to 70)	60 (50 to 85)		
Marital status (%)	Married	196 (85.97%)	54 (90.0%)	142 (84.5%)	0.388	
	Single	32 (14.03%)	6 (10.0%)	26 (15.5%)		
Duration of practice (yr)	Mean ± SD	17.26 ± 10.86	19.1 ± 10.46	16.6 ± 10.95	0.127	
	Median (Range)	18 (0–50)	20 (1–43)	16.5 (0–50)		
Last degree (%)	General Ophthalmologist	98 (42.99%)	20 (33.3%)	78 (46.4%)	0.151	
	Fellowship					
	Cornea & Anterior Segment	46 (20.17%)	10 (16.7%)	36 (21.4%)		
	Vitreoretinal	55 (24.12%)	21 (35.0%)	34 (20.2%)		
	Strabismus	8 (3.50%)	3 (5.0%)	5 (3.0%)		
	Glaucoma	8 (3.50%)	1 (1.7%)	7 (4.2%)		
	Oculoplastic	12 (5.29%)	4 (6.6%)	8 (4.8%)		
Type of Services (%)	Pathology	1 (0.43%)	1 (1.7%)	0 (0.0%)	0.609	
	Governmental	115 (50.43%)	31 (51.7%)	84 (50.0%)		
	In training	12 (5.26%)	4 (6.7%)	8 (4.8%)		
	Private	97 (42.56%)	23 (38.3%)	74 (44.0%)		
	NGO	4 (1.75%)	2 (3.3%)	2 (1.2%)		
Concerns about training or profession (%)	Not at all	4 (1.7%)	4 (6.7%)	0 (0.0%)	<0.001	
	Somewhat	64 (28.1%)	29 (48.3%)	35 (20.8%)		
	Considerable	96 (42.1%)	17 (28.3%)	79 (47.0%)		
	Seriously	64 (28.1%)	10 (16.7%)	54 (32.1%)		
	Not at all	5 (2.19%)	4 (6.7%)	1 (0.6%)		
Concerns about income (%)	Somewhat	58 (25.43%)	22 (36.7%)	36 (21.4%)	0.002	
	Considerable	88 (38.59%)	20 (33.3%)	68 (40.5%)		
	Seriously	77 (33.77%)	14 (23.3%)	63 (37.5%)		
	Not at all	5 (2.19%)	4 (6.7%)	1 (0.6%)		
	Somewhat	58 (25.43%)	22 (36.7%)	36 (21.4%)		
Probable Associated Factors with Depression (%)	Coronavirus	No	118 (51.75%)	33 (55.0%)	85 (50.6%)	0.652
		Yes	110 (48.24%)	27 (45.0%)	83 (49.4%)	
	Communication Problem	No	94 (41.22%)	20 (33.3%)	74 (44.0%)	0.17
		Yes	134 (58.77%)	40 (66.7%)	94 (56.0%)	
	Previous Psychological Problem	No	205 (89.91%)	58 (96.7%)	147 (87.5%)	0.047
		Yes	23 (10.08%)	2 (3.3%)	21 (12.5%)	
	Financial Problem	No	158 (69.29%)	48 (80.0%)	110 (65.5%)	0.05
		Yes	70 (30.70%)	12 (20.0%)	58 (34.5%)	
	Distress due to losing relatives	No	219 (96.05%)	58 (96.7%)	161 (95.8%)	>0.999
		Yes	9 (3.94%)	2 (3.3%)	7 (4.2%)	
	Isolation	No	208 (91.22%)	57 (95.0%)	151 (89.9%)	0.296
		Yes	20 (8.77%)	3 (5.0%)	17 (10.1%)	
	Others	No	228 (100%)	60 (100.0%)	168 (100.0%)	–
		Yes	0 (0.0%)	0 (0.0%)	0 (0.0%)	

NGO, nongovernmental organization; SD, standard deviation; yrs, years



**Figure 1.** The prevalence of various severities of depression among ophthalmologists working in different regions of Iran in 2020.

CI: 0.199–0.864,  $P = 0.019$ ). Furthermore, ophthalmologists who were somewhat concerned about their training/profession had a lower association with depression as compared to those having serious concerns (OR: 0.223; 95% CI: 0.097–0.515,  $P < 0.001$ ). This finding was correspondent among ophthalmologists who were somewhat concerned (OR: 0.364; 95% CI: 0.166–0.797,  $P = 0.012$ ) or who had no (OR: 0.056; 95% CI: 0.006–0.536,  $P = 0.012$ ) concerns about their income. Based on multivariable models, we determined that ophthalmologists who were somewhat concerned about their training/profession (OR: 0.240; 95% CI: 0.086–0.672;  $P = 0.007$ ) and those with no concerns about their income possessed lower association with depression (OR: 0.065; 95% CI: 0.005–0.91;  $P = 0.042$ ) [Table 2].

## DISCUSSION

The current study was purposed to investigate the prevalence of depression among the registered ophthalmologists who were practicing in Iran. Depression was found in 73.68% ( $n = 168$ ) of our studied subjects with severities ranging from mild (26.75%), moderate (27.63%), and severe (19.3%). The study by Grover et al, which was conducted in 2020 with a response rate of 24.8%, reported depression in 53% of the Indian ophthalmic surgeons.<sup>[14]</sup> Depression was also discovered in 32.6% of all studied ophthalmologists practicing or training in India in 2020 and varied severities

of mild, moderate, and severe depression were identified at 21.4%, 6.9%, and 4.3%, respectively.<sup>[13]</sup> Additionally, 64.7% of all Turkish physicians who participated in 2020<sup>[21]</sup> and 50.4% of Chinese physicians with the response rate of 68.7% in the study year of 2020<sup>[22]</sup> had symptoms of depression during the COVID-19 pandemic. The higher percentage of depression in our study as compared with other reports could be attributed to the longer working hours of Iranian ophthalmologists as well as the high incidence and mortality rates of coronavirus disease in our country. It should also be considered that the various levels of severity of depression were all discovered in our study, as compared to the Indian Study where most of the subjects had only mild depression.<sup>[13]</sup>

## Depression and Gender

In our study, no statistically significant difference was observed in the prevalence of depression between different genders which was in line with the study by Chambers et al.<sup>[25]</sup> However, higher incidence of depression was identified among female doctors as revealed in the annual report by the World Health Organization (WHO), the annual global prevalence, reported by Cyranowski et al Ford et al, and the study conducted on the Indian surgeon ophthalmologists and Saudi Arabian ophthalmologists.<sup>[13, 24–27]</sup> It was also discovered in a study investigated by Elbay et

**Table 2.** Univariate and multivariable analyses of the probable associated factors with depression among ophthalmologists

Factors	Level	Univariate analysis				Multivariable analysis				
		OR	95% CI		P-value	OR	95% CI		P-value	
			Lower	Upper			Lower	Upper		
Gender	Male	0.927	0.493	1.743	0.814	–	–	–	–	
	Female	R	–	–	–	–	–	–	–	
Residential Region	High Risk	R	–	–	–	–	–	–	–	
	Low Risk	–	–	–	–	–	–	–	–	
	Moderate Risk	2.363	0.87	6.42	0.092	0.379	0.014	10.064	0.562	
Marital Status	Married	0.607	0.237	1.556	0.298	–	–	–	–	
	Single	R	–	–	–	–	–	–	–	
Last Degree	General Ophthalmologist	R	–	–	–	–	–	–	–	
	Cornea & Anterior Segment	0.923	0.392	2.172	0.855	2.653	0.631	11.161	0.183	
	Glaucoma	0.427	0.094	1.941	0.271	1.855	0.421	8.174	0.414	
	Strabismus	1.795	0.209	15.441	0.594	1.085	0.139	8.458	0.938	
	Vitreoretinal Pathology	–	–	–	–	–	–	–	–	
	Oculoplastic	0.513	0.14	1.876	0.313	0.99	0.241	4.068	0.989	
	Type of Services	Government	2.71	0.366	20.078	0.329	–	–	–	–
		In training	2	0.201	19.914	0.554	–	–	–	–
Private		3.217	0.429	24.134	0.256	–	–	–	–	
NGO		R	–	–	–	–	–	–	–	
Concerns about training or profession	Not at all	–	–	–	–	–	–	–	–	
	Somewhat	0.223	0.097	0.515	<0.001	0.24	0.086	0.672	0.007	
	Considerable	0.861	0.366	2.022	0.73	0.827	0.0.333	2.411	0.827	
Concerns about income	Seriously	R	–	–	–	–	–	–	–	
	Not at all	0.056	0.006	0.536	0.012	0.065	0.005	0.91	0.042	
	Somewhat	0.364	0.166	0.797	0.012	1.107	0.441	2.776	0.829	
	Considerable	0.756	0.352	1.622	0.472	0.913	0.388	2.471	0.858	
	Seriously	R	–	–	–	–	–	–	–	

NGO, nongovernmental organization; CI, confidence interval; OR, odds ratio; R, reference

al that the incidence of depression was reported higher among female physicians in his sample.<sup>[21]</sup>

which may lead to increased prevalence of physical and psychological pressures.

### Depression and Age

In this study, it was revealed that a higher percentage of older ophthalmologists suffered from depression. Our findings were in contrast with the study by Khanna et al on Indian ophthalmologists that reported the decreasing odds of 3% for depression with increasing age.<sup>[13]</sup> This difference in comparison may be attributed to longer practice and training program hours conducted among the older ophthalmologists

### Depression and Marriage

Although in our study there was no difference between married and single ophthalmologists regarding depression, Elbay et al discovered that being married was associated with less incidence of depression and other psychological problems such as anxiety and stress.<sup>[21]</sup> Studies on physicians and Indian ophthalmologists also showed that being single was considered an influential factor

in increasing the depressive symptoms during the COVID-19 outbreak.<sup>[13, 21]</sup>

### Depression and Duration of Practice

The mean duration of practice among our study participants was  $17.26 \pm 10.86$  years, which was not significantly associated with depression. However, Elbay et al found that higher levels of depression and other mental disorders were observed among physicians who, as a result of having less working experience, executed excessive working hours in rotating shifts with minimal rest periods.<sup>[21]</sup>

### Depression and Last Degree

We found a lower percentage of depression among ophthalmologists in vitreoretinal fellowship as compared to the general ophthalmologists. This lower percentage might be attributed to the fact that as most of the retinal diseases need urgent management, patients with different types of retinal pathologies were referred to the vitreoretinal fellowship ophthalmologists during the COVID-19 pandemic as was done in the past. Another reason for lower percentages of depression among vitreoretinal fellowship participants may be as a subspecialty group they have adapted to operating under these challenging conditions while managing most of these complicated retinal diseases. On the contrary, Almater et al reported that depressive symptoms were significantly higher in fellows as compared to residents and consultants among the Saudi Arabian ophthalmologists.<sup>[27]</sup> This discrepancy can be related to the different facilities which have been provided for different grades of ophthalmologists in different countries.

### Depression and Types of Services

No statistically significant association was observed between depression and different services presented by the ophthalmologists. However, a higher level of depression was reported among in-training Indian ophthalmologists because of their concern regarding their training or profession challenges and getting their living.<sup>[13]</sup> Almater et al did not find any difference between ophthalmologists who were working in the specialized eye centers and those who were practicing in general hospitals in terms of the depression incidence.<sup>[27]</sup>

### Depression and Concerns about Training/Profession and Income

The substantial record of depressed ophthalmologists is those that had serious concerns about their training/profession and income in this pandemic period, which proved to be an additional influence in maximizing depression. This finding was also reported in United Kingdom, Saudi Arabia, and India illustrating the significant impact of coronavirus disease on the ophthalmology-training program.<sup>[13, 16, 28]</sup> The reduction of training courses for patient examination and surgeries at the educational hospitals due to the decreased number of referral patients and communication restrictions as a result of healthcare protocols contributed toward the negative impact on the ophthalmology training program. A higher level of depression was also reported among in-training Indian ophthalmologists because of their concern regarding their training or profession challenges and earning to sustain their living costs.<sup>[13]</sup>

### Association of Different factors with Depression

In assessing the prevalence of depression during the COVID-19 pandemic as it relates to multiple factors, it was determined that no inherent factors of coronavirus, communication problems, financial challenges, distress due to losing relatives or isolation were found to be influential. Higher percentages of depression was found even among patients with no prior history of psychological problems, so the direct impact of coronavirus on depression was able to be isolated. Our analysis shows that depression was discovered in ophthalmologists who were somewhat concerned as compared to those having serious concerns about their training/profession (OR = 0.024, 95%CI: 0.086–0.672;  $P = 0.007$ ) while those with no concerns about their income had lower association with depression (OR: 0.065; 95% CI: 0.005–0.91;  $P = 0.042$ ).

### Depression in Regions with Different levels of Risk of Coronavirus Disease

All ophthalmologists located in the low-risk regions had moderate depression and most of the

participants (47.1%) located in the moderate-risk region had mild depression. However, we noticed higher percentages of severe depression in ophthalmologists located in the high-risk regions. It has been reported that ophthalmologists are considered as one of the frontline physicians with the high risk of contracting coronavirus disease, due to their close proximity toward patients during vision testing, slit lamp, and fundus examinations.<sup>[27]</sup> Consequently, the application of personal protective equipment is necessary during patients' examination. In addition, supportive proceedings by the government, health administrations, and the Iranian Society of Ophthalmology should also be considered, particularly in the high-risk regions. The usage of the standard PHQ-9 questionnaire as our study tool can be a strength while the cross-sectional study design can be considered as our study limitation. Low response rate can also be taken into account as another limitation of the present study in spite of the sending several reminders, which can be attributed to the common taboo among our study population regarding the mental health problems.

In conclusion, high prevalence of depression was observed among older aged Iranian ophthalmologists living in high-risk contaminated regions who possessed serious concerns with respect to their training/profession and income. It is recommended that the health policymakers of Iran pay more attention to ophthalmologists who experience the aforementioned factors.

### Availability of Data and Materials

The datasets used and analyzed during this study can be made available from the corresponding authors upon reasonable request.

### Acknowledgments

The authors would like to express their gratitude to the Negah Specialty Ophthalmic Research Center, Shahid Beheshti University of Medical Sciences and all the loved ones who cooperated with this research project, especially ophthalmologists.

### Financial Support and Sponsorship

There were no sources of funding for the research.

### Conflicts of Interest

The authors report no conflict of interest.

### REFERENCES

1. Tavakoli A, Vahdat K, Keshavarz M. Novel coronavirus disease 2019 (COVID-19): an emerging infectious disease in the 21st century. *Iran South Med J* 2020;22:432–450.
2. Peyronnet V, Sibiude J, Deruelle P, Huissoud C, Lescure X, Lucet J-C, et al. Infection par le SARS-CoV-2 chez les femmes enceintes. État des connaissances ET proposition de prise en charge. CNGOF, Gynécologie Obstétrique Fertilité & Sénologie; 2020. Available from: <https://doi.org/10.1016/j.gofs.2020.03.014>.
3. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). *Int J Surg* 2020;76:71–76.
4. Farnoosh G, Alishiri G, Hosseini Zijoud SR, Dorostkar R, Jalali Farahani A. Understanding the 2019-novel coronavirus (2019-nCoV) and coronavirus disease (COVID-19) based on available evidence – a narrative review. *J Mil Med* 2020;22:1–11.
5. Rajavi Z, Safi S, Mohammadzadeh M. Guidance for ophthalmologists and ophthalmology centers during the COVID-19 pandemic. *J Ophthalmic Vis Res* 2020;15:438–441.
6. Wang D, Hu B, Chang Hu C, Fangfang Zhu F, Xing Liu X, Jing Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* 2020;323:1061–1069.
7. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav Immun* 2020;89:531–542.
8. Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care* 2020;9:241–247.
9. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *Gen Psychiatr* 2020;33:e100213.
10. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatr* 2020;7:e14.5
11. Amerio A, Bianchi D, Santi F, Costantini L, Odone A, Signorelli C, et al. Covid-19 pandemic impact on mental health: a web-based cross-sectional survey on a sample of Italian general practitioners. *Acta Biomed* 2020;91:83–88.
12. Seah I, Agrawal R. Can the coronavirus disease 2019 (COVID-19) affect the eyes? A review of coronaviruses and ocular implications in humans and animals. *Ocul Immunol Inflamm* 2020;28:391–395.
13. Khanna RC, Honavar SG, Metla AL, Bhattacharya A, Maulik PK. Psychological impact of COVID-19 on ophthalmologists-in-training and practising ophthalmologists in India. *Indian J Ophthalmol* 2020;68:994–998.

14. Grover R, Dua P, Juneja S, Chauhan L, Agarwal P, Khurana A. Depression, anxiety and stress in a cohort of registered practicing ophthalmic surgeons, post lockdown during COVID-19 pandemic in India. *Ophthalmic Epidemiol* 2020;13:1–8.
15. Zhang Y, Ma ZF. Impact of the COVID-19 pandemic on mental health and quality of life among local residents in Liaoning province, China: a cross-sectional study. *Int J Environ Res Public Health* 2020;17:2381. 3.
16. Alahmadi AS, Alhatlan HM, Bin Helayel H, Khandekar R, Al Habash A, Al-Shahwan S. Residents' perceived impact of COVID-19 on Saudi ophthalmology training programs – a survey. *Clin Ophthalmol* 2020;14:3755–3761.
17. Khamseh ME, Baradaran HR, Javanbakht A, Mirghorbani M, Yadollahi Z, Malek M. Comparison of the CES-D and PHQ-9 depression scales in people with type 2 diabetes in Tehran, Iran. *BMC Psychiatry* 2011;11:61.
18. Spitzer R, Kroken K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary care evaluation of mental disorders. Patient health questionnaire. *JAMA* 1999;282:1737.
19. Kocalevent RD, Hinz A, Brahler E. Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population. *Gen Hosp Psychiatry* 2013;35:551–555.
20. <https://coronomy.ir/20/11/2020>.
21. Elbay RY, Kurtulmus A, Arpacıoglu S, Karadere E. Depression, anxiety, stress levels of physicians and associated factors in Covid-19 pandemics. *Psychiatry Res* 2020;290:113130.
22. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open* 2020;3:e203976.
23. Chambers R, Campbell II. Anxiety and depression in general practitioners: associations with type of practice, fundholding, gender and other personal characteristics. *Fam Pract* 1996;13:170–173.
24. WHO. Depression and other common mental disorders: global health estimates. Geneva: WHO; 2017 [cited 2020 Jun 15]. Available from: [https://apps.who.int/iris/bitstream/handle/10665/254610/WHO-MSD-MER-2017.2\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/254610/WHO-MSD-MER-2017.2_eng.pdf?sequence=1)
25. Cyranowski JM, Frank E, Young E, Shear MK. Adolescent onset of the gender difference in lifetime rates of major depression: a theoretical model. *Arch Gen Psychiatry* 2000;57:21–27.
26. Ford DE, Erlinger TP. Depression and C-reactive protein in US adults: data from the third national health and nutrition examination survey. *Arch Intern Med* 2004;164:1010–1014.
27. Almater AI, Tobaigy MF, Younis AS, Alaqeel MK, Abouammoh MA. Effect of 2019 coronavirus pandemic on ophthalmologists practicing in Saudi Arabia: a psychological health assessment. *Middle East Afr J Ophthalmol* 2020;27:79–85.
28. Hussain R, Singh B, Shah N, Jain S. Impact of COVID-19 on ophthalmic specialist training in the United Kingdom- the trainees' perspective. *Eye* 2020;34:2157–2160.