

Knowledge, Awareness and Perceptions of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Disease among Ophthalmologists in Jordan

Yazan Gammoh ^{1,*}, Enas Alkhader ²

¹ Al-Ahliyya Amman University, Faculty of Allied Medical Sciences, Department of Optometry Science, ORCID: 0000-0001-9979-4450

² Al-Ahliyya Amman University, Faculty of Pharmacy, Department of Pharmaceutics and Pharmaceutical Technology, ORCID: 0000-0002-6430-675X

* Corresponding author email address: y.gammoh@ammanu.edu.jo; P.O.Box 121, Amman, 19328, Jordan

Abstract

This study aims at investigating the level of awareness of ophthalmologists in Jordan towards COVID-19 and their perceptions towards ophthalmic practice using a web-based survey. Knowledge of causes, symptoms and methods of transmission of COVID-19; ophthalmologists' attitudes and perceptions towards COVID-19 and clinical practice were assessed using a set of multiple-choice closed-ended questions. Of the 300 participants; 70% were in the age range of 30-40 years. While 95% acknowledged the scientific name of COVID-19, 45% were aware of its cause. Ophthalmologists aged 40-50 years were more likely to agree that air-puffing tonometer are a risk of infection spread (OR 1.5, 95% CI: 0.21-9.50, p<0.01). Ophthalmologists aged 30-40 years were more likely to agree that a slit lamp shield would reduce infection risk (OR 1.42, 95% CI: 0.30-6.8, p<0.01).

Ophthalmologists in Jordan demonstrated a high level of knowledge of the causes, symptoms and modes of transmission of COVID-19. Official national guidelines about safe ophthalmic service provision during the COVID-19 pandemic are recommended.

Keywords

COVID-19, Infection control, Jordan, Ophthalmology, SARS-CoV-2.

Author Biographies



Yazan Gammoh: BSc, MSc, PhD. He obtained his BSc with honors on 2003 in Optometry from Jordan University of Science & Technology, his MSc in Optometry from the University of Bradford and his PhD in 2011 in Optometry and vision science from the University of Bradford. On 2020 he obtained FIACLE, Fellowship of International Association of Contact Lens Educators from Canada. Currently he is an Associate Professor and the Chair of Optometry Department at the Faculty of Allied Medical Sciences at Al-Ahliyya Amman University. His Sub-specialty is in Myopia development and progression in adults. His research interests are in population-based prevalence of refractive error and contact lens practice.



Enas Ali Alkhader: BSc, MSc, PhD. She obtained her PhD in Pharmacy from the University of Nottingham/Malaysia campus, her MSc in pharmaceutical sciences from the University of Petra in Jordan and her BSc in Pharmacy from the University of Jordan. Currently she works as assistant professor at the Middle East University in Jordan, she is also the assistant dean for the British Joint Pharmacy Program (MPharm) at the Middle East University in Jordan. Previously she worked as an assistant professor at Al-Ahliyya Amman University. Her sub-specialty is drug delivery and nanotechnology. Her research interests are in nanotechnology, drug delivery, and pharmaceutical analysis/progression in adults. His research interests are in population-based prevalence of refractive error and contact lens practice.

1. Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), or what was initially termed as the 2019 novel corona-virus, is considered the third novel coronavirus in 17 years. Since it was first reported in Wuhan, China, the virus had spread globally, with the World Health Organization (WHO) declaring it as a Public Health Emergency of International Concern on 30 January 2020 and a pandemic on 11 March 2020 (Castagnoli et al., 2020; Lim et al., 2020).

With multiple hosts and a high transmissibility and infectivity rate, SARS-CoV-2 is a source of major challenge for the prevention and treatment of its infection (Wang et al., 2020; Chen et al., 2020). There are various methods of the COVID-19 human-to-human spread including direct contact and airborne droplets. Several routes of exposure have been reported including respiratory, ocular, blood, and saliva exposure (Lim et al., 2020; Khader et al., 2020). Ocular involvement is of particular interest as the polymerase chain reaction examination on tears from SARS-CoV infection were reported positive (Lim et al., 2020). The aforementioned facts put healthcare providers on high physical and psychological stress of their role in disease transmission as well as prevention, especially after reported COVID-19 infections among healthcare providers including ophthalmologists (Lim et al., 2020; Adams et al., 2020). The use of Personal Protection Equipment (PPE) is advocated for healthcare workers including full protection gowns, gloves, eye protection, and facial protection (Miller et al., 2020; Price et al., 2020).

There is a need to understand the knowledge and awareness of ophthalmologists regarding the COVID-19 as they are among the healthcare providers in concern, partially because of ocular transmission of the disease through close contact with patients' ocular secretions including conjunctival, aerosol, and tear secretions or contaminated surfaces. Not to mention the daily high patient volume waiting lists in the clinics, particularly after the relatively long-duration closure (Romano et al., 2020).

Given the multiple factors of virus infection and spread among ophthalmologists; the study aimed to investigate the level of knowledge, awareness and perceptions of ophthalmologists in Jordan towards COVID-19.

2. Materials and Methods

2.1 Study design and population

A web-based, cross-sectional study was conducted during the month of April of the year 2020 using an online survey hosted through Google Forms and distributed to ophthalmologists practicing in Jordan. A sample size of 307 was deemed to be representative of a population

of 450 ophthalmologists, assuming a 95% confidence interval level and a $\pm 5\%$ margin of error.

2.2 Data collection tools

The questionnaire was developed based on the content of the World Health Organization (WHO) online course on emerging respiratory viruses, including COVID-19 (WHO, 2020). The questionnaire was designed as a set of multiple-choice close-ended questions that covered the following: sociodemographic characteristics of participants; knowledge of causes, symptoms, signs, and methods of transmission of COVID-19; ophthalmologists' attitudes and perceptions towards COVID-19 and clinical practice.

2.3 Data analysis and ethical consideration

Data were exported from Google Forms and entered into Microsoft Excel Spreadsheets with data analysis performed using the SPSS software version 25 (IBM Corporation, Armonk, NY, USA). Numbers and percentages were calculated to describe categorical and nominal data. Two-tailed t-test analyses within subjects were conducted. The ODDs ratios and 95% Confidence Interval levels were calculated using multinomial logistic regression. A P value lower than 0.01 was considered statistically significant.

The tenets of the Declaration of Helsinki were observed when conducting the study. Participants' personal information were anonymous and participation in the online survey was voluntary. Participants were free to withdraw from the study at any point as stated in the electronic consent form that the participants had to read and agree to, prior to filling the questionnaire. The Ethical Committee of the Faculty of Allied Medical Sciences at Al-Ahliyya Amman University has approved the study (ethical approval number: AAU-1/6/2019-2020).

3. Results

3.1 Participants demographics

A total of 300 (169 males and 131 females) ophthalmologists participated in the study; all data collected were included in the analysis. The majority of the participants were in the age range of 30-40 years (70%). Only 3 participants were above the age of 60. While, 96.1% of the participants acknowledged the scientific name of the 2019 novel corona-virus, only 45% recognized the source of the emergence of the SARS-CoV-2.

3.2 Level of knowledge of COVID-19 mode of transmission, symptoms, approaches to increase immunity, and protection measures among ophthalmologists in Jordan

All the participants agreed that direct contact with a

COVID-19 patient is a major mode of virus transmission, while 99% agreed that a sneeze splash and touching a contaminated surface, are modes of transmission of the SARS-CoV-2. Regarding the knowledge of the symptoms of COVID-19, fever, coughing, and shortness of breath were acknowledged by 99% of the participants. Meanwhile, headache, throat congestion, and nasal congestion were acknowledged by 90% of the ophthalmologists. Nevertheless, 59% of the sample were not sure that diarrhoea and vomiting were symptoms of COVID-19.

3.3 Health and safety measures practiced by ophthalmologists in Jordan

Hand cleaning by either washing with soap and water or using a disinfectant was reported by 55%, of the ophthalmologists. While 50.5% of the participants use a tissue when sneezing, only 40% reporting immediate and safe disposal of the tissue. Face masks were not worn in the workplace by 5% of the sample.

3.4 Perceptions of ophthalmologists towards potential sources of COVID-19 infection in the workplace and the role of contact lenses in the infection cycle

Using a non-contact tonometer operated by producing a puff of air was thought to increase the risk of spreading the infection by 35% of the sample. On the other hand, 70% of ophthalmologists agreed that using a shield fitted on the slit lamp to act as a barrier between the patient and practitioner would reduce the risk of infection. Surface cleaning by methods such as 70% alcohol and, or 3% hydrogen peroxide were acknowledged by all participants. Alcohol swabs to clean ophthalmic devices were acknowledged by 95% of the participants. Social distancing at the clinic waiting area, as per the government's regulations, was acknowledged by all participants. All participants reported limiting the number of patients attending the clinic. Table 1 provides a summary of all the participants' responses to all the questions related to knowledge, awareness and perceptions towards COVID-19.

As gender and level of education showed no statistically significant association with any of the perceptions investigated, only age groups were included in the multinomial logistic regression analysis. In addition, there was no statistically significant association with other potential sources of infection such as surfaces, ophthalmic instruments and social interaction. As obtained from table 2, younger ophthalmologists (40-50) were more inclined to believe that using an "air puff" non-contact tonometer increases the chance of getting COVID-19 infection (OR 1.5, 95% CI: 0.21-9.50, $p < 0.01$). Practitioners were significantly more likely to perceive that using a protective shield installed in slit lamp decreases the chance of infection if they are in the 30 to 40 years of age group (OR 1.42, 95% CI: 0.30-6.8, $p < 0.01$).

4. Discussion

While the majority of the ophthalmologists in this study were aware of the name of the virus causing COVID-19, less than half of the study sample were aware of the cause of COVID-19 which could be due to the initial research outcomes in this regard (Adhikari et al., 2020). Symptoms such as fatigue, fever, myalgia, dry cough, and dyspnea were initially and widely reported among COVID-19 patients, which could contribute to the high level of knowledge of ophthalmologists to these symptoms (CDC, 2020; Gorman, 2020). Less common symptoms such as diarrhea and vomiting were not well acknowledged, which could be due to the scarcity of literature available about such symptoms for both COVID-19 and other infections caused by earlier coronavirus strains (Rothan et al., 2020; Wong et al., 2020). These outcomes are in accordance with studies involving other healthcare providers (Karasneh et al., 2020; Khader et al., 2020).

Table 1

Knowledge of causes, symptoms, signs, and methods of transmission of COVID-19 and ophthalmologists' attitudes and perceptions towards COVID-19 and clinical practice (N=300).

Questions related to causes, symptoms, signs, and methods of transmission of COVID-19 and ophthalmologists' clinical practice	Percentage of correct respondents (%)
What is the scientific name the 2019 novel corona- virus?	96.1
What is the source of emergence of the SARS-CoV-2?	45
Is direct contact with a COVID-19 patient is a major mode of virus transmission?	100
Are fever, coughing, and shortness of breath symptoms of COVID-19?	99
Are headache, throat congestion, and nasal congestion symptoms of COVID-19?	90
Are diarrhea and vomiting symptoms of COVID-19?	59
Do you use a tissue while sneezing?	50.5
Do you practice immediate and safe disposal of tissues?	40
Do you wear a mask at work?	95
Would the use of air-puffing tonometer increase the risk of infection?	35
Would using a slit lamp shield reduce the risk of infection?	70
Do you practice proper and frequent cleansing of surfaces?	100
Do you practice proper and frequent cleansing of ophthalmic instruments?	95
Do you practice social distancing in the waiting area?	100
Do you limit the number of patients' appointments?	100

Table 2

Age as a predictive factor for knowledge of the role of workplace practices and contact lenses in increasing the risk of COVID-19 infection.

	Age (years)	ODDs ratio	Confidence Interval (95%)	
			Lower	Upper
Using an "air puff" non-contact tonometer increases the chance of getting infected	30-40	1.1a	0.20	6.52
	41-50	1.5 a	0.21	9.50
	51-60	0.80 a	0.10	6.92
	>60	*	*	*
Using a protective shield installed on slit lamp increases decreases the chance of getting infected	30-40	1.42 a	0.30	6.80
	41-50	1.08 a	0.21	6.05
	51-60	0.96 a	-0.93	1.26
	>60	*	*	*

*a: $P < 0.01$

Personal protective measures, as well as workplace safety measures were extensively recognized, not to mention that the majority of the participants agreed on the need of taking these precautions. These findings are in accordance with measures adopted by ophthalmologists in other countries (Nair et al., 2020; Olivia et al., 2020). The aforementioned outcomes could be partially contributed to the extensive national and international guidance against the spread of COVID-19 and partially due to the fact that the participants have relied on reputable online resources for information related to protective measures in the workplace. In the same context, the vast majority of the participants took health and safety precautions after announcing the incidence of COVID-19 in Jordan as per WHO guidelines (WHO, 2020).

SARS-CoV-2 is capable of aerosol transmission, leading to air-puffing tonometers being considered a potential source of aerosol formation (Anderson et al., 2020; Lai et al., 2020). Younger ophthalmologists were more aware of the role of air-puffing tonometers in aerosol transmission. This could be attributed to the late introduction of air-puffing tonometers to Jordan which exposed the younger generation to these tonometers during their residency training. In light of this, it is advocated for ophthalmologists to switch to contact tonometry while using disposable tips (Lai et al., 2020). Meanwhile, most ophthalmologists agreed to the possibility of installing shields in slit lamps to reduce the probability of infection through air droplets which is in agreement with available literature (Lai et al., 2020).

4.1 Limitations

Although the sample investigated in this study

was statistically representative of ophthalmologists' population in Jordan; the results of this study relied on the willingness of practitioners to respond to an online survey and may not necessarily represent the knowledge and awareness of all practitioners (Bhagavathula et al., 2020). Another limitation to this study is the role of prior knowledge of other epidemics in the perception of practitioners (Piltch-Loeb et al., 2020; Vinck et al., 2019).

4.2 Conclusions

Despite the high level of knowledge about COVID-19 among Jordanian ophthalmologists, this study highlighted the need for ophthalmologists in Jordan to actively seek advice and recommendations about ophthalmic practices and COVID-19. Ophthalmologists need to take all necessary precautions in the workplace despite the limited evidence for an ocular route of SARS-CoV-2 infection.

Conflict of interests:

The authors declare that there is no conflict of interest.

Contribution of authors:

YG: Conceptualization-Lead, Resources-Equal, Validation-Equal, Writing-original draft-Equal, Writing-review & editing-Lead, Reading and approving the final draft-Lead.

EA: Conceptualization-Supporting, Resources-Equal, Validation-Equal, Writing-original draft-Equal, Writing-review & editing-Supporting, Reading and approving the final draft-Supporting.

Acknowledgments

This study was approved by the Deanship of Scientific Research, Al-Ahliyya Amman University.

References

- Adams, J. G., & Walls, R. M. (2020). Supporting the Health Care Workforce During the COVID-19 Global Epidemic. *JAMA*, 323(15), 1439–1440.
- Adhikari, S. P., Meng, S., Wu, Y. J., Mao, Y. P., Ye, R. X., Wang, Q. Z., Sun, C., Sylvia, S., Rozelle, S., Raat, H., & Zhou, H. (2020). Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infectious diseases of poverty*, 9(1), 1–12.
- Anderson, E. L., Turnham, P., Griffin, J. R., & Clarke, C. C. (2020). Consideration of the Aerosol Transmission for COVID-19 and Public Health. *Risk analysis: an official publication of the Society for Risk Analysis*, 40(5), 902–907.
- Bhagavathula, A. S., Aldhaleei, W. A., Rahmani,

- J., Mahabadi, M. A., & Bandari, D. K. (2020). Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study. *JMIR public health and surveillance*, 6(2), 1–9.
- Castagnoli, R., Votto, M., Licari, A., Brambilla, I., Bruno, R., Perlini, S., Rovida, F., Baldanti, F., & Marseglia, G. L. (2020). Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection in Children and Adolescents: A Systematic Review. *JAMA pediatrics*, 174(9), 882–889.
- Center of Disease Control. Symptoms of Coronavirus (COVID-19) [Internet]. Vol. 2019. (2020). p. 316475. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-coronaviruses> (Accessed November 23, 2020).
- Chen, T. M., Rui, J., Wang, Q. P., Zhao, Z. Y., Cui, J. A., & Yin, L. (2020). A mathematical model for simulating the phase-based transmissibility of a novel coronavirus. *Infectious diseases of poverty*, 9(1), 1–8.
- Gorman A. (2020). COVID-19 symptoms. *New Sci*, 246(3280),56.
- Karasneh R, Al-Azzam S, Muflih S, Soudah O, Hawamdeh S, Khader Y. Media's effect on shaping knowledge, awareness risk perceptions and communication practices of pandemic COVID-19 among pharmacists. *Res Social Adm Pharm*. 2021 Jan;17(1):1897-1902.
- Khader, Y., Al Nsour, M., Al-Batayneh, O. B., Saadeh, R., Bashier, H., Alfaqih, M., Al-Azzam, S., & AlShurman, B. A. (2020). Dentists' Awareness, Perception, and Attitude Regarding COVID-19 and Infection Control: Cross-Sectional Study Among Jordanian Dentists. *JMIR public health and surveillance*, 6(2), 1–7.
- Lai, C. C., Shih, T. P., Ko, W. C., Tang, H. J., & Hsueh, P. R. (2020). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *International journal of antimicrobial agents*, 55(3), 1–9.
- Lim, L. W., Yip, L. W., Tay, H. W., Ang, X. L., Lee, L. K., Chin, C. F., & Yong, V. (2020). Sustainable practice of ophthalmology during COVID-19: challenges and solutions. *Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie*, 258(7), 1427–1436.
- Nair, A. G., Gandhi, R. A., & Natarajan, S. (2020). Effect of COVID-19 related lockdown on ophthalmic practice and patient care in India: Results of a survey. *Indian journal of ophthalmology*, 68(5), 725–730.
- Olivia Li, J. P., Shantha, J., Wong, T. Y., Wong, E. Y., Mehta, J., Lin, H., Lin, X., Strouthidis, N. G., Park, K. H., Fung, A. T., McLeod, S. D., Busin, M., Parke, D. W., 2nd, Holland, G. N., Chodosh, J., Yeh, S., & Ting, D. (2020). Preparedness among Ophthalmologists: During and Beyond the COVID-19 Pandemic. *Ophthalmology*, 127(5), 569–572.
- Piltch-Loeb, R., Zikmund-Fisher, B. J., Shaffer, V. A., Scherer, L. D., Knaus, M., Fagerlin, A., Abramson, D. M., & Scherer, A. M. (2019). Cross-Sectional Psychological and Demographic Associations of Zika Knowledge and Conspiracy Beliefs Before and After Local Zika Transmission. *Risk analysis: an official publication of the Society for Risk Analysis*, 39(12), 2683–2693.
- Price A.D. P., Cui Y., Liao L., Xiao W., Yu X., Wang H., Zhao M., Wang Q., Chu S., & Chu L. [Internet] (2020). Is the fit of N95 facial masks effected by disinfection? A study of heat and UV disinfection methods using the OSHA protocol fit test. Available from: <https://www.medrxiv.org/content/10.1101/2020.04.14.20062810v1.article-info> (Accessed November 20, 2020).
- Romano, M. R., Montericchio, A., Montalbano, C., Raimondi, R., Allegrini, D., Ricciardelli, G., Angi, M., Pagano, L., & Romano, V. (2020). Facing COVID-19 in Ophthalmology Department. *Current eye research*, 45(6), 653–658.
- Rothan, H. A., & Byrareddy, S. N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *Journal of autoimmunity*, 109, 1–4.
- Vinck P., Pham P.N., Bindu K.K., Bedford J., & Nilles E.J. (2019). Institutional trust and misinformation in the response to the 2018–19 Ebola outbreak in North Kivu, DR Congo: a population-based survey. *Lancet Infect Dis*, 19(5),529-536.
- Wang, L., Wang, Y., Ye, D., & Liu, Q. (2020). Review of the 2019 novel coronavirus (SARS-CoV-2) based on current evidence. *International journal of antimicrobial agents*, 55(6), 1–7.
- WHO. WHO Situation reports - Coronavirus disease 2019 [Internet]. (2020). Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports> (Accessed November 23, 2020).
- Wilcox S. R. (2020). Management of respiratory failure due to covid-19. *British Medical Journal*, 369, suppl 1786, 1–2.
- Wong, S. H., Lui, R. N., & Sung, J. J. (2020). Covid-19 and the digestive system. *Journal of gastroenterology and hepatology*, 35(5), 744–748.

Citing the article:

Gammoh, Y. and Alkhader, E. (2022). Knowledge, Awareness and Perceptions of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Disease among Ophthalmologists in Jordan. *Al-Balqa Journal for Health and Applied Sciences*. 1 (1), 16- 20.