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# Evaluation of Turkish ophthalmologists awareness about novel coronavirus 19

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## Abstract

**Purpose:** To understand the objective and subjective awareness of ophthalmologists about novel coronavirus (nCov)-19 pandemic, the virus, the usage habits of Personal Protective Equipment (PPE), and sanitary products, also to measure their self-confidence during the pandemic.

**Methods:** An anonymous, self-administered survey was emailed to Turkish ophthalmologists. It consisted of 4 parts to collect data about demography, the knowledge of nCov-19, the usage of PPE, and sanitation products. Relying on the answers to the survey, two groups were conducted as “well-informed” and “poorly-informed.” The volunteers were also divided into those who use PPE correctly and those who do not. The statistical evaluation, according to the characteristics of the participants, such as risk statements, workplaces, pandemic assignments, conducted subgroups, and age groups, was done.

**Results:** Three-hundred and sixty-five ophthalmologists completed the survey. Three hundred ten (85%) volunteers considered themselves at high risk, 209 (57%) were confident about taking all precautions. Only 200 (54.8%) participants declared to have enough knowledge about ocular involvement, only 88 (24.1%) of them felt confident enough at daily practice. Especially who had pandemic assignment was the most pessimist. Younger ophthalmologists and the residents stated using insufficient PPE. Two hundred twenty-nine (62.7%) volunteers were well-informed and 245 (67.3%) of them use PPE correctly. Most of the participants (166, 45.4%) did not have sufficient information about the sanitation agents.

**Conclusion:** Ophthalmologists should be careful during daily practice due to the intimate nature of the examination. Most of the participants declared themselves at high risk, especially who had a pandemic assignment. Particularly, younger volunteers were not confident about taking enough precautions. The knowledge about the virus, PPE, and sanitation products was insufficient.

**Keywords:** Awareness and knowledge; novel coronavirus 19; ophthalmologists; ophthalmology; pandemic; self-confidence.

In 2019, an outbreak of novel coronavirus (nCov 19) affected the whole world with a pandemic. As so far, it is known to be a highly contagious disease with severe respiratory symptoms such as fever, dyspnea, and cough.<sup>[1–3]</sup> After the

first description of the virus, there have been more than 7 billion cases reported by the World Health Organization (WHO) with a mortality rate of 2.2% all around the world.<sup>[1,4–6]</sup> Analyzes of the agent revealed a single-stranded RNA

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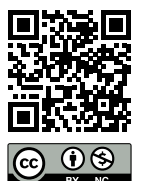
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virus with an envelope.<sup>[7]</sup> The common way of spread of the agent is through respiratory droplets.<sup>[1,6]</sup> Although this is a common way, some recent reports suggest contamination through aerosol contact directly to the conjunctiva and possible incubation as conjunctivitis.<sup>[9,10]</sup> Besides, ophthalmologic examination by its nature requires an intimate relation by the patient. Close slit-lamp examination has a potential risk for contamination.<sup>[6,11]</sup> There is growing knowledge for the contamination risk of the healthcare professionals through human-to-human transmission path. One of the earlier infected healthcare professionals was working as an ophthalmologist, who died due to the nCov 19.<sup>[6,12]</sup>

Ophthalmology practice has a unique character with high patient volume and overcrowded waiting rooms. Considering the importance of the pandemic, most of the ophthalmology societies recommended canceling all routine treatments and appointments except the urgent ones to reduce the transmission of the virus. In addition, physicians from different departments, including ophthalmologists, had to work in pandemic clinics, according to the increased need for healthcare professions.

Due to the transmission risk during the ophthalmologic examination and the possibility of the viral colonization of tear and ocular surface, proper use of Personal Protective Equipment (PPE) is of great importance. There are many various kinds of equipment, including shields, masks, goggles, and gloves.<sup>[13]</sup> WHO and the American Academy of Ophthalmology (AAO) recommend PPE for preventing both the patients and the ophthalmologists.<sup>[14]</sup> Turkish Ministry of Health also published a national guide for PPE use.<sup>[15]</sup> In addition, the use of sanitary products for reusable equipment such as lenses and tonometers is also important in ophthalmological practice.<sup>[13,14]</sup>

Clinicians also should be aware of the ophthalmological side effects of some controversial drugs such as chloroquine (CQ) and hydroxychloroquine (HCQ) that were prescribed during the pandemic.<sup>[16–18]</sup>

Due to all the enormous risks of contamination and the crucial nature of this pandemic, it is important to catch up-to-date information about all algorithms related to the pandemic.

Herein, it was aimed to evaluate the nCov 19 pandemic awareness and self-confidence of Turkish ophthalmologists about the virus itself, the use habits of PPE, and sanitary products.

## Materials and Methods

The study was performed with adherence to the Helsinki

Declaration and was conducted with the approval of the Institutional Review Board and The Ministry of Health. An email invitation which was valid through March 23–April 23, 2020, was sent to all Turkish Ophthalmological Association members to complete a self-administered and anonymous survey provided by Google-Forms. The aimed population was consisted of 4200 ophthalmologists.

The survey had four parts and started with an introduction part consisting of an explanation and an approval of admission. The design of the questions was forced choices and scales (1–5 degree). These four survey parts aimed to collect demographical data (part 1); scaled data about ophthalmologists' self-confidence and trust to their knowledge during the pandemic (part 2); the knowledge about nCov 19's transmission ways, ocular involvement, and thoughts about follow-up period after CQ use (part 3); the use of PPE and the sanitation products (part 4), respectively. A pilot test was performed for the study.

Due to the data received from part 3, participants were divided into two groups as "well-informed" and "poorly informed." Volunteers who answered 6 or more of 7 questions as true according to the AAO recommendations were defined as "well-informed."<sup>[14,15]</sup>

Due to the data received from part 4, which was about the appropriate use of the PPE according to the AAO and The Ministry of Health guidelines, the volunteers were divided into two groups who performed correct PPE use or not. As per the recommendations of AAO and Ministry of Health, the usage of mask for patient, surgical mask for examiner, and visors or goggles all together, considered as the right precautions for avoiding transmission.

To achieve the confident interval of 95% and a marginal error of 5%, the minimum sample size was calculated as 357.<sup>[19]</sup> The obtained data were evaluated statistically, according to the characteristics of the participants, such as risk statements, workplaces, pandemic assignments, conducted subgroups, and age groups.

IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. was used in the statistical analysis. The suitability of numerical variables to normal distribution was examined by Kolmogorov–Smirnov ( $n \geq 50$ ) test. Numerical variables are given as mean and standard deviation and median (min-max). Categorical variables were given as frequencies and percentages. Categorical variables were compared using the Chi-square test. Comparisons between continuous variables were performed by Mann–Whitney U test (skewed variables). To examine relationship between numeric variables, Spearman correlation analysis was per-

formed. The significance level was accepted as 0.05 for all hypotheses.

## Results

Out of approximately 4200 candidates, a total of 365 responded by the collection date of April 23, 2020 (significant with a  $\pm 5\%$  sampling error).

According to part 1 of the survey, the mean age was  $40.5 \pm 10.4$  (ranging 24–74) with a 0.94 female to male ratio (48.5% of the volunteers were female and 51.5% were male). The distribution of the participants according to their professional experience and the institutions was reported in Figures 1 and 2.

As stated by part 2, a total of 310 (85%) of the volunteers considered themselves as at high risk who scored 4 or 5 for the risk evaluation scale (1–5 degree), 209 (57.2%) volunteers were confident about taking all the precautions, especially PPE use, and 301 (82.5%) of them considered themselves competent about the appropriate use of PPE. Only 200 (54.8%) participants reflected themselves to have knowledge about ocular involvement of the nCov 19 and barely 88 (24.1%) of the participants considered themselves confident enough during daily practice. There was no statistically significant difference in terms of self-confidence during daily practice between subgroups except pandemic assignment ( $p=0.021$ ). Volunteers who had confidence about taking all precautions tend to be older ( $p=0.013$ ).

Part 3 results were summarized in Table 1. The percentage of the well-informed volunteers was 62.7% (229).

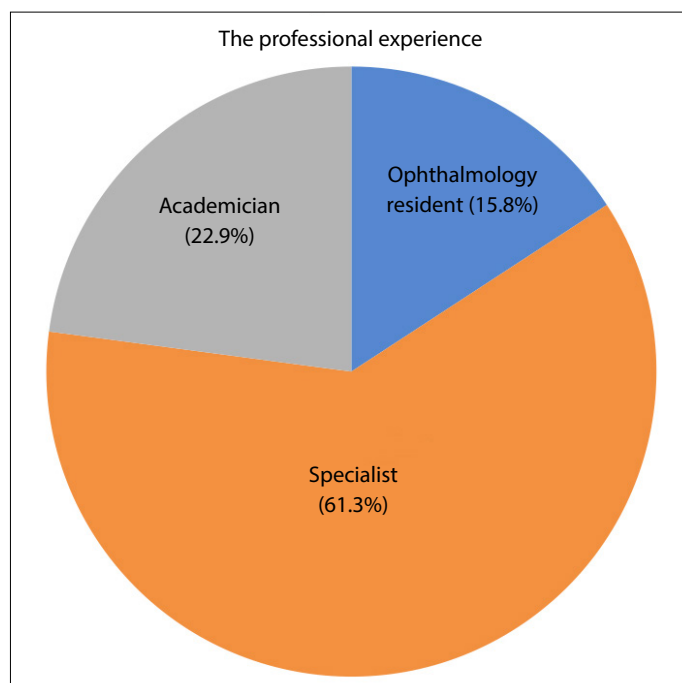
According to the analysis of part, 4245 (67.3%) of the participants seemed to have the knowledge of PPE use (Table 2).

The most common agents used for the sanitation of the reusable ophthalmic instruments were declared as hydrogen peroxide ( $n=132$ ; 36.1%) and glutaraldehyde ( $n=86$ ; 23.5%). The majority of the participants stated themselves not to have sufficient information about the sanitation agents ( $n=166$ ; 45.4%).

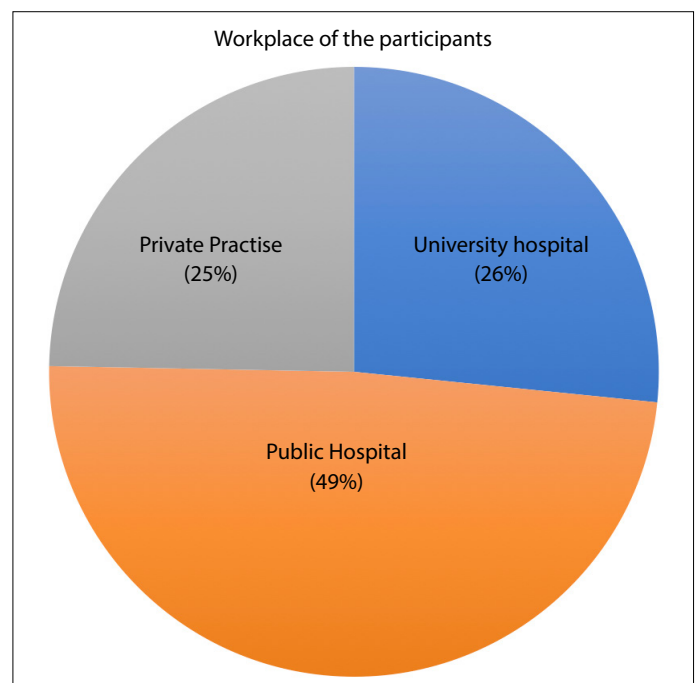
During pandemic, 89.7% ( $n=327$ ) of the participants canceled or postponed all elective cases, stopped all examinations except the urgent ones. Furthermore, nearly half of the participants were assigned in the pandemic care units ( $n=198$ ; 54.2%).

## Discussion

Ophthalmology, with its risky nature for transmission during a pandemic, requires great attention and catching up the recent knowledge is essential. To the best of our knowledge, the current study is the first report focused on the ophthalmologists, which evaluates the subjective and objective knowledge of the nCov 19 for ocular involvement, the proper use of PPE, and the self-confidence in the literature altogether. The present study has achieved a confidence interval of 95% with 365 participants.



**Fig. 1.** The distribution of the participants according to their professional experiences.



**Fig. 2.** The health institutions where the participants work.

**Table 1.** Participants’ responses to the propositions about the disease

	True (%)	False (%)	Not known (%)
nCov 19 could be a conjunctivitis agent	350 (95.8)	6 (1.6)	9 (2.4)
Alcohol-based sanitizers are enough for hand hygiene	283 (77.5)	57 (15.6)	25 (6.8)
Agent could transmit through direct contact to the eye	335 (91.7)	12 (3.2)	18 (4.9)
Droplet to the eye is an important way of transmission	315 (86.3)	18 (4.9)	32 (8.7)
Virus could be positive in the tear of infected patients without any signs of conjunctivitis	277 (75.8)	27 (7.3)	61 (16.7)
Before short period use of HQ and/or CQ, patients require an ophthalmologic examination	66 (18.0)	282 (77.2)	17 (4.6)
After a short period use of HQ and/or CQ, patients require an ophthalmologic examination	99 (27.1)	246 (67.3)	20 (5.4)

nCoV: Novel coronavirus; CQ: Chloroquine.

**Table 2.** The data about the use of PPE. Second column demonstrates the PPE recommendation knowledge of the participants. Third column shows the PPE that is being used

	Recommended PPE knowledge (%)	Current usage of PPE (%)
Mask for patient	255 (69.8)	294 (80.5)
Mask for examiner (surgical)	203 (55.6)	266 (72.8)
Mask for examiner (Ffp2, Ffp3, N95)	221 (60.5)	185 (50.6)
Face visors	237 (64.9)	102 (27.9)
Biomicroscope visors	253 (69.3)	292 (80.0)
Goggles	245 (67.1)	152 (41.6)
Gloves	250 (68.4)	200 (54.7)

PPE: Personal protective equipment.

There are distinct reports that stated different rates of ocular involvement of the virus. According to these limited literature data, there were 3–5% RT-PCR positivity of tear samples in nCov 19 positive patients and only 1–32% of the tear sample positive ones had the signs of conjunctivitis.<sup>[9,10,20]</sup> Ocular surface, cornea, and conjunctiva may be a colonization point and transmission may be possible with the contact of ocular tissues. There are recent reports declare the key receptor of the virus called ACE-2 exists on the ocular tissues such as conjunctiva or retina.<sup>[21]</sup> Thus, ophthalmological examination should be performed with required precautions.<sup>[20,22]</sup> In the present study, most of the participants, without any exception in subgroups, considered themselves at high risk for the transmission of the disease during routine clinic practice. Minocha et al.<sup>[11]</sup> reported that 80% of health workers who are working at the ophthalmology field considered themselves at high risk. This ratio was 85% in the present study among the ophthalmologists and it is consistent with the mentioned study. A study from Nigeria among 66 ophthalmologist participants declares that the ophthalmologists were not confident enough during examination at pandemic time.<sup>[23]</sup> This study also supports this article.

Worldwide, some of ophthalmologists were assigned in pandemic clinics due to the enormous patient burden. In the present study, it was observed that 54.2% of the participants had this kind of assignment during the pandemic. These participants – working in pandemic care units – more likely considered themselves at high risk.

The importance of the PPE has become vital in preventing disease transmission. Furthermore, it becomes crucial to comprehend the right use of PPE during daily ophthalmology practice to minimize the contamination risk.<sup>[24]</sup> There are several reports about the knowledge and the proper use of PPE in the literature. A survey study focused on the Egyptian catheterization laboratories during a pandemic reported that only 63.6% of the study centers were well equipped for the PPE.<sup>[25]</sup> An English pharmacist survey demonstrated that %34 of the participants were unable to source continuous supplies of PPE.<sup>[26]</sup> The mentioned percentage tends to be worse in developing countries. It was shown that 64% of the healthcare workers were financing their own PPE due to lack at their workplaces.<sup>[27]</sup> In the present study, only 57.2% of the volunteers were confident about taking all the precautions, especially PPE.

To minimize the risk of contamination, not only easy access but also the proper use of PPE is also important. A large survey-based study stated that there is a lack of training about the use of PPE and insufficient supply of PPE are both important.<sup>[23]</sup> Furthermore, the knowledge about the appropriate usage of PPE is as vital as the accessibility of the equipment since the inappropriate use is worthless even if the equipment is valid.<sup>[28]</sup> For example, a study from Nepal stated only 59% of the participants used PPE properly.<sup>[29]</sup> In the present study, although 82.5% of the population considered themselves competent about the appropriate use of PPE, only 67.3% of them seemed to have knowledge about PPE usage. In addition, older participants presumed to be sure about the appropriate usage of the PPE.

Clinicians should be aware of the general information about the virus itself, transmission routes, and prevention

and treatment protocols during the pandemic. Sufficient knowledge toward nCov 19 pandemic was reported to be 56.5–93.2% in different studies.<sup>[29,30]</sup> The percentage of the well-informed volunteers was 62.7% at the current study. In a recent study, the awareness rate of conjunctival transmission among ophthalmologists was reported as 82.6%.<sup>[31]</sup> The ratio of the same information was 91% in the present study. The question which “not known” was the most chosen as answer is “a patient who does not have any conjunctivitis may be positive for virus on tear.”

The question with the highest rate of the wrong answer was about CQ and HCQ treatment. As known, except the antiviral agents, CQ and HCQ were proposed for treatment options of the nCov 19.<sup>[16,32]</sup> Although there was not a complete clinical trial for them with lots of conflicts, many treatment guidelines adopted at the time of the survey were conducted.<sup>[17,18,33,34]</sup> The major ocular side effect of CQ and HCQ is retinal toxicity which is related to the dosage and the duration of use.<sup>[16]</sup> With the recommendations of AAO and The Royal College of Ophthalmologists, the use of CQ and HCQ should be handled carefully for patients with major risk factors such as other retinal diseases, long period of use, and high dose of use.<sup>[35]</sup> Due to current recommendations, if a patient does not have a major risk factor, a short-term use of these drugs does not require ophthalmologic examination before and after use. In the treatment of rheumatologic disorders, the average daily dose of <6.5 mg/kg and even with a cumulative therapy dose of 1000 g the risk of retinal toxicity is 1%.<sup>[35,36]</sup> Considering that even with the highest dose of these drugs for virus treatment is not more than 5000 mg, in which the risk of retinal toxicity seems to be very low. Moreover, ophthalmologic examination before and after the drug use poses a potential risk for virus contamination and causes increasing numbers of ophthalmologic visits. In a recent study, the poor knowledge regarding nCov 19 was about the risk of irreversible maculopathy at the higher doses of HCQ/CQ for short period usage (30.8% incorrect responses).<sup>[29]</sup> Herein, 32.6% of the volunteers declared that a patient with short-term treatment with HCQ/CQ should have an ophthalmologic examination after completing the treatment due to the risk of maculopathy, going along with the mentioned report.

There is also a special risk of human-to-human transmission through reusable ophthalmologic equipment such as tonometer tips and lenses.<sup>[13,14]</sup> Recent studies reported a long potential survival time on surfaces (plastic 16 h, cardboard 9 h) for the virus.<sup>[37]</sup> Therefore, appropriate sanitation should be performed to avoid this way of transmission. Hand hygiene is also crucial and WHO recommends the

use of alcohol-based solutions.<sup>[38]</sup> The majority of the participants were aware of the alcohol-based hand sanitizers, but when dealing with reusable ophthalmologic equipment, they were not confident enough. A total of 45% of the participants declared a lack of knowledge about the products for the sanitation of reusable ophthalmologic equipment. There is no specific study exploring each product for the proper and effective use of sanitation agents. In a Jordanian study, most of the doctors declared to clean the reusable tools frequently with sodium hypochlorite or alcohol-based products.<sup>[31]</sup> It seems that current study participants were not well informed about this issue.

Although the representation of the participants is seen within the confidence interval, the main limitation of the study is the number of participants. Again, studies with more participants that include a wider variety of questions will be more effective.

## Conclusion

Due to the nature of ophthalmological examination that requires close contact, physicians working in the field of ophthalmology feel themselves at high risk during pandemic. The knowledge and awareness about the disease, appropriate usage of PPE, sanitation, and management protocols are not recognized enough. Ophthalmologists should follow the current literature more closely. Necessary regulations, training, and equipment should be provided especially for young physicians and groups with pandemic assignments to feel more confident.

**Ethics Committee Approval:** This study was approved by Ege University Faculty of Medicine Ethics Committee (date 15.05.2020; number 20-5T/47).

**Peer-review:** Externally peer-reviewed.

**Authorship Contributions:** Concept: O.F., O.B.S., G.H., M.P.; Design: O.B.S., M.P.; Supervision: M.P.; Resource: O.F.; Materials: O.F.; Data Collection and/or Processing: O.F., O.B.S., G.H.; Analysis and/or Interpretation: O.F., G.H.; Literature Search: O.F., O.B.S., G.H., M.P.; Writing: O.F., O.B.S.; Critical Reviews: O.F., O.B.S., G.H., M.P.

**Conflict of Interest:** None declared.

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