The influence on the psychology and ocular surface of ophthalmologists and ophthalmic nurses in Wuhan, China, during the coronavirus disease 2019 (COVID-19) pandemic is not yet fully understood.

To characterize mental state and ocular surface state of ophthalmologists and ophthalmic nurses in Wuhan, China, and similar areas during the COVID-19 outbreak.

This survey study assessed ophthalmologists and ophthalmic nurses in Wuhan, China, and Jiangxi, China, a province approximately 300 km south of Wuhan. The Hospital Anxiety and Depression Scale, the Van Dream Anxiety Scale, and the Ocular Surface Disease Index were used to conduct questionnaire surveys via a messaging and social media app.

Mean scores from the Hospital Anxiety and Depression Scale (0-10 points), the Van Dream Anxiety Scale (0-100 points), and the Ocular Surface Disease Index (0-100 points).

Of 126 individuals, there were 42 ophthalmologists (33.3%) and 21 ophthalmic nurses (16.7%) from Wuhan and 42 ophthalmologists (33.3%) and 21 nurses (16.7%) from Jiangxi. The mean (SD) age of ophthalmologists was 36.1 (7.6) years in Wuhan and 41.2 (8.8) years in Jiangxi. For ophthalmic nurses, the mean (SD) age was 35.2 (7.4) years in Wuhan and 33.4 (7.9) years in Jiangxi. The response rate for ophthalmologists was 90.3% (84 of 93) and for nurses was 91.3% (42 of 46). The participation rate of ophthalmologists and nurses in Wuhan was 0.06% (42 of 70 000) and 0.07% (21 of 30 000), respectively; the participation rate in Jiangxi was 0.06% (42 of 70 000; 21 of 35 000) for both groups. In Wuhan, the mean (SD) Hospital Anxiety and Depression Scale (anxiety and depression were counted as separate scores), Van Dream Anxiety Scale, and the Ocular Surface Disease Index scores were 6.90 (2.30), 7.38 (2.19), and 24.52 (5.86), respectively, in ophthalmologists and 8.67 (3.04), 9.38 (2.64), and 43.90 (3.74), respectively, in ophthalmic nurses. In Jiangxi, these scores were 5.67 (2.89), 4.90 (3.15), 12.76 (7.27), and 38.79 (7.78), respectively, in ophthalmologists and 4.67 (3.20), 4.33 (3.23), 10.10 (7.62), and 41.52 (5.92), respectively, in ophthalmic nurses. The difference (95% CI) between the 2 regions for these scores in ophthalmologists was 2.48 (95% CI, 1.30-3.65), 11.76 (95% CI, 8.90-14.63), 5.12 (95% CI, 2.45-7.79), and 5.12 (95% CI, 2.47-7.77), respectively, in ophthalmic nurses was 4.16 (95% CI, 2.05-5.95), 5.05 (95% CI, 3.21-6.89), 11.38 (95% CI, 7.06-15.70), and −1.48 (95% CI, −5.41 to 2.25), respectively.

These findings suggest that ophthalmologists and ophthalmic nurses in Wuhan experienced more anxiety and depression and reported greater ocular surface abnormalities than counterparts outside of Wuhan, but the wide CIs preclude concluding confidently that there were differences.
Since December 2019, the Hubei Health Commission reported many patients with unexplained pneumonia, subsequently confirmed to be the novel coronavirus disease 2019 (COVID-19). COVID-19 is highly contagious. As of March 21, 2020, China has more than 82,000 cases of COVID-19, including 3387 medical staff, with similar trends now occurring throughout the rest of the world. Many health care workers are facing high-volume duty requirements, sleep deprivation, shortage of medical staff, shortage of COVID-19 testing, and shortage of personal protective equipment, which can contribute to placing these medical staff under physical and mental stress. In turn, these stresses can lead to increased psychological burden, emotional depression, and physical or mental fatigue. In addition, wearing goggles for long periods of time or irregular sleep or rest patterns also can contribute to the adverse health of staff, including to the ocular surface. To our knowledge, there is little research on the mental health and ocular surface health status of the frontline medical ophthalmic staff in Wuhan, China, prompting this investigation.

**Methods**

On February 10, 2020, we used the Hospital Anxiety and Depression Scale (HADS), the Van Dream Anxiety Scale (VDAS), and Ocular Surface Disease Index (OSDI) to conduct questionnaire survey via WeChat, a messaging and social media app. This study was carried out according to the Declaration of Helsinki, and the plan was approved by the ethics committee of the First Affiliated Hospital of Nanchang University. Ophthalmologists and ophthalmic nurses working in Wuhan, China (experimental group), and in Jiangxi, China (control group), were included and the scores of each questionnaire were collected. The ophthalmologists and ophthalmic nurses at each region were chosen randomly. All individuals signed written informed consent before participating in the investigation. Participants agreed in writing to participate in the study without any compensation. Mean (SD) scores for each group at each region were determined. Comparisons across regions included 95% CIs. All P values were 2-sided, and the significance threshold was less than .05. No adjustment to P values for multiple analyses was performed.

**Results**

Forty-two ophthalmologists and 21 ophthalmic nurses working in Wuhan and 42 ophthalmologists and 21 ophthalmic nurses working in Jiangxi were included in this study. The table shows characteristics of the 2 groups in each region; there was no significant difference in age and sex between groups. The response rate for ophthalmologists was 90.3% (84 of 93) and for nurses was 91.3% (42 of 46). The participation rate of ophthalmologists and ophthalmic nurses in Wuhan was 0.06% (42 of 70,000) and 0.07% (21 of 30,000), respectively, and 0.06% (42 of 70,000; 21 of 35,000) for ophthalmologists and ophthalmic nurses in Jiangxi. When compared with ophthalmologists in Jiangxi, the mean HADS, VDAS, and OSDI scores of ophthalmologists in Wuhan were higher (Figure 1A). Specifically, in Wuhan, the mean (SD) HADS (anxiety and depression were counted as separate scores), VDAS, and OSDI scores were 6.90 (2.30), 7.38 (2.19), 24.52 (5.86), and 43.90 (3.74), respectively, in ophthalmologists and 8.67 (3.04), 9.38 (2.64), 21.48 (6.15), and 40.05 (6.67), respectively, in ophthalmic nurses. In Jiangxi, the mean (SD) scores for the HADS, VDAS, and OSDI were 5.67 (2.89), 4.90 (3.15), 12.76 (7.27), and 38.79 (7.78), respectively, in ophthalmologists and 4.67 (3.20), 4.33 (3.23), 10.10 (7.62), and 41.52 (5.92), respectively, in ophthalmic nurses. The differences (95% CI) between the 2 regions for these scores in ophthalmologists were 2.48 (95% CI, 1.30-3.65), 11.76 (95% CI, 8.90-14.63), 5.12 (95% CI, 2.45-7.795), and 5.12 (95% CI, 2.47-7.77), respectively, and in ophthalmic nurses were 4.16 (95% CI, 2.05-5.95), 5.05 (95% CI, 3.21-6.89), 11.38 (95% CI, 7.06-15.70), and −1.47 (95% CI, −5.41 to 2.246).

Symptoms of anxiety scores and depression scores were correlated. The correlation of symptoms of anxiety and depression scores of ophthalmologists working in Wuhan was $r^2 = 0.46$ (95% CI, 0.47-0.82; $P < .001$) (Figure 2A). Similar findings were noted among ophthalmic nurses working in Wuhan (Figure 2B), with a positive correlation of $r^2 = 0.58$ (95% CI, 0.24-0.80; $P < .001$) (Figure 1B).

**Discussion**

These results support that the symptoms of anxiety and depression reported by ophthalmologists or ophthalmic nurses working in Wuhan using these validated surveys may be greater than in other regions, eg, Jiangxi, where the number of affected individuals with COVID-19 was not as high, although the wide CIs given the few number of participants evaluated suggest relatively large uncertainty regarding the precise magnitude of the results. These findings should be considered when reflecting on the mental health of medical staff in these types of pandemics. Medical staff may be prone to occupational exposures, and long-term stressful environments together with long working hours and heavy workloads could put pressure on the mental health of medical staff. Other studies have shown that the long-term stressful working environment can...
Table. Characteristics of Study Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sex, No. (%)</th>
<th>Education background, No. (%)</th>
<th>Income per mo, No. (%)</th>
<th>Marriage, No. (%)</th>
<th>Sleep duration, mean (SD), h</th>
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<tr>
<td></td>
<td>Age, mean (SD), y</td>
<td>Senior staff, mean (SD), y</td>
<td>Master’s degree</td>
<td>&lt;¥2000 (US $281)</td>
<td>¥2000-¥6000 (US $281-$843)</td>
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<td></td>
<td>Male</td>
<td>Female</td>
<td>Junior college</td>
<td>Undergraduate</td>
<td></td>
</tr>
<tr>
<td>Ophthalmologists (n = 84)</td>
<td>36.1</td>
<td>(7.6)</td>
<td>25 (59.5)</td>
<td>17 (40.5)</td>
<td>2 (4.8)</td>
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<tr>
<td>Wuhan (n = 42)</td>
<td>41.2</td>
<td>(8.8)</td>
<td>27 (64.3)</td>
<td>15 (35.7)</td>
<td>2 (4.8)</td>
</tr>
<tr>
<td>Jiangxi (n = 42)</td>
<td>35.2</td>
<td>(7.4)</td>
<td>4 (19.0)</td>
<td>17 (81.0)</td>
<td>6 (28.6)</td>
</tr>
<tr>
<td>Ophthalmic nurses (n = 42)</td>
<td>33.4</td>
<td>(7.9)</td>
<td>21 (100.0)</td>
<td>12.4 (8.8)</td>
<td>4 (19.0)</td>
</tr>
</tbody>
</table>

Figure 1. HADS, VDAS, and OSDI Scores Analysis

HADS indicates Hospital Anxiety and Depression Scale; OSDI, Ocular Surface Disease Index; VDAS, Van Dream Anxiety Scale.

A There was significant difference between the scores of the 2 groups.

Figure 2. Correlation of Anxiety and Depression Scores

HADS indicates Hospital Anxiety and Depression Scale; OSDI, Ocular Surface Disease Index; VDAS, Van Dream Anxiety Scale.

A There was significant difference between the scores of the 2 groups.
make the mental health problems of medical staff much more prominent. These findings also should be considered because the mental health of medical staff could affect the quality of medical services and patient safety.

This study also found that ophthalmologists in Wuhan reported higher OSDI scores, which suggested that their ocular surface conditions were abnormal. The higher the OSDI, the more severe the report of subjective feeling of dry eye, and a higher proportion of dry eye–related symptoms such as dryness, foreign body sensation, and burning. This study cannot determine if these symptoms resulted from wearing goggles as part of viral precautions or due to lack of high-quality sleep or other reasons. It also remains unknown if the reported symptoms of anxiety or depression may have led to greater perception of dry eye symptoms or a greater likelihood to rate their symptoms more severely.

This study design cannot determine why these results were reported. The findings do not preclude suggesting that medical staff adjust schedules, actively address adverse emotions, and pay attention to the mental health of ophthalmologists, ophthalmic nurses, and other health care professionals in these circumstances, while protecting the ocular surface when using personal protective equipment.

**Limitations**

A limitation of the present study is that the sample size of ophthalmologists and ophthalmic nurses included was not large enough.

**Conclusions**

These findings suggest that ophthalmologists and ophthalmic nurses in Wuhan experienced more anxiety and depression and reported greater ocular surface abnormalities than similar individuals outside of Wuhan, but the wide CIs preclude concluding confidently that there were differences.