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Comparison of the anxiety level between the medical staff and the public during the early phase of the coronavirus disease 2019 pandemic

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Abstract

Background: A sudden outbreak of the coronavirus disease 2019 (COVID-19) started in December 2019 in Wuhan, China. Up-to-date, there have been limited studies examining the anxiety status of Chinese individuals in the early phase of the pandemic period (January 30, 2020–February 15, 2020). This survey aimed to compare the level of anxiety of the medical staff with that of the public and to provide a theoretical basis for developing an effective psychological intervention.

Method: Questionnaires were sent on the Internet (http://www.wjx.cn) during this period. The anxiety levels of Chinese people were investigated using the Self-Rating Anxiety Scale (SAS), and the demographic data were collected simultaneously.

Results: A total of 1110 participants were enrolled in this study, with an effective response rate of 100%. A total of 482 respondents were medical staff (43.4%), while 628 were members of the general public (56.6%). The medical staff itself had a higher SAS score than the general public (48.36±13.40 *vs*. 45.74±11.79, $P < 0.01$), while the medical staff in Wuhan were more anxious than the public in Wuhan with a higher SAS score (54.17±14.08 *vs*. 48.53±11.92, $P < 0.01$).

Conclusion: The COVID-19 pandemic has had a significant impact on the anxiety levels of the medical staff and the public, with the medical personnel showing a higher anxiety level than the public, especially female medical staff in Wuhan. Therefore, urgent intervention programs to reduce anxiety should be implemented.

Keywords: Anxiety, COVID-19, Healthcare workers, Mental health, Self-Rating Anxiety Scale

Introduction

A novel coronavirus disease, referred to as coronavirus disease 2019 (COVID-19) by the World Health Organization (WHO), broke out in Wuhan, China at the end of 2019 (https://www.who.int/health-topics/coronavirus) and spread rapidly worldwide, causing a large global outbreak and becoming a major health concern.[1,2] In March 2020, the WHO declared COVID-19 a global pandemic and public health emergency.[2] The mortality rate of COVID-19 in China increased to 6% as shown in an early report.[3] Several mental problems have emerged due to the pandemic and its reverberations; the prevalence of anxiety, distress, fear of the disease, loneliness, posttraumatic stress symptoms, depression, anxiety, and suicidality was higher in the general population as a consequence of COVID-19.[4] During the period of the COVID-19 pandemic, several studies have been conducted to examine the mental health of the general public.[5,6]

To limit the spread of COVID-19, several measures have been implemented in many countries, such as city lockdown and the introduction of social distancing in public places.[6] However, due to the nature of their job, the healthcare staff were more exposed to infection; hence, the abovementioned measures may not be applicable for them.[6] The ongoing COVID-19 pandemic is placing a huge burden on the healthcare systems, especially in acute care departments.[7] As the workload suddenly increased for healthcare staff within the hospital, these professionals faced psychological pressure, ultimately leading to stress, anxiety, and mental fatigue.[6]

Many studies have focused on examining the levels of stress, anxiety, and depression of the general population. Previous studies demonstrated that the healthcare staff showed fear and anxiety in the early period of the severe acute respiratory syndrome coronavirus (SARS-CoV) 2003 and Middle East respiratory syndrome (MERS) pandemic.[8,9] However, few studies have focused on examining the mental health of medical staff in the early stage of the pandemic particularly during the city-wide lockdown period. From January 23 to April 8, 2020, Wuhan was placed under lockdown. Although it was the first city to undergo lockdown worldwide during the pandemic, the anxiety status of all medical staff in this city was never reported. Hence, this survey was launched to determine the anxiety levels of the medical staff during the early phase of the pandemic. To improve the psychological healthcare system further, a reliable investigation of the anxiety levels of the medical staff and the public is a prerequisite. Hence, in this study, a questionnaire was

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administered to the medical staff and the public in the early phase of the pandemic to analyze the differences in the level of anxiety among Chinese people during this period.

Methodology

Study design

This was a cross-sectional study. The questionnaire used in this study was divided into 2 parts. The first part included questions that determine the patients' demographic characteristics: sex, age, location, marital status, presence or absence of children, isolation method (in the group of medical staff), and education level. The second part included questions that determine the anxiety level of the respondents assessed using the Self-Rating Anxiety Scale (SAS) questionnaire. The population selection and definition of the variables in the SAS questionnaire are provided in the section "Sample characteristics."

Data collection

The questionnaire was used to obtain the demographic characteristics (sex, location, marital status, with/without children, and education level) and SAS scores of all study participants.

The SAS questionnaire, developed by Zung, is an initial psychometric evaluation of measures to assess for presence of variable anxiety symptoms.[10,11] It primarily assesses for presence of somatic symptoms. The respondent indicated how often he or she experienced each symptom using the following 4-point Likert scale: "none or a little of the time" (coded as 1), "some of the time" (coded as 2), "a good part of the time" (coded as 3), and "most or all of the time" (coded as 4). Items 5, 9, 13, 17, and 19 were reverse scored, and the total SAS scores ranged from 0 to 80.[10] After adjustment, the final scores were obtained by multiplying the original scores by 1.25. Scores of ≥50 indicated "psychological anxiety," 50–59 indicated mild anxiety, 60–69 indicated moderate anxiety, and ≥70 indicated severe anxiety.[12] The anxiety levels of the medical staff and the public were assessed, and the factors that might influence the psychological outcomes were explored. Finally, a comparison was made between the 2 study groups.[13]

Patients' characteristics

This study was approved by the Zhongnan Hospital of the Wuhan University Medical Ethics Committee (registration number: 2020030-1). The data, collected with the permission of the respondents, were acquired by conducting a questionnaire survey (including the SAS scores and personal demographic information) and distributed to the public through the Internet (http://www.wjx.cn) between January 2020 and February 15, 2020 (viz., the early phase of the COVID-19 pandemic). The survey was conducted anonymously, and information confidentiality was ensured.

The sample size of the study was determined to a minimum of 313 participants in each group, with an important difference of 3, a power of 0.80, and a type I error of 0.05. Finally, 1110 participants were included, of whom 482 were medical staff and 628 were members of the general public.

Statistical analyses

The data were described as mean (SD) or median (Interquartile Range, [IQR]) for continuous variables and number (%) for categorical variables. The effects of demographic factors on SAS scores between the medical staff and the public were assessed using a two-sample t test. The chi-square test was used to compare the anxiety levels between the 2 groups. All statistical analyses were conducted using R 3.6.3, and a P value of <0.05 was considered significant.

Results

We received 1110 questionnaires (aged ≥18years), all of which were valid, with an effective response rate of 100%. A total of 482 respondents (43.4%) were medical staff, while 628 respondents (56.6%) were members of the general public. The respondents' personal characteristics are presented in Table 1. Most respondents (91.53%) were aged between 18 and 50 years, and the age distribution was balanced by age groups (<25years: 357 [32.16%]; 25–35 years: 311 [28.02%]; 35–50 years: 348 [31.35%]). More than half of the respondents were women (65.95%) with a bachelor's degree (51.62%). Of all participants, 22.88% had mild anxiety, 11.53% had moderate anxiety, and 5.14% had severe anxiety. The SAS score was higher in the Wuhan population than in the rest of the population in China. The occurrence of these factors was compared when evaluating the anxiety levels among all study participants. A SAS score of <50 indicated no anxiety, while a SAS score of ≥50 indicated the presence of anxiety. In the present study, location was a statistically significant factor ($P < 0.05$).

The Wuhan participants were much more anxious than the participants outside of Wuhan (Table 2; $P < 0.01$). When the anxiety status of participants from Hubei and the rest of China was compared, the results were also significant ($P < 0.01$). This finding indicated that people in Wuhan were more anxious than those living in other areas in China, and people in Hubei were much more anxious than those living in other areas in China. The anxiety scores of the medical staff and the public were compared. Of all the participants, the female medical staff showed higher levels of anxiety than the female members of the general public ($P < 0.01$; SAS score: 49.09±13.14). Married medical staff had a higher SAS score than the members of the general public ($P < 0.01$), irrespective of whether the medical staff had or did not have children. Interestingly, our finding showed that the medical staff with lower education level were less anxious than the members of the general public, but the medical staff with higher education level were more anxious. However, the medical staff with a doctorate degree or higher were less anxious than the members of the general public. Among all participants, those with a bachelor's degree or below had a higher SAS score (49.40±13.18 and 47.03±10.80). Meanwhile, the medical staff with a doctorate degree or higher obtained the highest SAS score (49.5±16.16). The medical staff who underwent isolation were more anxious than those who did not undergo isolation ($P < 0.01$). Overall, the medical staff were more anxious than the members of the public, with a higher SAS score ($P < 0.01$).

In general, patients aged <25years had the lowest SAS scores. Of the members of the public, the group aged 35–50 years had the highest SAS score (49.48±12.47). Of the medical staff, the group aged >50years obtained an SAS score (52.87±12.75) above the anxiety threshold level. In households with family members who developed COVID- 19, whether a medical personnel or not, the average SAS score exceeded the anxiety threshold level.

Table 3 shows the distribution of anxiety levels of all participants. In this table, only the location and profession data showed correlations with anxiety level. As demonstrated in Table 2, the closer to the center of this pandemic, the higher the level of anxiety, especially among the medical staff. During the questionnaire survey, if the participant was a medical staff member, he or she was asked whether he or she prefers another isolation method. Among the 482 medical personnel who responded, the answers of 87 personnel were excluded from this analysis as they chose "other

Table 1

Demographics and Characteristics of the Medical Staff and the Public

	Medical Staff (n=482)	The Public (n=628)	All Participants (n=1110)
Sex			
Male	149 (13.42%)	229 (20.63%)	378 (34.05%)
Female	333 (30%)	399 (35.95%)	732 (65.95%)
Age			
<25 years	44 (9.13%)	313 (49.84%)	357 (32.16%)
25–35 years	197 (40.87%)	114 (18.15%)	311 (28.02%)
35–50 years	199 (41.29%)	149 (23.73%)	348 (31.35%)
>50 years	42 (8.71%)	52 (8.28%)	94 (8.47%)
Location			
Wuhan	63 (13.07%)	135 (21.50%)	198 (17.84%)
Hubei, not incl. Wuhan	138 (28.63%)	209 (33.28%)	347 (31.26%)
China, not incl. Hubei	281 (58.30%)	284 (45.22%)	565 (50.90%)
Marital status			
Married	368 (76.35%)	507 (80.73%)	875 (78.83%)
Single	114 (23.65%)	121 (19.27%)	235 (21.17%)
Children			
Pregnant	7 (1.45%)	12 (1.91%)	19 (1.71%)
With	344 (71.37%)	450 (71.66%)	794 (71.53%)
Without	131 (27.18%)	166 (26.43%)	297 (26.76%)
Education			
Bachelor's degree or lower	71 (14.73%)	212 (33.76%)	283 (25.50%)
Bachelor's degree	300 (62.24%)	273 (43.47%)	573 (51.62%)
Master's degree	96 (19.92%)	108 (17.20%)	204 (18.38%)
Doctorate degree or higher	15 (3.11%)	35 (5.57%)	50 (4.50%)
Anxiety			
None	259 (53.73%)	412 (65.61%)	671 (60.45%)
Mild	127 (26.35%)	127 (20.22%)	254 (22.88%)
Moderate	62 (12.86%)	66 (10.51%)	128 (11.53%)
Severe	34 (7.05%)	23 (3.66%)	57 (5.14%)

Data are n(%).

isolation methods." Therefore, in our study, we received 395 effective responses, as shown in Table 3. Pregnant female medical staff were much more anxious than the other medical staff. However, owing to the limited number of participants, this result was not statistically significant. The medical staff who lived alone or outside were less anxious than the other medical staff with a lower SAS score (46.57±13.40). Anxiety level had no statistically significant relationship with sex, marital status, education level, or having or not having children.

Discussion

COVID-19 is a newly recognized illness caused by a novel coronavirus called the SARS-CoV-2. This disease has rapidly spread worldwide. As a disease with high infectivity, severe symptoms, and high mortality, COVID-19 has caused serious social anxiety. In this situation, the medical staff have been the first line of defense against the pandemic. Their responses have had a huge impact on the level of stress associated with this extremely serious public health emergency. The present study compared the anxiety levels between the medical staff and the public, and observed that the anxiety levels of the medical staff were significantly higher than those of the general public.

This study aimed to systematically investigate the levels anxiety among medical staff and the general public during the early stages of the pandemic. The study found that the medical staff had a significantly higher anxiety levels than the public when they encounter an unknown novel infectious disease. Among the respondents, people in Wuhan, the center of the pandemic, showed higher anxiety levels than the people in other places. In particular, the medical staff in Wuhan showed more severe anxiety. Therefore, the level of anxiety should be taken into account when developing interventions to control the pandemic.

The SAS was used to assess the anxiety levels. This instrument has demonstrated good reliability and validity in the Western and Chinese population.[14] The differences between the public and medical staff was analyzed, and results showed that the isolation method had a significant effect on the anxiety levels in all groups of people ($P = 0.008$). The people who underwent isolation showed higher anxiety levels than those who did not undergo isolation, which was observed among the medical staff. The anxiety levels among those who did not choose isolation and those who chose isolation between the 2 study groups were compared, and results showed a P value of <0.01. This finding yields the same conclusion that the medical staff who underwent isolation were more anxious than the other people ($P < 0.01$). The SAS scores of the participants with family members who developed COVID-19 were higher than those of the others, but these conclusions were not statistically significant owing to the limited number of participants. This finding indicates that families with patients, whether a medical staff or not, were more anxious (although lacking subjects), while those without patients were less anxious. According to previous studies on other infectious diseases, including SARS, Middle East respiratory syndrome coronavirus, and Ebola virus, many medical staff experienced severe emotional stress during the outbreak.[15] Several studies investigating the anxiety status inferred that the medical staff had a higher anxiety level during the SARS pandemic in 2003 than during their typical work day.[16,17] A previous study evaluating the

Table 2

SAS Score of the Medical Staff and the Public

	Medical Staff SAS Score (SD)	Public SAS Score (SD)	*t* Test Value	*P*
Sex				
Male	46.72 (13.88)	45.15 (11.90)	1.14	0.26
Female	49.09 (13.14)	46.08 (11.73)	3.24	<0.01*
Age				
<25 years	47.12 (12.03)	43.21 (10.71)	2.232	0.03*
25–35 years	48.50 (13.79)	46.97 (11.90)	0.9902	0.33
35–50 years	47.98 (14.09)	49.48 (12.47)	1.332	0.30
>50 years	52.87 (12.75)	45.67 (12.08)	0.009	3.37
Location				
Wuhan	54.17 (14.08)	48.53 (11.92)	2.75	<0.01
Hubei, not incl. Wuhan	50.30 (14.15)	45.22 (11.71)	3.50	<0.01
China, not incl. Hubei	46.10 (12.33)	44.80 (11.63)	1.39	0.20
Marital status				
Married	48.23 (13.49)	45.41 (11.89)	3.21	<0.01*
Single	48.76 (13.15)	47.13 (11.32)	1.02	0.31
Children				
Pregnant	54.26 (12.29)	52.71 (14.56)	0.25	0.81
With	48.21 (13.46)	45.87 (11.94)	2.55	0.01*
Without	48.43 (13.32)	44.88 (11.06)	2.45	0.01*
Education				
Bachelor's degree or lower	49.40 (13.18)	47.03 (10.80)	1.37	0.17
Bachelor's degree	47.96 (13.07)	45.54 (12.58)	2.25	0.02*
Master's degree	48.67 (14.24)	43.80 (12.07)	2.61	0.01*
Doctorate degree and above	49.5 (16.16)	45.39 (9.70)	0.92	0.37
Have patients in family				
Yes	50.06 (12.78)	52.94 (15.95)	–0.60	0.55
No	48.28 (13.43)	45.54 (11.61)	3.51	<0.01*
Have isolation method (for the medical staff)				
No isolation	49.32 (13.10)	45.49 (11.87)	1.93	0.06
Take mask home	52.83 (14.55)	50.13 (13.82)	1.07	0.29
Live in separate room	46.57 (13.01)	49.19 (14.15)	–1.00	0.32
Live outside	47.85 (13.76)	48.13 (11.74)	–0.08	0.94
SAS score	48.36 (13.40)	45.74 (11.79)	3.40	<0.01*

Data are mean (SD).

SD, standard deviation.

* Statistically significant SAS, Self-Rating Anxiety Scale.

anxiety status during the MERS pandemic was conducted in 2015; results showed that during the acute infection stage, the healthcare workers who performed MERSrelated tasks had significantly higher total Impact of Events Scale-Revised scores than those who did not.[18] However, the number of studies investigating the effects of anxiety on mental health from during the COVID-19 pandemic is extremely limited. In conclusion, the observed effects are very similar to those observed during the earlier stages of an infectious disease outbreak. Anxiety levels were significantly higher among the medical staff, especially the female medical staff, in Wuhan.

Clinical implications

On January 23, 2020, the WHO defined COVID-19 as a public health emergency of international concern. In Wuhan, over 80,000 medical staff have been working on the frontline in the fight against the COVID-19 pandemic. The emotional status of the public, patients, and their families were frequently monitored, and that of the medical staff in China were rarely considered. The findings of this study helped in the assessment, diagnosis, and treatment of anxiety in all people during the pandemic, especially in the medical staff in Wuhan. The present study found that medical staff, especially female medical staff in Wuhan, who underwent isolation, were the most anxious group. For this group, more consideration and necessary interventions should be provided to help them avoid burnout.

A previous study showed that only 2.2% of the medical staff experienced anxiety while performing their usual tasks, with no significant difference between various specialties.[19] However, in our study, only 259 of the medical staff who responded (53.73%) did not experience anxiety, while the remaining 223 (46.27%) experience a higher level of anxiety. A previous study demonstrated that live disaster experiences can cause anxiety and stress.[20] Similar stimulating experiences, such as COVID-19 treatment, can elevate the levels of anxiety in the people involved in it. On the contrary, anxiety can have a beneficial impact on the medical staff's work skills.[21] This anxiety may not only be harmful, but it can also have a beneficial effect on the medical staff who are still required to work during the pandemic.

Limitations

Our study has several limitations. First, we collected the information by dispatching questionnaires on the Internet; therefore, non-responses and selection bias should be considered when drawing conclusions. We were unsure whether the information of the non-responders would be the sameas thoseof individuals who did not respond.[22] Second, we were unable to obtain a baseline information from these people; therefore, we were not able to determine their basal anxiety status. Lastly, the study was conducted only in the early phase of the COVID-19 pandemic. Furthermore, this was a cross-sectional study, which could not draw conclusions

Table 3

Distribution of Anxiety Level Among All Participants

	Anxiety Level (n)				
	Non n=671	Mild n=254	Moderate n=128	Severe n=57	*P*
Sex					
Male	237 (62.7%)	86 (22.75%)	39 (10.32%)	16 (4.2%)	0.55
Female	434 (59.29%)	168 (22.95%)	89 (12.16%)	41 (5.6%)	
Location					
Wuhan	103 (52.02%)	46 (23.23%)	30 (15.15%)	19 (9.6%)	<0.01*
Hubei, without Wuhan	204 (58.79%)	80 (23.05%)	46 (13.26%)	17 (4.9%)	
China, without Hubei	364 (64.42%)	128 (22.65%)	52 (9.2%)	21 (3.7%)	
Marital status					
Married	542 (61.94%)	190 (21.71%)	95 (10.86%)	48 (5.5%)	0.085
Single	129 (54.89%)	64 (27.23%)	33 (14.04%)	9 (3.8%)	
Children					
Pregnant	8 (42.11%)	6 (31.58%)	3 (15.79%)	2 (10.5%)	0.40
With	479 (60.33%)	183 (23.05%)	87 (10.96%)	45 (5.7%)	
Without	184 (61.95%)	65 (21.89%)	38 (12.79%)	10 (3.4%)	
Education					
Bachelor's degree or lower	163 (57.6%)	70 (24.73%)	43 (15.19%)	7 (2.5%)	0.058
Bachelor's degree	342 (59.69%)	138 (24.08%)	60 (10.47%)	33 (5.8%)	
Master' degree	135 (66.18%)	35 (17.16%)	19 (9.31%)	15 (7.4%)	
Doctorate degree or higher	31 (62%)	11 (22%)	6 (12%)	2 (4%)	
Have patients in family					
Yes	19 (51.35%)	9 (24.32%)	4 (10.81%)	5 (13.5%)	0.15
No	652 (60.76%)	245 (22.83%)	124 (11.56%)	52 (4.8%)	
Age					
<25 years	296 (76.88%)	64 (16.62%)	18 (4.7%)	7 (1.8%)	<0.01*
25-35 years	186 (61.59%)	66 (21.85%)	37 (12.3%)	13 (4.3%)	
35-50 years	209 (60.23%)	74 (21.33%)	47 (13.5%)	17 (4.9%)	
>50	46 (62.16%)	15 (20.27%)	9 (12.2%)	4 (5.4%)	
Have isolation method (for the medical staff)					
No isolation	54 (50.94%)	30 (28.3%)	11 (10.38%)	11 (10.4%)	0.088
Take mask in home	34 (40.48%)	23 (27.38%)	18 (21.43%)	9 (10.7%)	
Live in separate room	102 (58.96%)	43 (24.86%)	20 (11.56%)	8 (4.6%)	
Live outside	18 (56.25%)	7 (21.88%)	6 (18.75%)	1 (3.1%)	
Profession					
Medical staff	259 (53.73%)	127 (26.35%)	62 (12.86%)	34 (7.1%)	<0.01*
The public	412 (65.61%)	127 (20.22%)	66 (10.51%)	23 (3.7%)	

Data are n (%).

χ^2 test. * Statistical significant.

from this period alone. This is an important limitation of this study. Hence, more related studies are needed to determine other methods that can lessen the anxiety levelsof the medical personnel and the general public.

Conclusion

The medical staff had a significantly higher level of anxiety than the general public in the early phase of the COVID- 19 pandemic. People in Wuhan were more anxious than those living in other areas in China. The burden of anxiety was higher among the medical staff in Wuhan, especially the female medical staff.

Conflict of interest statement

We declare that we do not have any commercial or associative interest that represents a conflict of interest in connection with the submitted work.

Author contributions

Luo G analyzed and interpreted the data and was a major contributor in writing the manuscript. Ni S, Wu B, Wang Y and Lin L collected data. Jin X designed the study, collected the data, participated in the formulation of the Tables, and critically appraised the manuscript. Liu Y and Yao D revised the manuscript. All authors have read and approved the final manuscript.

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Ethical approval of studies and informed consent

The study was approved by the medical ethics committee of Zhongnan Hospital of Wuhan University on March 19, 2020 (registration number: 2020030-1). Informed consent from each participant was waived due to the pure data analysis nature of the study.

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Availability of data and materials

All data analyzed during this study are included in this published article.

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