

# Psychological Status and Correlated Factors of Primary Medical Staff During the COVID-19 Outbreak in Hefei City, China

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**Objective:** To investigate the mental illness and correlated factors of primary medical staff during the COVID-19 outbreak in Hefei city, China.

**Methods:** A total of 180 primary medical staff were randomly selected from seven community hospitals in Hefei Economic and Technological Development Zone as a study group. One hundred and eighty-two health people were recruited as the control group. The self-rating Anxiety Scale (SAS), self-rating Depression Scale (SDS) and Psychological questionnaire of public health emergencies were distributed to them for evaluation.

**Results:** The score of SAS, SDS in study group was higher than that in control group [(35.57±10.39) vs (31.31±7.98); (44.16±8.46) vs (41.47±9.47)] ( $t=4.371$ ,  $P<0.001$ ;  $t=2.849$ ,  $P=0.005$ ). The fear subscale and total score in the psychological questionnaire of sudden public health events were negatively correlated with age ( $r=-0.216$ ,  $P=0.004$ ;  $r=-0.154$ ,  $P=0.039$ ). Marriage was negatively correlated with depression subscales in psychological questionnaires of SAS, SDS and sudden public health events ( $r=-0.184$ ,  $P=0.013$ ;  $r=-0.298$ ,  $P<0.001$ ;  $r=-0.161$ ,  $P=0.031$ ;  $r=-0.147$ ,  $P=0.049$ ). Education level was positively correlated with the total score of a psychological questionnaire for sudden public health events ( $r=0.151$ ,  $P=0.043$ ); Logistic regression analysis showed that marital status was a protective factor of psychological abnormality.

**Conclusion:** It is necessary to pay attention to the psychological status of primary medical staff, especially the young unmarried medical staff.

**Keywords:** novel coronavirus pneumonia, doctor, nurse, anxiety, depressed

## Introduction

The new coronavirus is a new strain of coronavirus found in humans in addition to the six coronaviruses currently known to infect humans. It is named "COVID-19" by the World Health Organization (WHO), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus strain spreads rapidly in a short time,<sup>1,2</sup> and the doubling time is relatively shorter than severe acute respiratory syndrome (SARS). Currently, the disease has spread to other regions of China and around the world.<sup>3</sup> The COVID-19 epidemic spreads very quickly and affects a large number of people. By February 15, 2020, a total of 26 countries had been affected by the epidemic, resulting in 51,857 laboratory-confirmed infections and 1669 deaths. In response to this serious situation, the WHO declared the COVID-19 epidemic a public health emergency of international concern on January 30, 2020 and called for collaborative efforts of all countries to prevent and control its rapid

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spread.<sup>4</sup> However, the investigation from the early notification of the outbreak showed that many important information about the source of the virus and the ability to spread between the population, various clinical manifestations, treatment and epidemic characteristics is still unknown,<sup>2</sup> and thus the prevention and control of COVID-19 and the implementation of effective measures has great uncertainty.

Currently, COVID-19 spread has become a major national public health event, threatening people's physical and mental health and even life safety, seriously affecting people's daily life and work, endangering social and economic development.<sup>5</sup> Since the outbreak, response efforts by the China government have been swift, and three weeks into the epidemic, in an unprecedented move to retard the spread of the SARS-CoV-2 virus, a lockdown was imposed on Wuhan on 23 January, 2020, with travel restrictions. Within days, the quarantine was extended to additional provinces and cities, affecting more than 50 million people in total.<sup>6</sup> However, COVID-19 patients were found in almost all provinces across China in the short term. There was no doubt that the medical workforce played an indispensable role in this major public health emergency.<sup>7</sup> As of February 22, 2020, Anhui Province had a total of 989 confirmed cases, ranking in the top 10 in China. The primary medical staffs who are on the front line of prevention and control are under heavy work pressure and also suffer from huge psychological pressure. They feel lonely, isolated from the outside world, and unable to communicate face-to-face with their families. The pressure from all aspects cannot be effectively alleviated, making them feel more afraid and worried.<sup>8</sup> In the present study, we selected primary medical staff during the first-level prevention and control period in Anhui Province as the study group to evaluate the mental health status and compared them with healthy people in Hefei city, China in the same period. In addition, we also compared the mental health differences between doctors and nurses groups.

## Materials and Methods

### Study Subjects

A total of 180 primary medical staff consisting of doctors, nurses and medical technicians from 7 community health service centers in the Economic Development Zone of Hefei City were selected as a study group. The average age was  $37.96 \pm 9.81$  years. Ninety two of 180 participants were male, and 88 were female. For marital status, 29

were unmarried, 139 were married, 10 were divorced, and 2 were widowed. For educational level, there were 85 cases with a bachelor degree or above, 38 cases with a junior college degree, 30 cases with higher vocational education and 27 cases with technical secondary school. The inclusion criteria of study subjects were as follows: (1) participated in first-line epidemic prevention; (2) voluntarily participated in this study; exclusion criteria: (1) complicated with physical and mental diseases; (2) those who have not completed all scale measurements. One hundred and eighty-two healthy citizens of Hefei City in the same period were selected as control group, and the inclusion criteria were as follows: (1) healthy people who did not suffer from COVID-19; (2) volunteered to participate in this study; (3) junior high school education level or above; exclusion criteria: (1) combined with other physical and mental diseases; (2) those who did not complete all scale measurements. There were no significant differences in age, gender, marriage, and education level (all  $P > 0.05$ ) between the two groups (Table 1).

Ethics statement: The study protocol was approved by the Committee on Medical Ethics of the Second Affiliated Hospital of Anhui Medical University (approval number: YX2020-093), informed consent were received from the study participants and that the guidelines outlined in the Declaration of Helsinki were followed.

**Table 1** Baseline Characteristics of Study Subjects

Parameters	Study Group (n=180)	Control Group (n=182)	P value for $t/\chi^2$ Test
Average age	$37.96 \pm 9.81$	$37.75 \pm 9.97$	0.837
Gender			0.173
Male	92	106	
Female	88	76	
Marriage			0.290
Unmarried	29	36	
Married	139	140	
Divorced	10	6	
Widowed	2	0	
Education level			0.735
Technical secondary school and the following	27	30	
Undergraduates and above	85	91	
Junior colleges	38	38	
Vocational colleges	30	23	

## Research Tools

Wenjuanxing, an online crowdsourcing platform, was used for questionnaire survey ([www.wjx.cn/](http://www.wjx.cn/)). The scales used in this online survey included: (1) Self-rating Anxiety Scale (SAS):<sup>9</sup> This scale contains a total of 20 items, using a 4-point scale of 1 to 4 points; there is anxiety in Chinese norm of depression of less than 50 points;<sup>9</sup> (2) Self-rating Depression Scale (SDS):<sup>9</sup> The scale has a total of 20 questions, all of which have a score of 1 to 4 points, and Chinese norm for depression is <50 points, there is depressive;<sup>9</sup> (3) Impact of Event Scale-Revised (IES-R), a Psychological Questionnaire for Sudden Public Health Events.<sup>9</sup> This scale was surveyed by residents in 2003 to be affected by SARS. After evaluation of reliability and validity, a total of 25 items were established, using 0 to 3 four-level scores, the higher the total score, the greater the psychological impact of public health emergencies.<sup>9</sup>

## Statistical Analysis

SPSS 23.0 was used for statistical processing, measurement data was expressed as (mean  $\pm$  sd), comparison of means between two groups was performed by two-sample *t* test, and comparison of category variables was performed by chi-square test. Correlation analysis was conducted by Pearson correlation coefficient, and risk factors were analyzed by logistic regression analysis;  $P < 0.05$  means the difference is statistically significant.

## Results

### Comparison of SAS, SDS and Psychological Questionnaires for Public Health Emergencies Between the Two Groups

The SAS and SDS scale scores of the study group were higher than those of the control group [(35.57 $\pm$ 10.39) vs (31.31 $\pm$ 7.98); (44.16 $\pm$ 8.46) vs (41.47 $\pm$ 9.47)] ( $t=4.371$ ,  $P<0.001$ ;  $t=2.849$ ,  $P=0.005$ ) (Table 2).

### Comparison of Abnormal SAS and SDS Between the Two Groups

In the study group, there were 11 cases with abnormal scores on the SAS scale, 46 cases with abnormal scores on the SDS scale, and 52 persons with abnormal scores on the SAS and SDS scales. In the control group, there were 4 cases with abnormal scores on the SAS scale and 23 cases with abnormal scores on the SDS scale; the total number of abnormal scores on the SAS and SDS scale was 27. There was no significant difference in the proportion of the number of abnormal SAS scores between the study group and the control group ( $\chi^2 = 3.489$ ,  $P = 0.062$ ); the study group had a greater proportion of SDS population than the control group ( $\chi^2 = 9.789$ ,  $P = 0.002$ ;  $\chi^2 = 10.477$ ,  $P = 0.001$ ).

### Analysis of Related Factors of Mental Health Status of the Study Group

Age was negatively correlated with the fear subscale and total score in the psychological questionnaire of sudden public health events ( $r=-0.216$ ,  $P=0.004$ ;  $r=-0.154$ ,  $P=0.039$ ). Marriage was negatively correlated with SAS, SDS, depression scale in Psychological Questionnaire of Sudden Public Health Events, and total score of the psychological questionnaire of sudden public health events ( $r=-0.184$ ,  $P=0.013$ ;  $r=-0.298$ ,  $P<0.001$ ;  $r=-0.161$ ,  $P=0.031$ ;  $r=-0.147$ ,  $P=0.049$ ). The educational level was positively correlated with the total score of the psychological questionnaire of sudden public health events ( $r=0.151$ ,  $P=0.043$ ) (Table 3).

### Logistic Regression Analysis of Related Factors Affecting the Mental Health of Primary Medical Staff

Mental state was taken as the dependent variable ( $Y = 1$  means “mental abnormality” and 0 means “title mental status”), the above four factors were regarded as independent variables, and the forward LR method was adopted to incorporate the above factors into the logistic regression

**Table 2** Comparison of SAS, SDS and IES-R Scores Between Two Groups

	SAS	SDS	IES-R					
			Depression	Neurasthenia	Fear	Obsessive-Anxiety	Hypochondriasis	Total Score
Group	35.57 $\pm$ 10.39	44.16 $\pm$ 8.46	7.02 $\pm$ 5.88	6.42 $\pm$ 4.87	5.53 $\pm$ 5.00	6.49 $\pm$ 5.07	1.40 $\pm$ 1.32	26.92 $\pm$ 12.81
Control group	31.31 $\pm$ 7.98	41.47 $\pm$ 9.47	7.23 $\pm$ 6.18	6.14 $\pm$ 5.18	6.01 $\pm$ 5.69	6.25 $\pm$ 5.30	1.46 $\pm$ 1.38	27.09 $\pm$ 13.69
<i>t</i>	4.371	2.849	-0.320	0.518	-0.839	0.443	-0.472	-0.127
<i>P</i> value	0.000	0.005	0.749	0.605	0.402	0.658	0.637	0.899

**Table 3** Analysis of the Relevant Factors of Mental Health Status (*r* Values)

	SAS	SDS	Mental Questionnaire on Sudden Public Health Events					
			Depression	Neurasthenia	Fear	Obsessive-Anxiety	Hypochondriasis	Total Score
Age	0.130	0.013	−0.047	−0.096	−0.216	−0.014	0.027	−0.154
<i>P</i> value	0.898	0.859	0.535	0.201	0.004	0.848	0.718	0.039
Gender	−0.053	0.016	−0.074	0.042	0.094	0.027	0.057	0.032
<i>P</i> value	0.476	0.829	0.325	0.576	0.210	0.714	0.443	0.674
Marriage	−0.184	−0.298	−0.161	−0.081	−0.091	0.016	−0.059	−0.147
<i>P</i> value	0.013	0.000	0.031	0.279	0.226	0.829	0.434	0.049
Education	0.075	0.135	0.098	0.096	0.080	0.078	0.012	0.151
<i>P</i> value	0.317	0.070	0.191	0.200	0.285	0.301	0.875	0.043

**Table 4** Logistic Regression Analysis of Influencing Factors of Mental State Among Primary Medical Staff

Independent Variable	Value B	SE	Wald Value	<i>P</i> value	OR	95% CI
Age	−0.009	0.024	0.152	0.696	0.991	0.946–1.038
Gender	−0.208	0.433	0.230	0.631	0.812	0.347–1.190
Marriage	−4.202	0.785	28.666	0.000	0.015	0.003–0.070
Education	0.396	0.223	3.144	0.076	1.486	0.959–2.301
Constant	6.533	1.728	14.377	0.000	701.565	

model. The analysis showed that marriage was a protective factor for psychological abnormalities (OR = 0.015, 95% CI 0.003–0.070) (Table 4).

## Discussion

It has been reported that during the epidemic of influenza A (H1N1) in 2009 high-risk medical staff had a certain degree of psychological disorders, mainly manifested as emotional and sleep disorders, among which the medical staff in fever clinic were the most severe, especially at the early stage and the outbreak stage of H1N1.<sup>10</sup> Liu et al<sup>11</sup> found that there were problems with the mental health status of medical staff in military hospitals during the SARS outbreak. The scores of somatization, depression, anxiety and obsession were all increased in the psychological questionnaire evaluation, and the scores of somatization and depression were significantly increased. During the outbreak of the Ebola virus outbreak, an analysis of the psychological status of medical staff in Africa found that front-line medical staff had more prominent psychological problems in terms of compulsive behavior, interpersonal sensitivity, depressive symptoms and partial execution behaviors.<sup>8</sup> A study from Arab countries showed that during the outbreak of Middle East respiratory syndrome (MERS), medical staff's anxiety scores were relatively high.<sup>12</sup> During the

outbreak of influenza A in Japan, a survey of the psychological status of 1625 medical staff showed that medical staff in high-risk departments showed varying degrees of anxiety and mental fatigue<sup>13</sup>. Chan et al<sup>14</sup> conducted a survey on the psychological status of medical staff in Singapore two months after the SARS outbreak, their results showed that approximately 20% of medical staff had stress disorders. At the same time, this psychological disorder was related to health, family relations, friends or colleagues. There is a correlation between the relationship, work, and mental appearance of the medical staff, and the emotions of medical staff after the SARS outbreak were affected and hurt to varying degrees. Not only during the epidemic outbreak, medical staff suffered severely from the stress of the epidemic, the anxiety symptoms, depression symptoms and post-traumatic stress of high-risk medical staff remained at a relatively high level for 1–2 years or more after the SARS outbreak.<sup>15,16</sup>

Previous studies were mostly concentrated in general hospitals and were mostly limited to cross-sectional investigations.<sup>8,11</sup> The present study suggested that the mental health status of primary medical staff was lower than that of the healthy control group. Age was negatively correlated with the fear subscale and total score in the psychological questionnaire for public health emergencies; Marriage was

negatively correlated with the subscale and total score of depression in the psychological questionnaire of SAS, SDS and sudden public health events. Educational level was positively correlated with the total scores of psychological questionnaires for public health emergencies; these findings indicated that young and unmarried medical care groups had higher scores on the scale and worse mental health status; logistic regression analysis showed that marriage was a risk factor for psychological abnormalities. This study suggests that during the epidemic period, attention should be paid to the psychological status of primary care workers, especially young unmarried health care workers. Studies on the psychological status of and its influencing factors in health care workers (HCWs) during the coronavirus disease 2019 (COVID-19) outbreak indicated that married people were 1.639 times than single (OR = 1.639, 95% CI 1.355–1.922). The main reason for married people's stress might be that their work increased the risk of infection among family members.<sup>17</sup>

At present, there are relatively fewer researches on the mental state of medical staff during the outbreak of COVID-19, and most of the related studies were in Wuhan<sup>18,19</sup> or the tertiary hospitals.<sup>20</sup> There are few researches on the psychological changes among primary medical staff under long-term stress. As the first line of epidemic prevention and control, primary-level medical institutions need to participate in pre-examination and triage, key personnel investigation, and follow-up work of people returned from epidemic areas, fever residents and close contacts.<sup>21</sup> Because there is a certain gap between the medical knowledge, skills and protective equipment of the primary medical staff and the general hospital above the second level, the psychological problems may be more prominent. However, due to the COVID-19 epidemic, the questionnaire survey could only be conducted through an online platform, and the sample size is limited. In the future, further studies with a large sample size are still needed to provide a more precise reference for the psychological health interventions among primary medical staff in public health emergencies.

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## Disclosure

The authors report no conflicts of interest in this work.

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