

Psychological symptoms of the front-line medical staff during the recuperation after fighting against COVID-19 in China

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Research

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Abstract

Background

At the beginning of 2020, COVID-19 broke out in Wuhan, China. Medical staff from all over the country quickly supported Wuhan and put into combat. In May 2020, the epidemic has been effectively controlled, and medical staff withdrew from Wuhan and entered into recuperation.

Methods

During the recuperation in March and June, 2020, 441 medical staff were participated to investigate the psychological symptoms on SCL-90. Student's t-test and one-way analysis of variance were chosen to analyze the data.

Results

Of the 441 participants, the positive ratio ($i \geq 2$) of the ten dimensions and the average score of SCL-90 was from 3.17% to 13.61%. Compared respectively with the medical staff in front-line and the Chinese norms, the scores obviously decreased during the recuperation. Gender, occupation, professional ranks and titles, working position in Wuhan and the patient's condition affected the scores of SCL-90, age and educational attainment had little effect.

Conclusions

These results showed that the recuperation had the positive impact on the psychological status of the medical staff after fighting against COVID-19, which is worthy of further promotion. Our findings also showed that a small number of medical staff still had the risk on the mental problem, which need continuous attention and intervention.

Background

Since December 2019, the novel corona virus disease (COVID-19) was first detected and rapidly outbreak in Wuhan, Hubei province [1]. In late January 2020, the large population flow during the traditional Chinese Spring Festival accelerated the spread of the epidemic throughout the country, and the situation was very serious. On January 30, 2020, the WHO declared that this outbreak was named COVID-19 and was a Public Health Emergency of International Concern [2]. In order to control the epidemic, the Chinese government mobilized medical staff nation widely to support Wuhan in fighting against the COVID-19.

The epidemic brought great psychological pressure to the front-line medical staff who were all high-workload and had higher risk of COVID-19 infection than the general population [3]. The psychological problem is in the process of development and changing, different stages of epidemic development have different characteristics [4, 5]. Chen has reported that medical staff are at great risk of developing Psychological problems [6]. In the early stage of this outbreak, the shortage of medical supplies and the

insufficient understanding of the COVID-19 caused huge psychological distress among medical staff and the general population [3, 7]. With the development of the epidemic, the large number of confirmed and suspected patients resulted in the heavy workloads and high risk of infection for the front-line medical staff, which affected their physical and mental health [3]. In the late stage of this outbreak, the epidemic in Wuhan was effectively controlled and most patients were discharged from the hospital, so a large number of medical staff were evacuated from the front-line into a two-week medical quarantine. Out of concern from the Chinese government, medical staff were arranged a half month recuperation after the quarantine in order to relieve the mental and physical stress.

As most psychological problems could last for a long time and had different characteristics in different periods, it is necessary to pay attention to the psychological development of the front-line medical staff after fighting against COVID-19 in front-line. During the recuperation, the psychological symptoms of front-line medical staff was still unknown. Therefore, the purpose of this study was to assess psychological health status of the front-line medical staff after fighting against the COVID-19 during the recuperation, which could help us to discover the law of psychological problems and give scientific intervention and guidance.

Methods

Subject

In March and June, 2020, our team undertook the psychological screening and psychological intervention of the medical staff during the recuperation after fighting against COVID-19. The cross sectional observational study of the medical staff was carried out during the recuperation. One week later during the recuperation, the medical staff were conducted a SCL-90 questionnaire survey, and all the participants were voluntary. The study consisted of the 441 valid samples, comprised of 194 males and 247 females, aged from 19 to 57 years, with variables occupations and educational levels (Table 1).

The Symptom Checklist 90 (SCL-90)

The SCL-90 scale has been used internationally to assess psychological distress and symptoms of psychopathology for many years, and the reliability and validity are stable. The SCL-90 scale has 90 items, which is composed of nine symptom dimensions and one ADD dimension. The nine symptom dimensions are somatization (SOM), obsessive-compulsive (OC), interpersonal sensitivity (IS), depression (DEP), anxiety (ANX), hostility (HOS), phobic Anxiety (PHOB), paranoid Ideation (PAR), and psychoticism (PSY). Furthermore, seven additional items (ADD) used to assess disturbances in appetite and sleeping [8]. In this study, the comparison was respectively made between this medical staff sample during the recuperation with the medical staff during fighting against COVID-19 [9], and the norms of the SCL-90 for Chinese normal people [10].

Ethics

This study was approved by the Ethics Committee of the Air Force Medical University and the Ethics Committee of Lintong Rehabilitation and Recuperation Center, and all experimental procedures were performed following the guidelines of the institutional ethics committee. The aims of this investigation and all procedures were explained to all subjects before their cooperation, and all subjects were informed that their cooperation was completely voluntary.

Statistical methods

Data was analyzed by SPSS 18.0 software, which was expressed as the mean \pm SD. Categorical variables for basic characteristics were expressed as a number (%). Student's t-test and one-way analysis of variance (ANOVA) were chosen to analyze the data comparison among groups. The two-group samples were analyzed by Student's t-test, and multiple independent groups were analyzed by one-way ANOVA. $P < 0.05$ was considered to be significant.

Results

General information of the medical staff included in this sample

As shown in Table 1, the study consisted of the 441 valid samples after eliminating the invalidated questionnaires by the incorrect completion. This sample was comprised of 194 males (43.99%) and 247 females (56.01%), aged 19-25 (12.24%), 26-35 (37.64%), 36-45 (43.31%), 46-57 (6.80%), with variables educational attainment (under degree 7.03%; college degree 13.83%; bachelor degree 62.81%; master degree and higher 16.33%), different occupations (doctor 14.29%; nurse 50.79%; medical technician 8.62%; pharmacist 4.76%; medical management and medical support personnel 21.54%), and different professional ranks and titles (none 10.88%; junior title 32.43%; intermediate title 45.80%; senior title 10.88%). In Wuhan, during the front-line fighting against COVID-19, this sample belonged to different working position with different patient's condition. Among them, 38 worked in outpatient department (8.62%), 241 worked in general ward (54.65%), 46 worked in intensive care unit (10.43%), and 116 worked in other positions (26.30%). Meanwhile, 198 contacted the mild patient (44.90%), 108 contacted the serious patients (24.49%) and 135 had no direct contact with patients (30.61%).

On SCL-90 test as in Table 1, the scores of different age group and different educational attainment group have no statistic differences ($P \geq 0.05$). Different gender group, different occupation group, different professional ranks and titles, different working position group and different patient's condition in Wuhan all have the statistic differences ($P < 0.05$).

Table 1 The descriptive characteristics of the participants.

Variables	Number (n)	%	X ± MD	F
Gender				
Male	194	43.99	1.23 ± 0.33	4.941**
Female	247	56.01	1.30 ± 0.33	
Age				
19-25	54	12.24	1.20 ± 0.44	1.366
26-35	166	37.64	1.26 ± 0.32	
36-45	191	43.31	1.28 ± 0.31	
46-57	30	6.80	1.34 ± 0.32	
Educational attainment				
Under degree	31	7.03	1.22 ± 0.50	0.961
College degree	61	13.83	1.21 ± 0.29	
Bachelor degree	277	62.81	1.28 ± 0.32	
Master degree and higher	72	16.33	1.28 ± 0.33	
Occupation				
Doctor	63	14.29	1.37 ± 0.47	6.491***
Nurse	224	50.79	1.30 ± 0.33	
Medical technician	38	8.62	1.24 ± 0.26	
Pharmacist	21	4.76	1.26 ± 0.27	
Medical management and medical support personnel	95	21.54	1.13 ± 0.18	
Professional ranks and titles				

None	48	10.88	1.12 ± 0.17	3.842*
Junior title	143	32.43	1.27 ± 0.38	
Intermediate title	202	45.80	1.29 ± 0.33	
Senior title	48	10.88	1.31 ± 0.30	
Working position				
Outpatient Department	38	8.62	1.30 ± 0.31	9.771***
General ward	241	54.65	1.28 ± 0.31	
Intensive care unit	46	10.43	1.45 ± 0.55	
Others	116	26.30	1.16 ± 0.33	
Patient's condition				
Mild patients	198	44.90	1.28 ± 0.34	10.247***
Serious patients	108	24.49	1.36 ± 0.40	
No direct contact	135	30.61	1.18 ± 0.22	

Note: * indicates $P < 0.05$, ** indicates $P < 0.01$, *** indicates $P < 0.001$.

The scores of the SCL-90

For this front-line medical staff after fighting against COVID-19, the score severity distribution of ten dimensions of the SCL-90 was shown in Table 2, and the average score of ten dimensions was shown in Table 3. In Table 2, it was shown that the severity distribution of ten dimensions were basically similar, with a large number focused on $i = 1$ and $1 < i < 2$. However, of the 441 participants, the positive ratio ($i \geq 2$) of the ten dimensions (SOM, OC, IS, DEP, ANX, HOS, PHOB, PAR, PSY, ADD) and the average score of SCL-90 was still from 3.17% to 13.61%. Compared this front-line medical staff during the recuperation and the medical staff during the front-line, the scores of the ten dimensions (SOM, OC, IS, DEP, ANX, HOS, PHOB, PAR, PSY, ADD) were all have the significant statistical differences and the scores during the recuperation obviously decreased (Table 3). Compared this sample during the recuperation with the

Chinese norms, among these ten dimensions and the average score were also have the significant statistical differences (Table 3).

Table 2 SCL-90 scale score severity distribution in this sample (n, %).

Dimension	1		1 < i < 2		2 ≤ i < 3		3 ≤ i < 4		positive	
	n	%	n	%	n	%	n	%	n	%
SOM	98	22.22	317	71.88	24	5.44	2	0.45	26	5.90
OC	95	21.54	299	67.80	43	9.75	4	0.91	47	10.66
IS	170	38.55	240	54.42	27	6.12	4	0.91	31	7.03
DEP	179	40.59	242	54.88	17	3.85	3	0.68	20	4.54
ANX	162	36.73	256	58.05	20	4.54	3	0.68	23	5.22
HOS	235	53.29	187	42.40	16	3.63	3	0.68	19	4.31
PHOB	310	70.29	117	26.53	12	2.72	2	0.45	14	3.17
PAR	276	62.59	143	32.43	19	4.31	3	0.68	22	4.99
PSY	241	54.65	183	41.50	15	3.40	2	0.45	17	3.85
ADD	102	23.13	279	63.27	56	12.70	4	0.91	60	13.61
AVERAGE	32	7.26	393	89.12	14	3.17	2	0.45	16	3.63

Table 3 Comparison with the front-line and with the Chinese norms respectively (mean ± SD).

Dimension	Medical Staff During Recuperation (n = 441)	Medical Staff During Front-Line (n = 548)	Chinese norms (n = 1388)
SOM	1.32 ± 0.37	1.46 ± 0.72 ^a	1.37 ± 0.48 ^b
OC	1.41 ± 0.44	1.75 ± 0.88 ^a	1.62 ± 0.58 ^b
IS	1.28 ± 0.41	1.51 ± 0.78 ^a	1.65 ± 0.61 ^b
DEP	1.23 ± 0.36	1.53 ± 0.79 ^a	1.50 ± 0.59 ^b
ANX	1.25 ± 0.35	1.50 ± 0.79 ^a	1.39 ± 0.43 ^b
HOS	1.20 ± 0.33	1.48 ± 0.80 ^a	1.46 ± 0.55 ^b
PHOB	1.12 ± 0.28	1.44 ± 0.75 ^a	1.22 ± 0.41 ^b
PAR	1.18 ± 0.35	1.40 ± 0.73 ^a	1.43 ± 0.57 ^b
PSY	1.17 ± 0.31	1.36 ± 0.65 ^a	1.29 ± 0.42 ^b
ADD	1.47 ± 0.44	1.58 ± 0.76 ^a	
AVERAGE	1.27 ± 0.33	1.51 ± 0.73 ^a	1.44 ± 0.43 ^b

Note:

Comparison between the medical staff during the recuperation and during the front-line: ^a indicates $P < 0.05$;

Comparison between the medical staff during the recuperation and the Chinese norms: ^b indicates $P < 0.05$.

ANOVA of different groups

For this sample during the recuperation, the variance between male and female of SCL-90 scores was shown in Figure 1a. SOM, ANX and ADD had the statistical differences, respectively. In Figure 1b, the scores of ten dimensions (SOM, OC, IS, DEP, ANX, HOS, PHOB, PAR, PSY, ADD) on SCL-90 all had the statistical differences for different occupation groups. As shown in Figure 1c, the comparisons among the different professional ranks and titles groups demonstrated that the score of SOM, OC, DEP, ANX, PAR and ADD on SCL-90 had the statistical differences. During fighting against COVID-19 in Wuhan, different working position and the different patient's condition directly determined the risk of the work. So, as in Figure 1d and Figure 1e, the comparisons among the different working position groups and the different

patient's condition groups displayed that the scores of ten dimensions (SOM, OC, IS, DEP, ANX, HOS, PHOB, PAR, PSY, ADD) on SCL-90 all had the obviously statistical differences.

Discussion

In December 2019, COVID-19 occurred in Wuhan, Hubei province, and rapidly spread throughout China. The whole China entered into a state of combat, especially the front-line medical staff. In this study, we investigated the psychological status of the front-line medical staff during the recuperation after fighting against COVID-19. Compared with the psychological status during the front-line and the Chinese norm, the scores of the SCL-90 were satisfied, and a small number of medical staff still has the high risk for the psychological problems ($i \geq 2$), and the most important factors affecting the sores of the medical staff were the working position in Wuhan and the treated patient's condition, other factors has less effects.

From the perspective of the severity of psychological situation, the dimension or the average result scored 2 or higher in the SCL-90 is considered to be a positive result [11]. In this study, the positive rate of OC and ADD during the recuperation were more prominent. In front-line, medical staff need to repeatedly disinfect and wash hands in order to prevent infection, and the repeated decontamination behavior makes medical staff have a certain degree of compulsive behavior, which was consistent with the results of the ten sub-questions within the OC dimension. In SCL-90 test, seven additional items (ADD) used to assess disturbances in appetite and sleeping [12]. It has been reported that during the front line, a large number of medical staff suffered the sleeping problem, which was mainly manifested in difficult falling asleep, even waking up during the whole night, waking up early, and having more dreams [3]. So, sleep efficiency was reduced, and sleep symptoms such as sleep structure symptoms occurred. From the result of this study, the sleeping problem of medical staff has been lasted to the recuperation and need the long-term attention.

This study also found that the average scores of SCL-90 of medical staff during the recuperation were lower than working in front-line, and also lower than the Chinese norm. And these data illustrated that recuperation was associated with mental health status and better deployment of mental health [13–15]. The report on the impacts of recuperation in United Kingdom Armed Forces personnel had the results that personnel engagement with the recuperation had the better mental health [13]. United Kingdom conventionally provided armed forced or special mission staff about continuous 10-day period as the recuperation [13]. Military mental health studies suggested that recuperation is very popular and satisfied, similar policies had been widely implemented by other coalition nations. However, some researchers demonstrated that the relaxed holidaying was helpful to the physical and psychological recovery, especially after the difficult mission, but the effects were short lived [13, 16]. So, after fighting against COVID-19, recuperation is a good way for the medical staff to rest and psychologically re-set, especially after the outbreak of the stress in the front-line, and the long-term results of the medical staff still need our continuous attention.

The results of this study showed that the factors affecting the score of SCL-90 included gender, professional ranks and titles, working position in Wuhan and the patient's condition during the front-line against COVID-19. The working position and the patient's condition during the front-line were the two most important factors. Age and educational attainment had little effect on the ten dimension score of SCL-90 except the ADD dimension. In this study, females suffered more psychological problems than males, which was consistent with previously extensive epidemiological studies [17–19]. There are other risk factors for psychological problems of the medical staff, such as professional ranks and titles. The higher the professional ranks and title level, the longer the working time, the richer the work experience, and the stronger the psychological pressure resistance ability [20, 21]. In addition, the working position and the patient's condition in Wuhan were directly affect the psychological situation of the medical staff, because these factors were directly related to the time and the degree of contact with the COVID-19 patients on the front line. The patients are the main source of transmission COVID-19 [22, 23]. As medical staff were in frequent close contact with the patients during their treatment and care, the medical staff had the high risk of infection [6, 24]. In Italy, two nurses confirmed COVID-19 even committed suicide due to the great pressure and fear [25]. In this study, age and educational attainment had little effect on the psychological situation of the medical staff. Some study showed that people at all age were generally vulnerable to COVID-19 through the analysis of 4021 confirmed patients nationwide. Some researchers also found that the higher age of the medical staff, the higher mental health score and the more psychological problems during fight against COVID-19 [9]. There are many factors affecting the test results, and the psychological state is changing. Therefore, more scholars should work together to explore more characteristics.

Conclusions

In summary, the evaluation of the mental status of the front-line medical staff during the recuperation was satisfied. However, some medical staff still had the risk of the psychological problems, we should continuously pay attention to the development of the psychological status of the medical staff.

Abbreviations

SCL-90

The Symptom Checklist 90

SOM

somatization

OC

obsessive-compulsive

IS

interpersonal sensitivity

DEP

depression

ANX

anxiety

HOS

hostility

PHOB

phobic Anxiety

PAR

paranoid Ideation

PSY

psychoticism

ADD

additional items

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the Air Force Medical University and the Ethics Committee of Lintong Rehabilitation and Recuperation Center, and all experimental procedures were performed following the guidelines of the institutional ethics committee.

Consent for publication

All authors agree with the ranking and consent for publication.

Availability of data and materials

All data generated or used in the study are available from the corresponding author by request.

Competing interests

The authors declare no conflict of interest.

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Authors' Contributions

Study-design, experimental work and data analysis, J.D., Y.G. and B.W.; writing the manuscript, J.D.; supervised the project and reviewed the manuscript, S.Z.. All authors have read and agreed to the published version of the manuscript..

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Figures

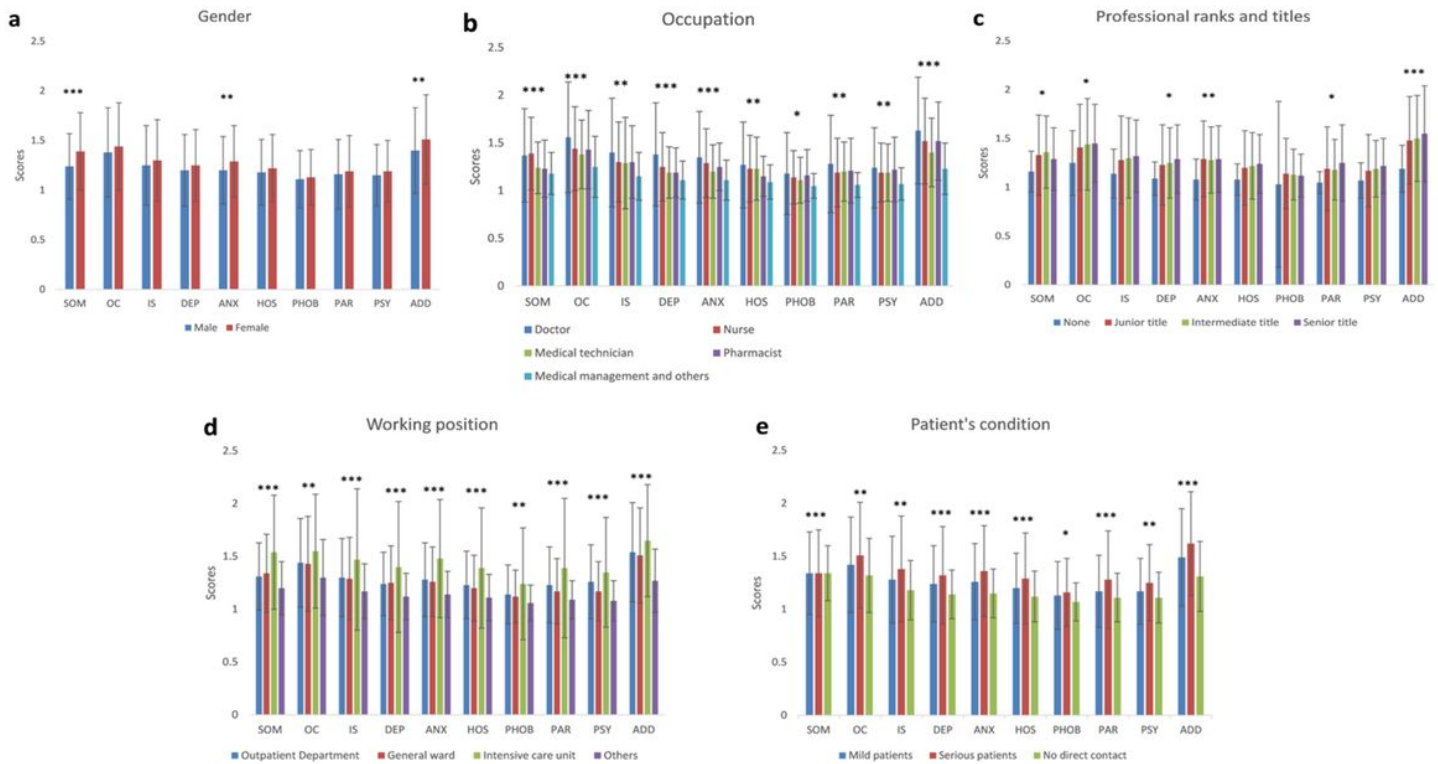


Figure 1

ANOVA of different groups on SCL-90 a One-way ANOVA of SCL-90 scores for gender groups; b One-way ANOVA of SCL-90 scores for occupation groups; c One-way ANOVA of SCL-90 scores for professional ranks and titles groups; d One-way ANOVA of SCL-90 scores for working position groups; e One-way ANOVA of SCL-90 scores for patient's condition groups. * indicates $P < 0.05$, ** indicates $P < 0.01$, *** indicates $P < 0.001$.