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Impact of individual factors and personality trait on psychological problems of family members living with staff of a COVID-19 frontline hospital: A cross-sectional self-administered anonymous questionnaire survey

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Abstract

Aim: This study aims to evaluate the association between individual factors/personality traits and depression and anxiety in family members living with staff working on the frontline of COVID-19 care.

Methods: The subjects were family members over the age of 15 years living with staff members of a COVID-19 frontline hospital. Between March 27 and April 11, 2021, 204 self-administered anonymous questionnaires were distributed, and 149 responses were received. Symptoms of depression and anxiety were assessed using the Hospital Anxiety and Depression Scale (HADS). Personality trait was assessed using the Big Five personality traits, and fear of COVID-19 was assessed using the Fear of COVID-19 Scale. We examined associations between HADS depression or anxiety scores with individual background factors, scores of Big Five personality traits, and Fear of COVID-19 Scale.

Results: The participants with anxiety had significantly higher scores for neuroticism and for the Fear of COVID-19 Scale. The participants with depression had significantly lower scores for extraversion and higher scores for the Fear of COVID-19 Scale. No individual background factors were significantly associated with HADS depression or anxiety scores.

Conclusion: Among family members of staff of a COVID-19 frontline hospital, lower extraversion, higher neuroticism, and fear of COVID-19 were associated with anxiety and depression. This questionnaire survey was conducted before wide-spread rollout of

Abbreviations: COVID-19, Coronavirus disease 2019; HADS-A, Hospital Anxiety and Depression Scale Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale Depression subscale.

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COVID-19 vaccination, so the findings of this study are expected to be applicable to other future novel infectious outbreaks.

KEYWORDS
anxiety, COVID-19, depression, family of hospital staff, personality

INTRODUCTION

Coronavirus disease 2019 (COVID-19) pandemic continues to damage public health and has created economic crises. Fear of infection, the need to make lifestyle changes (such as self-isolation and social distancing), and worsening economic conditions caused by COVID-19 have negatively impacted upon people's mental health.[1–3] Notably, hospital staff involved in frontline care of patients with COVID-19 have been in particular danger of psychological problems, such as depression, anxiety, and post-traumatic stress.[4–7] These hospital staff are likely to develop stress from fear of becoming infected by COVID-19 themselves and/or of transmission of COVID-19 to family members they reside with.[8] Family members may not only have a social role in supporting hospital staff members,[9] they are exposed and at risk of secondary infection of COVID-19.[10,11]

Mental health of families of hospital staff members on the frontline of care of patients with COVID-19 has been reported in a small number of studies. In a 2020 survey based in China, around one-third of 845 families of hospital staff members showed symptoms of depression and anxiety.[12] Reported risk factors of depression were being parents or next of kin of hospital staff members, and long working hours of hospital staff members.[12] In another study, subjects comprised 208 family members of nurses on the frontline of COVID-19 care, and 71.4% of participants expressed moderate depressive symptoms.[13] Risk factors were female sex, high age, and being married.[13] Another study from 2021 reported that risk factors of post-traumatic stress disorder of the family members of hospital staff were male sex and the type of work of hospital staff: doctors, followed by nurses, then by medical technicians.[14] These previous studies highlighted the impact of COVID-19 on psychological problems of families of hospital staff members and suggested the importance of preventive support for these populations.

Mental health is influenced not only by external factors, but also by individual personality traits.[15,16] Previous studies on mental health of family members of hospital staff on the frontline of caring for patients with COVID-19 examined relationships between psychological problems and demographic characteristics, such as age, sex, and education or working status.[12,13] To our knowledge, however, no studies have examined personality traits and the mental health of family members of hospital staff working on the frontline of COVID-19 care. To address this gap, this study aims to evaluate the association between depression and anxiety and individual factors, including personality traits, in family members of medical or office staff of a general hospital accepting patients with suspected or confirmed COVID-19.

METHODS

Subjects

The subjects were family members over the age of 15 years and living with a staff member working at a hospital with known cases of COVID-19. In order to collect real-world data, we did not establish any exclusion criteria, including past history of mental illness. The hospital prepared 36 beds (from March 27 to 31) and later 60 beds (from April 1 to 11) out of their 102 beds for patients with COVID-19. The hospital also provided an outdoor clinic for patients with fever or respiratory syndrome. The hospital staff included nurses, physicians, physical therapists, occupational therapists, speech therapists, pharmacists, clinical laboratory technicians, nursing assistants, and general office workers. Between March 27 and April 11, 2021, 204 self-administered anonymous questionnaires were distributed, and 149 responses were received (response rate: 73%). During this period, the first COVID-19 vaccination was rolled out for hospital staff in Japan, but our subjects (families of hospital staff) had not yet completed two stages of vaccination by the time of the survey.

Questionnaire

The questionnaire included questions on background factors of participants. Table 1 shows details of these questions. Symptoms of depression and anxiety were assessed by the Hospital Anxiety and Depression Scale Depression (HADS-D) and Anxiety (HADS-A) subscales, respectively.[17–19] The HADS has been validated in healthy populations,[20,21] and used in several previous studies that examined mental health problems among COVID-19 frontline healthcare workers.[7,22–24] Personality traits of participants were assessed by the Big Five personality traits,[25,26] and fear of COVID-19 was assessed using the Fear of COVID-19 Scale.[27,28]

Statistics

JMP Pro 14.0 was used for statistical calculation. In the HADS-A and HADS-D, the cutoff point was set as 7/8; the upper cutoff point means moderate or higher symptoms.[21,29] Differences of age and scores of Big Five personality traits and Fear of COVID-19 Scale between the groups were assessed using the Student's *t*-test.

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TABLE 1 Questionnaire results.

Age[a]	
Mean	45.52
SD	19.57
Sex[b]	
Male/female	66/80
Relation to hospital staff[b]	
Spouse	41
Parent	49
Sibling	11
Child	39
Parent in law	2
Child in law	0
Grandparent	2
Grandchild	0
Other next of kin	2
Occupation of your family (hospital staff)[b]	
Nurse	100
Physician	0
Physical therapists	6
Occupational therapists	8
General office worker	17
Others	15
Does your family member (hospital staff) treat or care for patients with COVID-19?[c]	
Yes/No/Unkown	87/45/11
Do you have a medical complication (heart disease, respiratory disease, diabetes, hypertension, cancer)?[b]	
Yes/No	38/108
Are you currently pregnant?	
Yes/No	1/145
Does your family member (hospital staff) have a medical complication (heart disease, respiratory disease, diabetes, hypertension, cancer)?[b]	
Yes/No	19/127
Are there other people living with you?[b]	
Yes/No	132/14
Please select age of family members living with you (multiple answers allowed)	
Under 1 year old	0
Over 1 and under 6 years old	13
Over 6 and under 18 years old	34
Over 18 and under 50 years old	74
50s	51
60s	24
70s	25
Over 80 years old	12
Are your family members living with you currently pregnant?	
Yes/No	0/146

[a] $n = 145$.
[b] $n = 146$.
[c] $n = 143$.

Statistical significance was set as $p < 0.05$ in age and Fear of COVID-19 Scale, and as $p < 0.01$ in Big Five personality traits (Bonferroni correction; $p = 0.05/5$ personality traits). Association of background factors of participants with symptoms of depression and anxiety were assessed using χ^2 test or Fisher's exact test, with statistical significance set as $p < 0.05$. Concerning age, the subjects were stratified into two groups depending on being over/under 50 years of age, because age over 50 years was reported to be a risk factor for poorer condition after contracting COVID-19.[30]

RESULTS

The participants at the upper cutoff point of moderate anxiety had a significantly higher score for neuroticism (Table 2). The participants at the upper cutoff point for moderate depression had a significantly lower score for extraversion (Table 3). Groups at the upper cutoff point of moderate symptoms of anxiety or depression showed higher scores on the Fear of COVID-19 Scale (Tables 2 and 3). No background items were associated with anxiety or depression (Supporting Information: Table 1). The items about pregnancy were excluded from statistical analysis because they were not applicable in the majority of subjects.

DISCUSSION

This is the first known study to comprehensively assess the impact of individual factors and personality traits on the psychological problems of family members living with hospital staff working in hospitals with COVID-19 wards. As personality traits, lower extraversion was associated with depression and higher neuroticism was associated with anxiety. Higher Fear of COVID-19 Scale score was related to anxiety and depression. Regarding background factors, there were no items that were associated with anxiety or depression.

In the current study, the rates of participants with upper cutoff points of moderate depression or anxiety were 24.8% and 14.1%, respectively. A previous study conducted a questionnaire survey of families of COVID-19 frontline nurses. Mild, moderate, or severe depression in their subjects were reported as 22.6%, 71.4%, and 1.8%, respectively.[13] Another study on depression and anxiety of family members of hospital staff involved in frontline care of patients with COVID-19 reported that 29.4% of the subjects had depression

TABLE 2 Differences of Big Five score and Fear of COVID-19 Scale score between each HADS-A group.

	HADS-A ≤7	HADS-A ≥8	*p*
Big Five score, mean (SD)			
Extraversion	52.64 (11.03)	48.83 (13.42)	0.185
Neuroticism	46.56 (11.75)	57.89 (11.50)	<0.001*
Openness	47.54 (9.22)	51.17 (11.00)	0.130
Conscientiousness	50.08 (10.48)	51.78 (13.42)	0.536
Agreeableness	54.45 (10.11)	55.33 (8.86)	0.725
Total score of Fear of COVID-19 Scale, mean (SD)	18.71 (4.94)	22.44 (5.53)	<0.001*

Abbreviations: HADS-A, Hospital Anxiety and Depression Scale Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale Depression subscale.

*Significant differences.

In Big Five score, *p* value was set as <0.01. In Fear of COVID-19 Scale, *p* value was set as <0.05.

n = 145.

TABLE 3 Differences of Big Five score and Fear of COVID-19 Scale between each HADS-D group.

	HADS-D ≤7	HADS-D ≥8	*p*
Big Five score, mean (SD)			
Extraversion	53.94 (10.94)	45.07 (10.40)	<0.001*
Neuroticism	46.82 (12.34)	52.55 (11.01)	0.024
Openness	48.73 (9.17)	45.03 (10.31)	0.060
Conscientiousness	50.78 (10.72)	48.31 (11.31)	0.274
Agreeableness	55.44 (9.46)	51.03 (11.15)	0.032
Total score of Fear of COVID-19 Scale, mean (SD)	18.60 (4.91)	21.54 (5.50)	0.006*

Abbreviations: HADS-A, Hospital Anxiety and Depression Scale Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale Depression subscale.

*Significant differences.

In Big Five score, *p* value was set as <0.01. In Fear of COVID-19 Scale, *p* value was set as <0.05.

n = 145.

and that 33.7% of the subjects had anxiety.[12] The prevalence of depression in the Japanese general population was reported as 7.9% in 2013 before the COVID-19 pandemic,[31] but had risen to 17.3% in 2020 during the pandemic.[32] Meanwhile, the prevalence of anxiety in the Japanese general population during the COVID-19 pandemic has been reported as 10.9%.[32] Psychological scales were inconsistent across the current and previous studies, but the frequencies of depression and anxiety in our subjects were higher than those reported in a general population. This suggests that family members living with hospital staff on the frontline of COVID-19 are a high-risk population for psychological problems.

In this study, lower extraversion and higher neuroticism were associated with psychological problems. One study reported that higher extraversion was associated with the anguish of limiting social activity.[33] Conversely, another study showed that higher extraversion was correlated with better adaptation to the environment created by a pandemic situation.[34] Elsewhere, highly extraverted individuals were more optimistic because they tended to think that the pandemic would end sooner.[35] Individuals with higher levels of neuroticism were reported in one study to tend to pay close attention to COVID-19-related information and easily felt anxiety.[36] More recently, the relationship between personality traits and the COVID-19 pandemic was reviewed; in line with the results of our study, individuals with higher extraversion, agreeableness, and conscientiousness showed good adaptation to the pandemic and individuals with higher neuroticism showed poor adaptation.[37] Our results suggest that individuals with personality traits of lower extraversion and higher neuroticism are at higher risk for depression and anxiety in life under emerging infectious diseases.

Reasonably, Fear of COVID-19 Scale score was significantly associated with depression and anxiety in our subjects. This current study, conducted about 1 year after the beginning of the COVID-19 pandemic, suggests that fear of infection with COVID-19 continues to adversely affect mental health. However, this is a cross-sectional study, so a causality cannot be proven. Individuals with mental illness might be more likely to have a fear of COVID-19. Another study reported a correlation between the Fear of COVID-19 Scale score and anxiety, depression and stress measured by the Depression,

Anxiety and Stress Scale 21 in the general public in Israel.[38] In another, Fear of COVID-19 Scale scores were associated with decrease of job satisfaction and with increase of psychological distress among nurses on the frontline of COVID-19 care and with intention to leave their jobs.[39] The current study was conducted before wide-spread vaccination of the general population, so further investigation is needed to determine whether vaccination has reduced the fear of COVID-19 infection and its impact on mental health.

In this study, there was no significant relation between background individual factors and psychological problems. In another study, 845 families of hospital staff on the frontline of COVID-19 treatment in hospitals in Ningbo, China, were surveyed in February 2020, early in the COVID-19 pandemic. Risk factors for anxiety or depression were female sex, being parents or next of kin of hospital staff, and contact with positive or suspected COVID-19 patients within their family (hospital staff).[12] A later survey of families of COVID-19 frontline nurses showed that female sex and older age were risk factors of mental health problems.[13] Female sex was a risk factor for psychological problems in both two previous studies, whereas the current study showed no significant association between female sex and psychological problems. There is inconsistency between the studies regarding the age or relationship with the hospital staff, perhaps due to the difference in the distribution of subject demographics or survey period from the beginning of COVID-19 pandemic. Moreover, there was a relatively small number of samples in our study compared with previous studies,[12,13] potentially leading to beta error regarding association between psychological problems and risk factors.

In conclusion, among family members of COVID-19 frontline hospital staff, lower extraversion and higher neuroticism and fear of COVID-19 were associated with anxiety and depression. Preventive management based on the findings of risk factors for psychological problems is needed to effectively maintain mental health. The well-being of family members affects the quality of life of hospital staff who are working at hospitals with COVID-19 wards. This questionnaire survey was conducted before rollout of COVID-19 vaccination, so the findings of this study are expected to apply to other future outbreaks of infectious diseases.

AUTHOR CONTRIBUTIONS

Shun Takahashi and Momoko Buyo designed the study. Shun Takahashi, Momoko Buyo, Hiroko Kojitani, and Seiji Sato collected the data. Shinya Uenishi and Shun Takahashi performed the statistical analysis. Shinya Uenishi wrote the first draft and Shun Takahashi assisted writing the paper. Momoko Buyo, Seiji Sato, Hiroko Kojitani, Ryo Odachi, Toshiko Matsuoka, Yuka Okuda, Sohei Kimoto, and Masaya Hironishi provided feedback about data analysis and interpretation. All authors contributed to and have approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in the supplementary file.

ETHICS APPROVAL STATEMENT

The study protocol was approved by Wakayama Medical University institutional research board (reference number 3013).

PATIENT CONSENT STATEMENT

At the top page of the questionnaire, a written explanation about the study was provided for the subjects. They answered a question on consent to participation in the research, and this was considered to be informed consent.

CLINICAL TRIAL REGISTRATION

N/A.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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