JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Coronavirus Pandemic

Assessment on risk and stress of resident doctors during the COVID-19 pandemic

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Abstract

Introduction: It has been noted that post-traumatic stress disorder symptoms could be common in physicians who have experienced a traumatic event. The aim of this study was to determine the prevalence of post-traumatic stress disorder and contributing risk factors among resident doctors working in a tertiary care hospital during the COVID-19 pandemic.

Methodology: A cross-sectional study was conducted via an online survey from May to July 2020. Sociodemographic characteristics, exposure to the coronavirus, application of personal hygiene rules, presence and use of personal protective equipment, anxiety and prevalence of post-traumatic stress disorder were investigated.

Results: In total, 17.8% (n = 40) of 225 resident doctors who participated in the study had post-traumatic stress disorder. Working at a department serving to COVID-19 patients increased the risk of post-traumatic stress disorder by 2.9 times (OR = 2.936, p = 0.003) while contacting positive patients increased this risk by 2.6 times (OR = 2.607, p = 0.023) and lack of personal protective equipment by 3.6 times (OR = 3.656, p = 0.018). Anxiety scores were statistically significantly higher in women, married and those living with their parents or spouses and children (p = 0.049; p = 0.011; p = 0.004, respectively).

Conclusions: Working in a department serving to COVID-19 patients, contact with positive patients and lack of personal protective equipment were risk factors in the emergence of post-traumatic stress disorder in resident doctors. Anxiety was also found to be greater in women, married and those living with their families.

Key words: Anxiety; COVID-19 pandemic; post-traumatic stress disorder; personal protective equipment; resident doctors.

J Infect Dev Ctries 2021; 15(8):1080-1085. doi:10.3855/jidc.14877

(Received 08 February 2021 – Accepted 05 May 2021)

Introduction

The coronaviruses are known to cause respiratory infections in humans, ranging from the common cold to more severe diseases, such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). COVID-19 is an infectious disease caused by the most recently discovered coronavirus. This novel virus and disease originated in Wuhan, China, in December 2019 and spread expeditiously globally and eventually became a pandemic [1,2]. Undoubtedly, healthcare professionals comprise the groups that have been most exposed to the virus throughout this process. Healthcare professionals working under high-risk conditions are both physically and mentally frazzled. As with the COVID-19 pandemic, healthcare professionals were the group most often exposed to the virus during the SARS epidemic that emerged in 2003. Subsequent studies have shown that the psychological effects continued even after the SARS epidemic had ended. A significant reduction in social functioning and mental health was observed among healthcare professionals caring for patients suspected of SARS in a hospital in Taiwan compared to the control group [3]. Moreover, in a study conducted in Toronto during the SARS epidemic in which both infected healthcare professionals and their caregivers were evaluated, participants stated that they felt fear, loneliness, boredom, and anxiety and were concerned about infecting their family members and friends [4]. Another study conducted with 1,257 healthcare professionals in China during the COVID-19 outbreak found that 50.4% of the participants had experienced depression, 44.6% anxiety, 34% insomnia, and 71.5% stress [5]. The current COVID-19 pandemic is characterized by its unpredictable course, high mortality rates, and a lack of effective treatment. These conditions raise the risk of post-traumatic stress disorder (PTSD) in healthcare professionals dealing with the COVID-19 pandemic [6]. In fact, more than 8,000 cases of PTSD were detected in a study conducted in 26 countries during the 2003 SARS epidemic among infected healthcare professionals,

especially working in hospitals [7]. Therefore, it is important to evaluate risk factors and stress levels among resident doctors working under these conditions. The present study aims to determine the prevalence of PTSD in resident doctors working in a tertiary university hospital using the current DSM-5 diagnostic criteria and contributing risk factors.

Methodology

This cross-sectional study was conducted in a 3-month period between May and July 2020. The population of the study consisted of 438 resident doctors working in the Faculty of Medicine of Pamukkale University. A sample was not selected, and it was aimed to reach the entire population. Prior to the study, approval was obtained from the Research Ethics Committee of Pamukkale University, Faculty of Medicine (28.04.2020/08). A questionnaire with 25 items was used to survey sociodemographic characteristics, exposure to the virus, application of personal hygiene rules, presence and use of personal protective equipment and level of anxiety, determined after a literature review. The PCL-5 check-list evaluating PTSD prevalence was sent to the participants online, and the participants were asked to fill these forms. The criteria for inclusion in the study were working as a resident doctor in the university hospital and not having diagnosed with mental disorders such as depression, anxiety disorder and PTSD.

Table 1. Demographic characteristics of resident doctors.

	n (%)
Gender	
Woman	122 (54.2)
Male	103 (45.8)
Marital status	
Married	75 (33.3)
Single	150 (66.7)
Chronic disease	
Yes	34 (15.1)
No	191 (84.9)
Profession	
Basic medicine	14 (6.2)
Internal medicine	196 (87.1)
Surgical medicine	15 (6.7)
Smoking status	
Yes	190 (84.4)
No	35 (15.6)
COVID-19 suspected patient contact	
Yes	193 (85.8)
No	32 (14.2)
COVID-19 positive patient contact	
Yes	144 (64.0)
No	81 (36.0)
Experiencing a situation that will require COVID-19 quarantine	
Yes	50 (22.2)
No	175 (77.8)

The PTSD Checklist for DSM-5 (PCL-5)

The PCL-5 is a 5-point Likert type self-rating scale consisting of 20 questions evaluating post-traumatic stress disorder. Each of the items in the scale are scored between 0 and 4, and a total point between 0 and 80 can be received. Subscales of this scale are re-experiencing (questions 1–5), avoidance symptoms (questions 6 and 7), negative alteration (questions 8–14) and hyperarousal symptoms (questions 15–20). The validity and reliability of the scale for the Turkish language was performed by Murat Boysan *et al.* in 2017 and the recommended cut-off value was determined as ≥ 47 [8,9]. In this study, the Cronbach alpha value of the scale was 0.954 and the subscales for re-experiencing, avoidance symptoms, negative alteration, hyper-arousal symptoms were 0.876; 0.819; 0.884; 0.877, respectively.

Statistical Analysis

Statistical analysis was performed using IBM SPSS version 21.0. All the results of the quantitative variables were reported as either mean ± standard deviation or a frequency (percentage). Given the normal and non-normal distribution of the values, a t-test or Mann–Whitney U test and a one-way variance analysis (ANOVA) or Kruskal–Wallis test were performed to test whether demographic characteristics were correlated with PTSD symptoms and anxiety. Logistic regression analysis was performed to determine PTSD risk. A p-value < 0.05 was statistically significant.

Results

A total of 225 (51.3%) resident doctors participated in our study. The mean age of the resident doctors was 28.07 ± 3.02 years (min: 24; max: 41), and 54.2% (n = 122) were women. While 64.0% (n = 144) of the resident doctors stated that they had contact with a COVID-19 positive patient, 22.2% (n = 50) of them stated that they had experienced a situation that would require quarantine due to COVID-19 infection (Table 1).

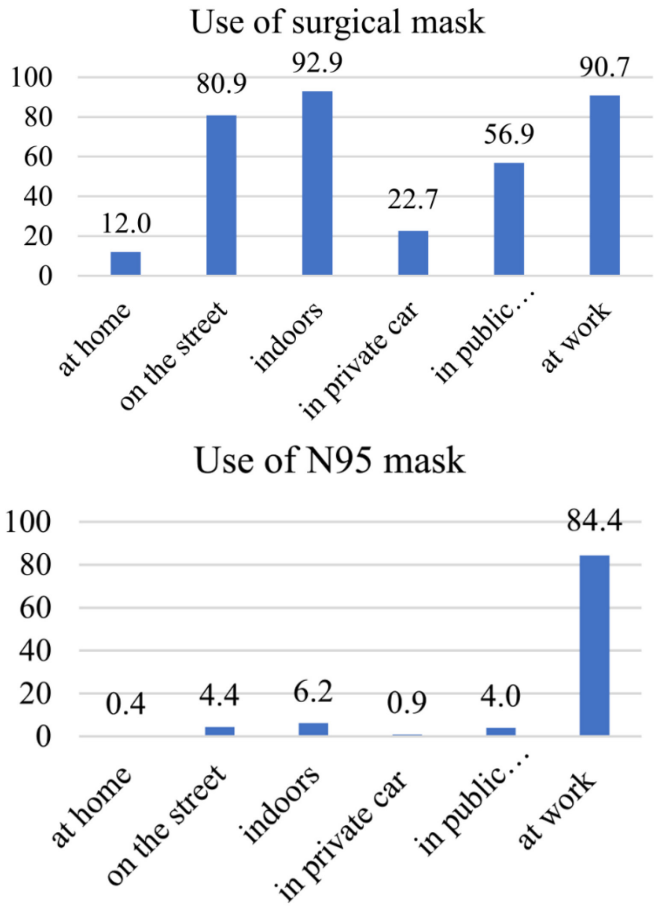
Inquiring the adequacy of personal protective equipment revealed that only 32.4% (n = 73) of the participants found it was adequate, while 54.7% (n = 123) stated that it was partially adequate, and 12.9% (n = 29) stated that it was inadequate.

Resident doctors were asked about the use of masks and 92.9% ($n = 209$) stated that they used surgical mask in public places and 90.7% ($n = 204$) in working environments, while 84.4% ($n = 190$) stated that they used N95 masks in working environments. Figure 1 shows the use of surgical and N95 masks by resident doctors.

Table 2 evaluates the handwashing facilities and hand hygiene behaviors of the resident doctors. It has been noted that only 28.9% (65) of these doctors had enough time for hand hygiene, and only 29.8% (67) had enough facilities for it. However, 87.6% (197) stated that they always washed their hands after contact with a patient's bodily fluids.

The anxiety mean score among resident doctors was 5.80 ± 2.28, and the PTSD mean score was 31.96 ± 16.42, with the mean score for re-experiencing 7.06 ± 4.20, avoidance symptoms 3.26 ± 2.09, negative alteration 11.84 ± 6.09, and hyperarousal symptoms 9.80 ± 5.54. PTSD was present in 17.8% ($n = 40$) of the resident doctors. The PTSD score was found to be statistically significantly higher among resident doctors who worked in a department related to COVID-19, had contact with a positive patient, and encountered a situation that would require quarantine than among those who did not encounter these situations ($p = 0.001$; $p = 0.003$; $p = 0.046$, respectively). Anxiety scores were found to be statistically significantly higher in females than in males, in married couples than in singles, in those living with parents or spouses and children than in those living alone and in nonsmokers than in smokers ($p = 0.049$; $p = 0.011$; $p = 0.004$; $p = 0.027$, respectively) (Table 3). In addition, logistic regression analysis revealed that working in COVID-19–related departments increases the risk of PTSD by 2.9 times (OR = 2.936, $p = 0.003$, 95% CI = 1.454–5.928) and positive patient contact by 2.6 times (OR = 2.607, $p = 0.023$, 95% CI = 1.138–5.973). On the other hand, the risk of developing PTSD was 3.6 times higher (OR = 3.656, $p = 0.018$ 95% CI = 1.246–10.726) for those who thought that they had inadequate personal protective equipment than for those who believed that they had adequate equipment.

Figure 1. Mask usage areas of resident doctors.



Discussion

Resident doctors working in hospitals during the COVID-19 pandemic have been at excessive risk of being infected by this virus. In our study, it was determined that 64.0% of the resident doctors had contacted a COVID-19 positive patient, and 22.2% had a situation that would require quarantine due to

Table 2. Working conditions, equipment use and hand hygiene status of resident doctors, n (%).

	Never	Sometimes	Frequently	Mostly	Always
Enough time for hand hygiene	-	20 (8.9)	51 (22.7)	89 (39.6)	65 (28.9)
Enough facility for hand hygiene	2 (0.2)	18 (8.0)	46 (20.4)	92 (40.9)	67 (29.8)
Washing hands before contact with the patient	6 (2.7)	37 (16.4)	56 (24.9)	64 (28.4)	62 (27.6)
Washing hands before asepsis	6 (2.7)	22 (9.8)	47 (20.9)	53 (23.6)	97 (43.1)
Washing hands after contact with the patient's body fluids	-	1 (0.4)	11 (4.9)	16 (7.1)	197 (87.6)
Washing hands after contact with the patient	-	8 (3.6)	23 (10.2)	58 (25.8)	136 (60.4)
Washing hands after contact with the 1-meter area around the patient	5 (2.2)	56 (24.9)	53 (23.6)	67 (29.8)	44 (19.6)

COVID-19. On the other side, the prevalence of PTSD among resident doctors was determined as 17.8%. In a study conducted with healthcare professionals in China during the COVID-19 pandemic, the prevalence of PTSD was shown to be between 3.8% and 31.6% [10-12], while the PTSD prevalence was found to be 16.7% in a study conducted on healthcare professionals in Greece [13]. In a study carried out on healthcare professionals in China during the SARS epidemic in 2003, the prevalence of PTSD was found to be 25.8%, while a study conducted on healthcare professionals in Singapore stated that 20% of the participants were diagnosed with PTSD [14,15]. We think this difference in the prevalence of PTSD may have been due to the scale used, the cut-off value of the scale and differences in the periods in which these studies were carried out during the outbreak. Furthermore, people who work in high-risk units such as isolated SARS services or have friends or close relatives who came into contact with SARS have been shown to be two to three times more likely to develop PTSD than those who were not exposed to these conditions [16]. Similarly, in our study, those working in polyclinics, services, etc. related to the novel coronavirus outbreak and those who had contacted positive patients were found to be at approximately two and a half times higher risk of developing PTSD.

Many studies have shown that psychiatric diseases such as anxiety, stress, depression and sleep disorders occurred in healthcare professionals during this pandemic [15,17,18]. Anxiety may result from possible positive patient contact and the possibility of being infected afterwards and even bringing the virus home and transmitting it to loved ones [13]. In our study, the anxiety levels were found to be higher in women, married and in those living with their parents or spouse

Table 3. Comparison of PTSD and Anxiety scores of resident doctors according to demographic characteristics.

	PTSB scores	Test / *p*	Anxiety scores	Test / *p*
Gender				
Woman	33.80 ± 15.95	t = 1.839	5.87 ± 2.30	z = -1.973
Male	29.78 ± 16.76	*p* = 0.67	5.72 ± 2.26	*p* = 0.049
Marital status				
Married	34.43 ± 16.58	t = 1.602	6.35 ± 2.11	z = -2.542
Single	30.72 ± 16.25	*p* = 0.111	5.53 ± 2.31	*p* = 0.011
Lived together				
Alone[1]	29.61 ± 16.37		5.23 ± 2.35	
With parents[2]	36.38 ± 18.25	kwh = 6.634	6.33 ± 1.91	kwh = 13.501
With spouse and children[3]	33.59 ± 15.19	*p* = 0.085	6.35 ± 2.08	*p* = 0.004
Other[4]	28.50 ± 14.71		6.00 ± 2.62	(1-2; 1-3)
Profession				
Basic medicine	34.29 ± 15.77		6.00 ± 2.14	
Internal medicine	31.73 ± 16.43	F = 0.171	5.75 ± 2.29	kwh = 1.379
Surgical medicine	32.67 ± 17.66	*p* = 0.843	6.27 ± 2.21	*p* = 0.502
Chronic disease				
Yes	30.38 ± 17.74	t = -0.605	5.82 ± 2.59	z = -0.213
No	32.24 ± 16.20	*p* = 0.545	5.80 ± 2.22	*p* = 0.831
Smoking status				
Yes	29.31 ± 18.07	z = -1.385	5.00 ± 2.07	z = -2.207
No	32.44 ± 16.10	*p* = 0.166	5.95 ± 2.07	*p* = 0.027
Work section				
Covid-19 section	37.52 ± 17.97	t = 3.388	6.37 ± 2.22	z = -2.446;
Other section	29.59 ± 15.16	*p* = 0.001	5.56 ± 2.26	*p* = 0.014
Suspected patient contact				
Yes	32.65 ± 16.30	t = 1.569	5.88 ± 2.31	z = -1.394
No	27.75 ± 16.72	*p* = 0.118	5.31 ± 2.02	*p* = 0.163
Positive patient contact				
Yes	34.38 ± 16.88	t = 2.999	5.95 ± 2.34	z = 1.331
No	27.65 ± 14.70	*p* = 0.003	5.53 ± 2.15	*p* = 0.183
Quarantine requirement				
Yes	36.04 ± 13.67	t = 2.008	6.26 ± 2.63	z = -1.626
No	30.79 ± 16.97	*p* = 0.046	5.67 ± 2.15	*p* = 0.104

z: Significance of difference determined using Mann Whitney U; kwh: Significance of difference determined using Kruskal walls test; t: Significance of difference determined using t-test; F:Significance of difference determined using ANOVA

and children. Likewise, Alzaid *et al.* showed that being a woman, living with family members and having a family history of COVID-19 increase the risk of anxiety disorder [19]. Studies have indicated that inadequate preventive measures increase the symptoms of anxiety and depression in healthcare professionals. In our study, it was demonstrated that lack of personal protective equipment increases the risk of PTSD. Lack of personal protective equipment causes risky working conditions, insecurity, and increased exposure to infections in healthcare professionals [18].

Masks play a crucial role in protecting healthcare professionals against respiratory system viruses, including COVID-19 [20]. Additionally, when the risk of infectious diseases in the respiratory tract is perceived as high, it is observed that the use of masks increases [21]. In this study, the use of masks was found to be common among the resident doctors. Surgical masks were found to be used more than N95 masks. Besides, it was determined that N95 masks were worn also outside in addition to working environments (indoor, public transportation, on the street). Similarly, Supehi *et al.* found that surgical masks were used at a rate of 60.1%, while N95 masks were used at a rate of 12.0% [20]. However, despite training provided to healthcare professionals about proper use of masks, it was observed that the use of N95 masks in low-risk areas was quite high [20]. This may be attributed to the belief that N95 masks are superior to surgical masks in protecting healthcare professionals against transmissible acute respiratory infections in clinical environments. A study conducted in China showed that 98.0% of resident doctors used surgical masks while going out, whereas 96.4% avoided visiting any crowded environment [22]. In the study conducted by Chen *et al.*, it was stated that resident doctors took various precautions to prevent and control the pandemic by decreasing meetings and social contacts in 97.4% and wearing a mask in 93.6% while going out, and avoiding crowded and closed places in 91.5% [23].

Hand hygiene has become an important practice in the USA with the emergence of the COVID-19 outbreak. Hand hygiene, including alcohol-based hand cleaning or hand washing, is a simple but effective way to prevent the spread of pathogens and infections in healthcare [24,25]. Although frequent hand washing was proven to slow the spread of COVID-19 and reduce the disease burden associated with COVID-19, as well as other respiratory infections [26], it was noted that only 28.9% (65) of doctors had enough time for hand hygiene, 29.8% (27) had always enough facilities for hand hygiene, and most of them stated that they washed their hands after contact with patients and the bodily fluids of patients. We attribute this to the intensive working conditions of resident doctors and that there might have been a shortage of available materials in the first periods of the pandemic. We are of the opinion that regular controls in terms of medical equipment and hand hygiene facilities are also important in terms of controlling the pandemic.

This study had some limitations. Since the study was conducted with resident doctors working in a tertiary university hospital in a single region, we cannot generalize these results for the whole society. Although the data collection instruments of the study were sent to all resident doctors, volunteerism was taken as the basis for participation.

Conclusions

In this study, 17.8% of the resident doctors were found to have PTSD, and this condition was independent of gender, marital status, specialty, disease status and the people the participants lived with. Working in a department related with COVID-19, contacting positive patients and inadequate personal protective equipment were also revealed to raise the risk of PTSD. Additionally, the anxiety among resident doctors was higher in the women, those who were married and those living with their parents or spouses and children. Although surgical masks were found to be more commonly worn by the resident doctors, the doctors did not always have enough time and facilities in terms of hand hygiene and hand washing.

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Conflict of interests: No conflict of interests is declared.