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Post-Traumatic Stress Symptoms among Nurses during the COVID-19 Pandemic: A Cross-Sectional Study

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Abstract

Background and Aim: The COVID-19 pandemic exposed nurses to repeated traumatic and stressful experiences, including direct contact with infected patients, fear of infection, prolonged workload, and exposure to severe illness and death. This study intends to evaluate post-traumatic stress symptoms among nurses during the COVID-19 pandemic.

Materials and Methods: In this descriptive cross-sectional study, 160 nurses were selected by simple random sampling from five hospitals affiliated with Shahid Beheshti University of Medical Sciences, Tehran, Iran. Data were collected using a demographic questionnaire, the Mississippi Scale for Posttraumatic Stress Disorder (M-PTSD) , and the 10-item Post-Traumatic Stress Disorder Reaction Index (PTSS-10). Data were analyzed using SPSS software version 26.

Results: Most nurses (76.9%) had moderate PTSD symptom, 17.5% had severe symptoms, and 5.6% had mild symptoms. On the PTSS-10 scale, 69.4% of the nurses obtained a score of above 5. Also, moderate symptoms were most frequent for re-experiencing/avoidance (60.62%), increased physical arousal (63.12%), and the behavioral domain (60.00%). No statistically significant differences were found between the nurses in terms of PTSD subscales or total score according to personal history of COVID-19 infection ($p \geq .05$).

Conclusion: A substantial burden of post-traumatic stress symptoms was observed among nurses during the COVID-19 pandemic. The absence of a significant association between PTSD and history of personal infection suggests that broader occupational and pandemic-related stressors may have contributed to this psychological burden. Routine screening and organizational/psychological support should be incorporated into pandemic preparation trainings.

Keywords: Stress disorders, post-traumatic, COVID-19, nurses, pandemics.

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Introduction

During the COVID-19 pandemic, post-traumatic stress symptoms were frequently reported among healthcare workers, particularly nurses [1-3]. A systematic review and meta-analysis of 119 studies involving 117,143 healthcare workers estimated the pooled prevalence of PTSD symptoms at 34%, with severe symptoms reported in approximately 14% of the participants [4]. Similarly, a meta-analysis of 55 studies from 26 countries reported a pooled PTSD prevalence of 29.1% among nurses. These findings indicate that post-traumatic stress symptoms were the important psychological consequences of COVID-19 pandemic among healthcare workers, highlighting the need for regular assessment in nurses exposed to prolonged pandemic-related occupational stress [5-6].

The COVID-19 pandemic began in December 2019, when the first cases of a novel coronavirus were reported in Wuhan, China. The COVID-19 pandemic rapidly became a global health emergency and generated substantial physical and psychological consequences. Anxiety, depression, fear, uncertainty, sleep disturbance, emotional changes, and trauma-related symptoms were reported during the pandemic [4,7-12]. Quarantine and isolation further increased emotional distress, depression, irritability, insomnia, anger, and post-traumatic symptoms. Fear of infection or transmission to others, prolonged quarantine, insufficient support, limited access to healthcare, fatigue, and boredom are among the factors that may intensify psychological distress [7,10-12].

Healthcare workers were among the first groups directly exposed to these conditions. During COVID-19, they faced repeated contact with infected patients, changing clinical conditions, increased workloads, shortages or burdens associated with protective equipment, and concerns about transmitting infection to family members [13-15]. Evidence from SARS and other infectious disease outbreaks has shown that healthcare workers may experience anxiety,

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acute stress, fatigue, insomnia, impaired concentration, and reduced occupational performance after prolonged exposure to such pandemics [16-17].

Nurses are particularly vulnerable because of their continuous bedside contact with patients and responsibility for monitoring, treatment, communication, and end-of-life care. Nursing is inherently stressful, and caring for patients with severe injuries or life-threatening illness may increase the risk of post-traumatic symptoms [17-19].

Studies during COVID-19 and earlier outbreaks have reported substantial psychological issues among nurses, including acute stress and PTSD-related symptoms, particularly among those working in intensive care and frontline settings [20-24].

International evidence continues to demonstrate a substantial burden of PTSD among healthcare workers during COVID-19[25-28]. Systematic reviews and meta-analyses have reported considerable variation in PTSD prevalence according to population, measurement instrument, timing, and clinical context [29-31]. Iranian studies have similarly reported PTSD, perceived stress, burnout, and secondary traumatic stress among frontline nurses and medical staff during Covid-19 pandemic [32-35]. These findings indicate that the psychological effects of pandemic may extend beyond personal infection because nurses can experience repeated occupational exposure, fear, uncertainty, witnessing severe illness and death, and concern for family members even when they themselves remain uninfected.

Given the prolonged exposure of nurses to COVID-19-related stressors and the potential consequences for individual well-being and health-system functioning, this study aimed to evaluate PTSD symptoms among nurses working in five hospitals affiliated with Shahid Beheshti University of Medical Sciences in Tehran and to compare symptom scores according to personal history of COVID-19 infection.

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Methods

A descriptive cross-sectional study was conducted from 2020 to 2021, from January 2020 to June 2021, during the COVID-19 pandemic in five hospitals affiliated with Shahid Beheshti University of Medical Sciences in Tehran, Iran. Simple random sampling was used to select 160 participants from among eligible nurses working in the selected hospitals, based on the lists of nurses available in the nursing offices of the hospitals.

The list of nurses who met the inclusion criteria was compiled. Subsequently, 160 nurses were randomly selected from the list. The inclusion criteria were: 1) being a nurse of either sex; 2) holding a bachelor's degree in nursing or a higher academic degree; 3) being employed at one of the selected hospitals affiliated with Shahid Beheshti University of Medical Sciences in Tehran; 4) having at least one year of work experience; 5) providing informed consent to participate in the study; and 6) self-reporting no history of mental health disorders. The exclusion criteria were voluntary withdrawal from the study at any stage of data collection and submission of an incomplete questionnaire.

The selected nurses were informed about the study objectives, and those who provided informed consent participated in the study. Ethical approval was obtained from the Ethics Committee of Tehran Medical Sciences Branch, Islamic Azad University, under the code: IR.IAU.TMU.REC.1400.054. Participation was voluntary, and participants were free to accept or decline participation in the study without any consequences. Written informed consent was obtained from all participants before their participation in the study.

Initially, detailed explanations regarding the objectives and procedures of the study were provided to the participants. Participation was voluntary, and participants were free to accept or decline participation in the study without any consequences. Written informed

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consent was obtained from all participants before their participation in the study.

Data were collected using a demographic information questionnaire, the Mississippi Scale for Posttraumatic Stress Disorder (M-PTSD) and the Post-Traumatic Stress Disorder Reaction Index.

The Mississippi Scale for Posttraumatic Stress Disorder (M-PTSD), developed by Vreven et al. in 1995. It consists of 35 items rated on a five-point Likert scale from "not at all true" to "completely true," based on DSM-III diagnostic criteria, and includes four subscales: avoidance and re-experiencing, withdrawal and emotional numbness, arousal, and lack of control and self-harm. Mississippi Scale for Posttraumatic Stress Disorder (M-PTSD) has total scores ranging from 35 to 175. Based on the classification used in previous research, Scores of 35–70 are categorized as mild, scores of 70–107 as moderate, and scores of 107–175 as severe levels of post-traumatic stress symptoms. Therefore, the severity categories reported in the present study were based on these established scores range [18]. Construct validity was confirmed through confirmatory factor analysis, and significant convergent validity was reported with questionnaires assessing stressful life events [19]. The Persian version showed reliability coefficients of 0.92 for internal consistency, 0.92 for split-half reliability, 0.91 for one-week test–retest reliability, and 0.82 using the checklist peer method. Vreven et al. reported a Cronbach's alpha of 0.84, [20], while Goodarzi reported a test–retest reliability of 0.91 for the Persian version [21].

Post-traumatic Stress Disorder Reaction Index developed by Lundin and Weisaeth in 1989[22]. This questionnaire assesses the severity of an individual's reaction to a traumatic event. Post-traumatic Stress Disorder Reaction Index consists of 10 items, using a seven-point scale ranging from "never" to "always" with each item scored from 0 to 1. Responses 1–3 were scored as 0 and responses 4–7 as 1; a total score above 5 indicates a severe response to a traumatic event. Higher scores indicate greater severity

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of post-traumatic stress symptoms. The scoring procedure and interpretation of the total score have been clarified in the methods section to facilitate interpretation of the mean scores reported in Table 3[18]. The scale was examined by Lundin and Weisaeth in 1989 and 1992 using factor analysis, yielding r=.32, [22]and its validity was also confirmed in Iran through factor analysis by Mirzamani et al [23].

Its reliability was confirmed by Lundin and Weisaeth using Cronbach's alpha (.85) [22], while Ahmadi et al. reported a Cronbach's alpha of.92 for the Iranian version 20[36]. Because the validity of the Persian versions of these instruments had previously been established by other researchers in Iran, no additional validity testing was performed in the present study. Reliability in the present study was assessed using internal consistency and Cronbach's alpha.

All questionnaires in this study were coded anonymously to ensure confidentiality, and the data were analyzed using SPSS software, version 26. Descriptive statistics were used to summarize demographic characteristics and PTSD-related variables. Independent-samples t-tests were used to compare PTSD scores according to participants' history of COVID-19 infection. A *p*-value of less than.05 was considered statistically significant. Data were analyzed using SPSS software, version 26.

Results

The demographic findings showed that 75.0% of participants were female, 61.3% were married, and most of them worked in intensive care units (23.1%). More than half of the nurses had no children (56.3%), and 70.6% reported no history of physical illness. Most participants (55.6%) reported no personal history of COVID-19 infection, while 44.4% reported COVID-19 infection among family members. Approximately 80% of them had received vaccination at the time of the study, and 59.4% had received two vaccine doses. Table 1 shows the severity of PTSD symptoms among nurses.

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Table 1. Severity of PTSD symptoms of nurses

Severity of PTSD symptoms	Frequency	Percent
Mild (<65)	9	5.6
Moderate (65–130)	123	76.9
Severe (>130)	28	17.5
Total	160	100.0

Most nurses (76.9%) experienced moderate PTSD symptoms, whereas 17.5% had severe and 5.6% had mild symptoms. Based on the PTSS-10 scale, 69.4% of the participants obtained a score above 5, indicating a strong traumatic stress response. The distribution of nurses according to the severity of PTSD symptoms is presented in Table 2.

Table 2. Severity of PTSD symptoms among participating nurses

Subscales of Post-Traumatic Stress Symptoms	Mild n (%)	Moderate n (%)	Severe n (%)	Total n (%)
Re-experiencing/avoidance	18 (11.25)	97 (60.62)	45 (28.13)	160 (100)
Numbing/emotional responsiveness	70 (43.75)	68 (42.50)	22 (13.75)	160 (100)
Increased physical arousal	38(23.75)	102 (63.12)	22 (13.75)	160 (100)
Behavioral/masochism domain	14 (8.75)	96 (60.00)	50 (31.25)	160 (100)

Moderate symptoms were the most prevalent severity level in three domains: increased physical arousal (63.12%), re-experiencing/avoidance (60.62%), and behavioral symptoms (60.00%). In contrast, mild symptoms were the most prevalent in the numbing/emotional responsiveness domain (43.75%), followed by moderate symptoms (42.50%). The distribution of PTSD symptom severity across the four domains is presented in Table 2.

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Table 3. Comparison of stress symptom severity according to history of COVID-19 infection

Severity of stress symptoms	History of COVID-19	No history of COVID-19	Total
	n (%)	n (%)	n (%)
Mild	21 (22.8)	23 (33.8)	44 (27.5)
Moderate	53 (57.6)	33 (48.5)	86 (53.8)
Severe	18 (19.6)	12 (17.6)	30 (18.8)
Total	92 (100.0)	68 (100.0)	160 (100.0)
χ^2	2.396		
p	.302		

Moderate stress symptoms were the most frequently observed severity level among nurses, accounting for 53.8% of the total sample, followed by mild (27.5%) and severe symptoms (18.8%). The proportion of nurses with mild stress symptom severity was higher among those without a history of COVID-19 infection (33.8%) than among those with a history of infection (22.8%). However, no statistically significant association was found between a history of COVID-19 infection and the severity of stress symptoms ((\chi^2 = 2.396), (p =.302)). The comparison of stress symptom severity according to COVID-19 infection history is presented in Table 3.

Discussion

This study demonstrated a substantial burden of PTSD symptoms among nurses during the COVID-19 pandemic. Most participants (76.9%) had moderate symptoms, 17.5% had severe symptoms, and 69.4% exceeded the PTSS-10 threshold. The findings suggest that, despite increased knowledge about transmission, control measures, and vaccination compared with the early phase of the pandemic, nurses continued to experience considerable psychological stress. The prevalence of moderate symptoms in the present study differs from the more severe pattern reported by Ismaili Dolabi Nejad and colleagues who reported 88% of medical staff had severe PTSD during the early phase of COVID-19 [24]. This difference may reflect the timing of assessment, greater experience with disease management, vaccination, and adaptation to infection-control procedures.

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Sirati Nir and colleagues also reported a high level of perceived stress among healthcare workers during the pandemic, while earlier outbreak research had documented severe psychological reactions among healthcare personnel [25]. The PTSS-10 findings reinforce the overall results and indicate that 69.4% of nurses had a score of above 5. Previous research involving healthcare workers during SARS outbreak demonstrated that exposure to severe infectious outbreaks can produce persistent trauma-related symptoms similar to those observed after other major disasters [27]. Jiang and colleagues also reported substantial post-traumatic symptoms during COVID-19 and identified previous experience with dangerous situations as an important correlate [28]. In the present study, re-experiencing/avoidance symptoms were moderate in 60.62% of the nurses, indicating that a substantial proportion of participants experienced persistent trauma-related symptoms. This finding is consistent with the studies done by Ismaili Dolabi Nejad and colleagues and d'Ettorre and colleagues, which reported substantial trauma-related symptoms among healthcare workers [24,29]. The relatively high prevalence of moderate symptoms in the present study may reflect the considerable psychological burden associated with working in a high-stress healthcare environment during the COVID-19 pandemic. Numbing and emotional responsiveness were mild in 43.75% of the participants in this study, suggesting that although emotional detachment was generally less pronounced, a considerable proportion of nurses still experienced some degree of reduced emotional responsiveness. This finding is broadly consistent with previous studies among healthcare workers and pandemic-exposed populations [28]. Increased physical arousal was moderate in 63.12% of the participants. This result is consistent with previous research demonstrating high stress responses among healthcare workers during infectious disease outbreaks [21,29]. Physiological arousal may reflect persistent fear of infection, repeated exposure to critically ill patients, sleep disturbance, high

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workload, and difficulty disengaging psychologically from the clinical environment. The severity of behavioral domain was moderate in 60.00% and severe in 31.25% of the participants. Although this domain was less consistently reported in previous studies, its presence suggests that trauma-related responses may extend beyond intrusive symptoms and arousal to behavioral and emotional regulation. Such symptoms may affect nurses' functioning, communication, and ability to recover between shifts. An important finding was the absence of a statistically significant difference in PTSD symptoms between nurses with and without a personal history of COVID-19 infection. This finding is consistent with the report of Ismaili Dolabi Nejad and colleagues [24]. Personal infection may therefore be only one component of pandemic-related psychological exposure. Nurses without a documented infection may also had daily contact with infected patients, fear of becoming infected, concern about transmitting infection to relatives, prolonged use of protective equipment, and repeated exposure to severe illness and death. In the present study, no significant association was found between a history of COVID-19 infection and the severity of PTSD symptoms among nurses. This finding suggests that the experience of post-traumatic stress symptoms was not necessarily limited to nurses with a personal history of COVID-19 infection. Previous studies have also highlighted the importance of occupational and organizational factors in the psychological well-being of healthcare workers. Greenberg and colleagues emphasized the need to protect healthcare workers' mental health during the COVID-19 pandemic, while guidance for hospital planners recommended early psychological interventions for staff exposed to pandemic-related stress [16,24].

The absence of an association between infection history and PTSD symptoms may be explained by factors such as high workload, uncertainty, inadequate rest, staffing pressures, and a perceived lack of control over working conditions. Therefore,

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organizational and occupational stressors may have played an important role in the development of psychological symptoms among nurses, regardless of their personal history of COVID-19 infection. The present findings are also consistent with broader systematic evidence. Reviews have reported PTSD and related psychological symptoms among healthcare workers during COVID-19, with considerable variation across settings [27-29,32-35]. Recent meta-analytic evidence continues to show that nurses and other frontline healthcare workers constitute a psychologically vulnerable group [32-35]. Iranian evidence similarly demonstrates substantial occupational stress, secondary traumatic stress, and professional quality-of-life challenges among nurses during the pandemic [21,22,36].

The findings have implications for nursing management and health policymakers. Psychological screening should be incorporated into occupational health programs, particularly during prolonged infectious disease emergencies. Screening should be accompanied by confidential counseling, peer-support mechanisms, adequate staffing, rest and recovery opportunities, and referral pathways for nurses with clinically significant symptoms. Organizational interventions are essential because individual coping strategies cannot fully compensate for sustained occupational exposure.

This study has limitations. Its cross-sectional design prevents causal inference and does not allow evaluation of changes in symptoms over time. The instruments were self-report screening tools and therefore do not establish a clinical diagnosis of PTSD. The study was conducted in five hospitals affiliated with one university, which may limit generalizability. In addition, factors such as previous traumatic experiences, sleep, social support, workload, burnout, and perceived organizational support were not comprehensively assessed.

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Conclusion

A substantial burden of post-traumatic stress symptoms was observed among nurses during the COVID-19 pandemic. Most nurses had moderate symptoms, while a considerable proportion had severe symptoms, particularly in the domains of re-experiencing/avoidance and increased physical arousal. Personal history of COVID-19 infection was not significantly associated with the severity of PTSD symptom, suggesting that broader occupational and pandemic-related stressors may be important contributors. Hospitals and health systems should incorporate routine psychological screening, early intervention, peer support, adequate staffing, and accessible mental health services into preparation plans for future infectious disease emergencies.

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Conflict of Interest

The authors declare no conflict of interest.

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