



Original Article

The Role of Stress of Covid-19 Infection during Work Shifts, and Nurses' Emotional Exhaustion Under Covid-19 Conditions

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ABSTRACT

Background: The sudden outbreak of the novel coronavirus has caused a wave of concern throughout society and among medical staff members. Consecutive peaks, persistent stress, along with disorders caused by work shifts lead to physical weakness and psychological complications over time. The aim of the present study was to investigate the effect of work shifts under Covid-19 conditions on the emotional exhaustion of medical staff members with the mediating role of stress of Covid-19 infection.

Methods: This applied and descriptive field research was conducted cross-sectionally in 2020. The statistical population included 250 nurses from Imam Khomeini Hospital in Amol city, Iran. A total of 150 individuals were selected using Morgan Table and simple random sampling methods. A standard questionnaire with confirmed validity and reliability was used as the data collection instrument. To perform data analysis, the structural equation modeling method was used to measure the fit of the research model and test the hypotheses in SPSS ver. 22 and Amos ver. 22 software.

Results: The results showed that disorders caused by work shifts had a significant effect on the emotional exhaustion and stress of Covid-19 infection in nurses on a medical staff. Stress of Covid-19 infection had a significant effect on nurses' emotional fatigue. The mediating role of stress of Covid-19 infection in the relationship between work shifts and emotional exhaustion was also confirmed.

Conclusion: The transmission rates of different types of Covid-19 mutations with consecutive peaks have caused constant stress in nurses. Related disorders caused by work shifts and the large number of patients and hospitalizations will lead to a lack of energy and of concentration in nurses, which in turn will lead to poor performance, reduced quality of life, and ultimately emotional fatigue.

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Introduction

Nursing is considered as one of the most important professions in the healthcare field today. Apart from its key importance, nursing also includes a large and important part of the population working in healthcare. Because of its special circumstances, such as constant contact with patients, being responsible for human

health, performing clinical procedures, dealing with emergencies, and work shifts, this profession has its own stressful consequences that can reduce the quality of patient care in health professions [1, 2]. Furthermore, today's world is contending with a virus called Covid-19 which belongs to the corona family presents with symptoms such as fever, cough, and shortness of breath [3]. The first case of Covid-19 was reported in December 2019 in Wuhan, China, and since then, this virus has caused unprecedented and widespread disorder in human societies [4]. The unpredictable nature and rapid spread of the disease at younger ages in subsequent mutations of the

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virus and changes in virus behavior have caused concern in individuals, sometimes leading to psychological and social disorders, especially for high-risk and vulnerable groups such as people with underlying diseases and older adults [5]. Among these, the most important fighting group, who rightly remind everyone of their selfless sacrifice, comprises hospital staff and nurses. The nature of nurses' job, which is linked to human relationships and empathy for patients, can lead to psychological complications, and harmful occupational factors such as work shifts can lead to emotional exhaustion even under normal situations [6]. One of the adverse effects of the Covid-19 disease is increased anxiety due to Covid-19 infection, which leads to emotional exhaustion in people who experience it continuously [7, 8].

Stress refers to a state of tension in which a set of psychological, physiological, and behavioral changes occurring as a result of the continuation of threatening stimuli in the work environment [9]. Stress is a type of anxiety, stress, worry, and fear [10]. It is an emotional and physiological state that affects productivity and health [11] and manifests in the form of mental and physical exhaustion, irritability, anger, anxiety, hypertension, lack of self-confidence, and a lack of motivation at work [12]. Stress always disrupts the mental-physical balance of a person [13] and reduces a person's efficiency in various aspects of work, family, and social life by creating problems [14]. During the Covid-19 pandemic, nurses experience a wide range of work stress when they think that the disease is threatening themselves and/or their relatives, family members, and friends [15]. Consequences of stress at the workplace include burnout and emotional exhaustion [14]. Emotional exhaustion is the feeling of exhaustion caused by work which occurs when a person suffers from burnout. It is a process that starts first from the physical state and then leads to mental exhaustion, decreased capability, and ultimately a reduced desire to do anything [16]. In fact, fatigue arises from feelings of stress and failure due to worry about the inability to perform professional activities [17]. The negative effects of emotional exhaustion affect both the individual and the organization. At the individual level, emotional exhaustion is associated with depression, sleep and digestive disorders, and at the organizational level, it is associated with poor performance and reduced feelings of unity and compatibility [18]. One of the risk factors for nurses' emotional exhaustion is work shifts [6], which include working hours other than daily working hours and cause physical problems such as digestive and blood pressure issues [19] as well as mental and psychological problems such as burnout [6]. Because of the large number of clients and unforeseen hospitalizations of patients during the Covid-19 pandemic as well as the absence of some nurses, the number of staff is decreased. Consequently, work shifts become more intensive, and nurses are forced to work longer hours, which in turn makes them more prone to emotional exhaustion. Studies on the spread of coronavirus-like diseases, like SARS, have shown that disorders such as stress and anxiety caused by infectious diseases affect the quality of performance of healthcare workers.

Studies on coronavirus diseases such as SARS have shown that disorders such as stress and anxiety caused by infectious diseases strongly affect the quality of performance of healthcare workers [20]. In their article titled "The effect of time pressure on emotional exhaustion of healthcare frontline staff during Covid-19 disease," Wang et al. concluded from their study results that increasing the number of visits and a lack of time for patients increase the emotional exhaustion of healthcare providers. Rahmani et al. found in their study that Covid-19-related anxiety increases burnout and emotional exhaustion in hospital staff in southeastern Iran [8]. Bahmani et al. showed a significant positive relationship between stress of Covid-19 infection and work shifts of nurses [5]. In a study conducted in Al-Zahra Hospital, Habibi et al. showed a positive and significant relationship between work shifts and emotional exhaustion [6]. Considering the effect of stress caused by this disease on medical staff, the importance of the health of these guardians of public health, and Covid-19-related psychological disorders affecting medical staff, the present research was conducted to investigate the effect of work shifts on emotional exhaustion among healthcare workers during the Covid-19 pandemic taking into account the mediating role of stress of Covid-19 infection.

Methods

This applied and analytical research was conducted cross-sectionally in 2020 at Imam Khomeini Hospital in Amol County. The study population comprised 250 nurses employed at Imam Khomeini Hospital who had at least one year of work experience. The participants included 148 people selected using the Morgan Table method. Considering the possibility of non-return of a number of questionnaires, 155 people were selected from the members of the study population using the simple random sampling method, and 150 questionnaires were completed and analyzed. A standard questionnaire was used to collect data. The Barton Standard Shiftwork Index includes questions on the adverse physical effects of work shift and the adverse effects of shift work on the individual and on social and family life, which were scored on a 5-point Likert scale ranging from strongly disagree to strongly agree [21]. Emotional exhaustion was measured using the Maslach questionnaire, the questions of which were scored on a 5-point Likert scale ranging from completely agree to completely disagree [22]. The Lin & Ahorsu COVID Stress Scale consists of seven items scored on a 5-point Likert scale ranging from strongly disagree to strongly agree [23].

The current study was approved by the local ethics committee with reference number IR.PNU.REC.1399.68646. Participation in the research was voluntary, and subjects could leave the research at any time they desired. Informed consent was attained from each participant.

Content and convergent validity were used to assess the validity, and Cronbach's alpha method and composite reliability were used to test the reliability of the questionnaire. The reliability coefficient for the research variables is presented in Table 1.

Table 1: Cronbach’s alpha coefficients and reliability and validity of research variables

| Index | Cronbach’s alpha coefficients | CR | AVE |
|----------------------|-------------------------------|-------|-------|
| Work shift | 0.844 | 0.859 | 0.693 |
| Emotional exhaustion | 0.870 | 0.801 | 0.740 |
| Covid-19 stress | 0.766 | 0.821 | 0.550 |

CR: Composite reliability, AVE: Average variance extracted

The closer the Cronbach’s alpha index is to 1, the greater the inter-item correlation and the more homogeneous the questions will be. Cronbach suggested a reliability coefficient of 45% as low, 75% as moderate and acceptable, and 95% as high. In many references, values above 0.7 are considered desirable. Composite reliability is a criterion that compares to Cronbach’s alpha; constructs are calculated not absolutely but according to their inter-construct correlations. A standard CR value (0.7) indicates the appropriateness of the criterion. The average variance extracted (AVE) criterion represents the average variance shared between each construct and its indices. Standard AVE values (0.5) indicate the appropriateness of the criterion. The research indices have the desired reliability (Table 1).

Results

The demographic characteristics of the sample members showed that 80% were women and 20% were men. Among the participants, 2% had an associate degree, 78% had a bachelor’s degree, and 20% had a master’s degree. A total of 62% of the participants had permanent and temporary-to-permanent employment status, and 38% were contractually employed. The mean age of participants was estimated as 35 years.

The Kolmogorov-Smirnov test was used to ensure the normal distribution of the collected data. We tested the

null hypothesis suggesting that the data distribution is normal at $\alpha=5\%$. Therefore, if a test statistic is equal or greater than 0.05, the data distribution is considered normal. The results of this test are shown in Table 2.

The significance level (sig) of research indices is more than 0.05, and because the results of the Kolmogorov-Smirnov test confirmed normal distribution, parametric statistics were used to test hypotheses and other statistical tests. Therefore, to confirm the model and test the hypotheses, structural equation modeling was used in Amos ver.22 software. The two partial indices of critical value of CR and P were used to test the significance of the hypotheses. Considering the P value<0.05, the critical value should be greater than 1.96, and lower values are not considered important in the model. A P value>0.05 indicates a significant difference between the calculated value for regression weights with zero at 0.95 confidence interval. To test the research hypotheses, structural equations and Amos ver. 22 software were used (Figure 1).

To fit the above model, Analysis of Moment Structures (AMOS) ver. 22 software was used, the general indices of which are shown in Table 3.

To explain the values of the fit indices in the above table, it is necessary to mention that a CIMN/DF index value between 1 and 3 indicates the optimal model fit. The other three indices are NFI, IFI, and CFI, the values of which are always between 1 and 0. The closer this number is to 1, the better the model fit. RMSEA is another model

Table 2: Results of Kolmogorov-Smirnov test

| Indices | Kolmogorov-Smirnov test | Sig |
|------------------------------|-------------------------|-------|
| Work shift | 1.428 | 0.074 |
| Emotional exhaustion | 1.404 | 0.089 |
| Stress of Covid-19 infection | 1.334 | 0.072 |

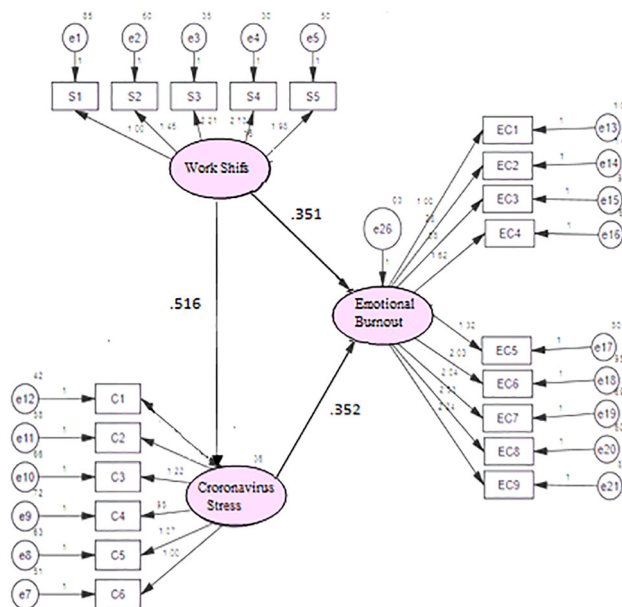


Figure 1: Regression coefficients in standard model mode

Table 3: Results of testing the fitness indices of the conceptual model

| RMSE | IFI | RFI | CFI | NFI | GFI | P | CIMN/DF |
|-------|-------|-------|-------|-------|-------|-------|---------|
| 0.068 | 0.913 | 0.908 | 0.917 | 0.941 | 0.921 | 0.000 | 2.786 |

RMSE: root mean square error of approximation, IFI: incremental fit index, RFI: relative fit index, CFI: comparative fit index, NFI: normed fit index, GFI: goodness of fit index; P: P value, CIMN/DF: Chi-square/degree of free

Table 4: Results of hypothesis testing

| Hypothesis | Regression coefficients | Critical value (CR) | P value | Result |
|--|-------------------------|---------------------|---------|-----------|
| Work shifts affect nurses' emotional exhaustion. | 0.351 | 2.785 | 0.000 | Confirmed |
| Work shifts affect the stress of Covid-19 infection in nurses. | 0.515 | 6.151 | 0.000 | Confirmed |
| Stress of Covid-19 infection affects nurses' emotional exhaustion. | 0.352 | 3.246 | 0.000 | Confirmed |

fit index, the appropriate value of which is less than 0.1. It can be observed that the conceptual model of the research has optimal fit indices (Table 3). Considering the results of model analysis, the research hypotheses were investigated, and the results are presented in Table 4.

Discussion

The present study investigated the effect of work shifts on nurses' emotional exhaustion during the Covid-19 pandemic with the mediating role of stress of Covid-19 infection. The results indicated that 95% of work shifts (regression coefficient=0.351 and critical value=2.785) had a positive and significant effect on the emotional exhaustion of the medical staff (Table 4), which is consistent with the results achieved by Habibi et al., who found that rotating shifts have the greatest effect on emotional exhaustion among the burnout dimensions of staff working at Al-Zahra Hospital. Furthermore, the Covid-19 pandemic and subsequent increase in the number of referrals and related care exacerbated the normal disorders caused by work shifts, such as gastrointestinal diseases, insomnia, hypertension and the exhaustion process. Regarding the second hypothesis of the research, work shifts (regression coefficient=0.515 and a critical value=6.151) have a positive and significant effect on stress of Covid-19 infection, which is consistent with a study by Bahmani et al., who found a higher level of fear of Covid-19 infection in nurses due to fatigue, physical weakness, and disorders caused by shift work, which is also exacerbated by the unfavorable conditions of isolated patients. Regarding the third hypothesis of the research, it can be stated that the stress of Covid-19 infection with a regression coefficient of 0.352 and a critical value of 3.246 has a positive and significant effect on the emotional exhaustion of the medical staff, which is consistent with the results of Rahmani et al. as well as those of Wang et al. They found in their studies that workplace stressors are the main cause of reduced performance and, ultimately, emotional exhaustion of employees. Stress is the main cause of emotional exhaustion in nursing due to its occupational nature. This process is accelerated due to the frequency of referrals and hospitalizations and the high prevalence of the Covid-19 disease.

Conclusion

The results of the present study revealed that both Covid-19 disease and work shifts affect the emotional

exhaustion of nurses during the pandemic, which can, in turn, endanger the mental health of nurses. Therefore, effective measures include paying double attention to work shifts of nurses and control measures, developing special shifts for Covid-19 disease, selecting appropriate shift workers, training shift workers, providing protective interventions such as adequate protective equipment, and paying attention to regular rest; providing the right conditions for sleep hygiene, social support, and incentive and motivational interventions can also be effective. Considering that the stress of Covid-19 infection weakens both the immune system and the psychological well-being of people, emotional exhaustion can be prevented by identifying people suffering from mental distress, giving psychological training and solutions to achieve peace, sharing information about the physical and mental effects of the disease, creating empathy, signing contracts with the temporary labor force to reduce the workload, arranging shifts with shorter working hours, and applying nurse job rotation.

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Conflict of Interest: None declared.

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