Original Article

Workload Status and Its Relationship with Job Stress in Nurses during the COVID-19 Pandemic

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Abstract

Background and Purpose: Currently, the high prevalence of COVID-19 and increased workload in hospitals has posed a threat to the physical, mental, and emotional health of nurses. The present study was an attempt to investigate the workload and its relationship with job stress of nurses in COVID-19 reference hospitals in southern Iran.

Materials and Methods: This descriptive-analytical and cross-sectional study was conducted in 2021 on 431 nurses from COVID-19 reference hospitals in southern Iran. Data collection tools included the NASA workload and OSIPOW job stress standard questionnaires. Data were analyzed using t-test, ANOVA, and Pearson correlation coefficient in $SPSS_{23}$ Software and at a significance level of 0.05

Results: The mean age and work experience of the nurses participating in the study were 31.03 ± 5.23 and 6.42 ± 4.61, respectively. The mean scores of the workload and job stresses were 83.64 ± 17.24 (of 100) and 236.68 ± 16.54 (of 300), respectively. Mental load dimension (85.81 ± 19.31, of 100) among workload dimensions and role workload dimension (43.62 ± 19.14, of 50) among job stress dimensions had the highest mean score. Thus, there was found a statistically significant relationship between workload and job stress of nurses ($P = 0.04$, $r = 0.19$).

Conclusion: Workload and job stress of the studied nurses were estimated at a high level. There was a significant positive correlation between these two variables, and increasing workload resulted in an increase in job stress.

Keywords: Workload; Job Stress; Nurses; COVID-19

1. Introduction

The prevalence of a new coronavirus called the COVID-19 virus in 2020 and its rapid pandemic in the world have imposed much material and emotional cost on various countries (1). The rapid spread of the virus in different countries has resulted in a heavy burden of infection and hospitalization such that in less than three months up to March 15 of 2020, 163,000 people around the world were infected with this virus. Besides, lack of definitive specific treatment has caused more than 6,000 deaths during this period (2).

The outbreak of Covid-19 has disrupted the natural life processes of people in the countries affected by the pandemic (3). This disease has a high physical and mental load due to its high spreading power (4). Findings from a study in China indicated that Covid-19 has been a major public health concern internationally and posed a major challenge to physical and mental health (5). On the other hand, in the face of public health crises, people are usually prone to various physical and mental problems (6).

The current COVID-19 pandemic status is acute and at a worrying level worldwide. Therefore, countries face various challenges in providing resources to control and treat the disease, especially in hospitals and health centers (7). In this situation, healthcare providers are afraid of infection due to the contagious nature of this disease, unknown ways of its transmission, close contact with patients, and the possibility of being infected by their coworkers. Also, they are under high physical, mental, and psychological pressures and high workload (8-10). In Iran, at least 40 healthcare workers died due to COVID-19, and hundreds of people have been hospitalized after the onset of symptoms (8).

Continuation of this situation can have serious consequences for patients and even collapse the medical system (8, 11).

The results of a review study showed that the Covid-19 pandemic was associated with high workload in addition to negative psychological effects, such as irritability, sleep disorders, stress, anxiety, and depression (12). Physical and psychological parameters, such as workload and job stress are the most important components that determine the job performance of employees in the workplace (13). These two components not only affect employees' attention, perception and decision-making ability, but can also have a lasting effect on their general health and lead to many accidents in the workplace (14).

Taking care of the physical and mental health of health workers is crucial to control the Covid-19 pandemic (15). Nurses are among the most important human resources in health systems because of their direct and extensive contact and communication with patients (16). This occupational group is often the first to become aware of changes in patients' conditions and play a decisive role in rescuing the patient (17). They are always facing some degree of workload and job stress due to the critical nature of their job and work environment (18). High workload and stressful work environment are the causes of dissatisfaction among nurses (19). About 18% of nurses are forced to leave their jobs due to workload and high job stress (20). Workload and job stress affect the lives of nurses and those around them (21), in addition, they can have direct and indirect negative consequences for patients. The direct effects may be related to the lack of sufficient time to perform care tasks, which can lead to patient mortality

(22). Also, high workload and job stress can indirectly influence patient safety by affecting communication and reducing job satisfaction and motivation, and burnout of nurses (23).

The current crisis of COVID-19 can exacerbate the workload and job stress of nurses. Since one of the most important and influential factors in improving patient health is nurses' practice and high workload and job stress can have unfavorable effects on their practice, the present study was conducted to investigate the workload and its relationship with job stress in nurses at COVID 19 reference hospitals in southern Iran in 2021.

2. *Material and Methods*

This cross-sectional study was conducted in southern Iran in 2021. The population of the current study consisted of nurses working in COVID-19 reference hospitals in Shiraz University of Medical Sciences (SUMS), including Hazrat Ali Asghar, Shahid Chamran, and Shahid Faghihi hospitals.

The sample size was estimated at 431 people with an error level of 4%. They were randomly selected proportional to the number of nurses working in each hospital based on their personnel code and table of random numbers.

Inclusion criteria of the study were willingness to participate in the study and employment in different clinical wards of the studied hospitals. On the other hand, the exclusion criterion was temporary employment (less than three months) in the studied hospitals.

The data collection instrument was a three-part questionnaire, the first part of which was about the demographic information of the subjects (age, gender, marital status, level of education, work experience, type of employment, length of rest time after each shift, the number of shifts per month, and number of patients monitored in each work shift). The second part included the specialized and standard questionnaire of the National Aeronautics and Space Administration Task Load Index (NASA), which was used to measure workload in nurses. The third part included OSIPOW standard job stress questionnaire.

To assess workload, we applied the NASA-TLX (NASA -Task Load Index) technique. Correspondingly, this technique was developed by the Human Performance Group at NASA Ames Research Center, which involved 6 subscales as follows: mental load, physical pressure, temporal pressure, efficiency and performance, effort, frustration, and failure. 20-step bipolar scales were then used to obtain ratings for these subscales. In this regard, the score of each scale was from 0 to 100. NASA-TLX score was also calculated by multiplying each subscale rate to its weight. Afterward, the overall workload was obtained by summing across scales and dividing them by 15 (24, 25). The validity of the questionnaire has been confirmed in the Hill et al. study (26). Mohammadi et al. in their study indicated the acceptable reliability of the NASA-TLX among health workers, with Cronbach's alpha = 0.897 (27).

The OSIPOW Job Stress Questionnaire contained 60 questions in 6 dimensions, including role workload, role insufficiency, role ambiguity, role boundary, responsibilities, and physical environment (each dimension with 10 questions). The questionnaire was scored on a 5-point Likert scale. The questions of this tool were answered based on a range of five options: never (score 1), sometimes (score 2), often (score 3), usually (score 4), and most of the time (score 5). Based on the range of scores

of this questionnaire, the total job stress level is classified as low stress (mean score 60-120), low to moderate (mean score 121-180), moderate to severe (mean score 181-240), and severe stress (mean score 241-300). Sharifian et al. confirmed the validity and reliability (Cronbach's alpha = 0.89) of the OSIPOW stress questionnaire (28).

After completing the questionnaire, the collected data were entered into SPSS Software, version 23.0. Then, the data were analyzed using descriptive and inferential statistical methods, Pearson correlation coefficient (to investigate the relationship between workload and its dimensions with job stress and its dimensions, as well as the relationship between the main components of research with age and work experience), T-test (in order to examine the relationship between the main components of the research with gender and marital status variables), and ANOVA (to investigate the relationship between the main components of research with employment type and level of education variables) at a significance level of $\alpha = 0.05$.

Participation in the study and completing the questionnaire forms were completely voluntary. After obtaining the necessary permits from the Shiraz University of Medical Sciences (SUMS) and justifying the participants about the objectives of the project, they were ensured on the confidentiality of their answers, and their informed consent was obtained. This study was approved by the Ethics Committee of SUMS (Ethics Code: IR.SUMS.REC. 1399.505).

3. Results

The mean age of the nurses participating in the study was 31.03±5.23 years, and most of them (53.31%) were placed in the age group below 30 years. The mean score for the work experience was 6.42±4.61 years and the majority of the participants (58.31%) were in the group of below 10 years of work experience. In terms of gender, 60.11% of the participants were women and the rest were men. Most of the respondents had a bachelor's degree (84.46%), with more than 20 shifts per month (46.64%); they were working as project workforce (48.03%). For most of the nurses studied, the duration of rest after each work shift was 12 hours (75.64%). Table 1 shows the Characteristics of nurses participating in the present study.

Table 1. Characteristics of Nurses Participating in the Study (n= 431)

Variables	Category	Frequency (Percent)
Age (year)	<30	229 (53.31)
	30-40	160 (37.06)
	>40	42 (9.63)
Work experience (year)	<10	251 (58.31)
	10-20	161 (37.29)
	>20	19 (4.4)
Gender	Man	172 (39.89)
	Woman	259 (60.11)
Marital status	Single	132 (42.30)
	Married	180 (57.70)
Level of education	Associate Degree	22 (5.10)
	Bachelor	364 (84.46)
	Masters	43 (9.98)
	Doctoral	2 (0.46)
Type of employment	Official	64 (14.85)
	Contractual	74 (17.17)
	Bespoke	57 (13.22)
	Project	207 (48.03)
	Corporative	29 (6.73)
Duration of rest after each work shift	12 hours	326 (75.64)
	13-24	91 (21.11)
	25-48	14 (3.25)
Number of shifts per month	<10	46 (10.67)
	20-10	184 (42.69)
	>20	201 (46.64)
Number of patients monitored in each work shift	2 patient	33 (10.58)
	3 patient	14 (4.49)
	>3 patient	265 (84.93)
Total	-----	431 (100)

Based on the obtained results, 96.06% of the studied nurses had a workload of more than 50 (out of 100) and 65.89% of them had moderate to severe stress (Table 2).

Table 2. Frequency distribution of Workload and Job Stress of Nurses Participating in the Study

	Workload		Job Stress			
	50≥	50<	low	Low to medium	Medium to high	high
Frequency	17	414	0	129	284	18
Percent	3.94	96.06	0	29.93	65.89	4.18

The mean score of workload among the nurses and its dimensions were estimated at a high level equal to 83.64±17.24 (of 100). Considering its dimensions, we assigned the highest mean score to the component of mental load (85.81±19.31 of 100) and the lowest one was related to frustration and failure (78.44±16.64 of 100). Also, the mean score of nurses' job stress was estimated at a moderate to a severe level equal to 236.68±16.54 (of 300). Considering its dimensions, we assigned the highest mean score to the component of role workload (43.62±19.14 of 60) and the lowest one was related to role ambiguity (35.09±15.26 of 60, Table 3).

Table 3. Mean and Standard Deviation of Workload and Job Stress of Nurses
Participating in the Study

Variables	Dimensions	Mean±Std
Workload	Mental load	85.81±19.31
	Physical pressure	85.67±19.11
	Temporal pressure	84.28±17.49
	Efficiency & Performance	83.51±18.10
	Effort	84.09±17.14
	Frustration & Failure	78.44±16.64
	Total Workload	83.64±17.24 (of 100)
Job Stress	Role Workload	43.62±19.14
	Role Insufficiency	42.48±16.41
	Role Ambiguity	35.09±15.26
	Role Boundary	38.25±16.32
	Responsibilities	39.90±13.24
	Physical Environment	37.34±14.18
	Total Job Stress	236.68±16.54 (of 300)

The results of the present study demonstrated a statistically significant and direct relationship between workload and job stress (r= 0.19, P=0.04, Table 4).

Table 4. Correlation between Workload and Job Stress of Nurses Participating in the Study

Components of Workload	Components of Job Stress						Total Job Stress
	Role workload	Role Insufficiency	Role ambiguity	Role Boundary	Responsibilities	Physical environment	
Mental load r(p)*	0.38 (<0.001)	0.28 (0.041)	0.09 (0.076)	0.08 (0.089)	0.26 (0.018)	0.32 (0.017)	0.23 (0.04)
Physical pressure r(p)	0.41 (<0.001)	0.19 (0.034)	0.11 (0.062)	0.11 (0.086)	0.25 (0.025)	0.21 (0.049)	0.21 (0.042)
Temporal pressure r(p)	0.37 (0.001)	0.12 (0.089)	0.14 (0.081)	0.06 (0.151)	0.18 (0.063)	0.14 (0.043)	0.17 (0.071)
Efficiency & Performance r(p)	0.24 (0.026)	0.24 (0.025)	0.21 (0.038)	0.14 (0.051)	0.22 (0.032)	0.11 (0.074)	0.20 (0.041)
Effort r(p)	0.31 (0.01)	0.14 (0.046)	0.32 (0.02)	0.09 (0.097)	0.25 (0.014)	0.06 (0.085)	0.19 (0.045)
Frustration & Failure r(p)	0.19 (0.032)	0.29 (0.011)	0.24 (0.03)	0.13 (0.077)	0.06 (0.064)	0.08 (0.084)	0.19 (0.049)
Total Workload	0.32 (0.001)	0.21 (0.041)	0.18 (0.051)	0.10 (0.092)	0.20 (0.036)	0.15 (0.058)	0.19 (0.04)

*r: Pearson Correlation Coefficient, P: P-Value (Correlation is significant at the 0.05 level)

A relationship was also observed in the results for the mean scores of workload and level of education (F= 3.68, P= 0.001), and type of employment (F= 3.24, p = 0.002). Also, there was a statistically significant relationship between nurses' mean scores, job stress score, and variables of gender (t= 2.86, P= 0.03), and type of employment (F= 2.78, P= 0.04, Table 5).

Table 5. Relationship between variables of Workload and Job stress with demographic characteristics of Nurses Participating in the Study

Variables	Demographic Variables					
	Age	Work experience	Gender	Marital status	Type of employment	Level of education
Workload	r=0.12	r=0.19	t =1.22	t =1.53	F =3.24	F =3.68
	P= 0.26	P= 0.24	P= 0.08	P= 0.06	P= 0.002	P= 0.001
Job Stress	r=0.10	r=0.08	t =2.86	t =1.17	F =2.78	F =1.01
	P= 0.36	P= 0.41	P= 0.03	P= 0.09	P= 0.04	P= 0.11

*****r**: Pearson Correlation Coefficient, **P**: P-Value, **t**: T-Test, **F**: Test ANOVA, (Correlation is significant at the 0.05 level)

4. Discussion

The results of the present study showed that the workload and job stress of the studied nurses were at a high level in COVID-19 reference hospitals. Biganeh et al. also reported that workload and job stress in nurses were at a high level (29). Kouhnavard et al. examined job stress and workload of hospital staff and showed that workload and stress were higher among nurses than others (30). In line with the results of the present study, Malekpour et al. (31), Arghami et al. (32), Safari et al. (33), and Ortiz-Solis et al. (34) reported a high level of workload among the nurses. Moreover, consistent with the findings of the current research, Farzi et al. (35), Bardhan et al. (36), Guo et al. (37), Lai et al. (38), and Shahrour and Dardas (39) reported prevalence of high job stress among nurses.

Considering the COVID-19 pandemic, job descriptions of nurses working in the COVID-19 reference hospitals are very critical such that non-compliance with health protocols of disease prevention will bring irreversible consequences (39). These conditions can lead to high workload and job stress among nurses. The lack of comprehensive knowledge about COVID-19 disease and its nature, the complex state of treatment of this disease, mortality of health staffs, unexpected death of patients

with this disease, lack of personal protective equipment, rapid change, and lack of access to up-to-date information, lack of specific medications, lack of adequate support, and fear of transmitting the infection to family members were found to be the causes of workload and job stress among the studied nurses.

Moreover, exposure of nurses to workplace stressors (e.g., working relationships with other coworkers, communication with patients and their caregivers, high level of knowledge and skills required to work in medical wards (especially in the current COVID-19 pandemic), the need for immediate response to emergency cases, and heavy responsibilities resulting from patient care were also reported to be the other reasons for high levels of workload and job stress (40).

The results of this research revealed a significant relationship between workload and job stress. These results were in line with those of Kokoroko and Sanda (41), Yen et al. (42), Sandrin et al. (43), Gonzalez-Munoz et al. (44), Kwansah et al. (45), and Donkor (46). Another study showed that high workload and inappropriate work environment were associated with job stress in staff (47).

It seems that high workload in nurses can be associated with their job stress due to its effects on physical, mental, and

psychological health. In other words, these two variables can reinforce each other. In a study conducted on 194 nurses at Ratchaburi Public Hospitals in Thailand, Aoki et al. reported that high workloads exacerbated job stress in nurses (48).

5. *Conclusion*

Based on the results of this study, workload and job stress of the studied nurses were at a high level. Therefore, hospital managers and nursing managers are recommended to pay attention to determining the job descriptions of nurses and their expectations, planning and organizing shifts, and fair distribution of tasks among nurses. It is also recommended to incorporate content related to crisis management in the in-service training program, provide regular counseling services, provide motivational incentives and welfare services for nurses, and provide support for nurses to reduce their stress and workload.

Further studies are recommended to identify and evaluate possible factors affecting the workload and job stress, such as working hours, organizational culture, wages, and fees of nurses during the COVID-19 crisis.

Limitations of the study

The use of a cross-sectional design to collect the study data limit a definite conclusion about the causal relationship between the study variables. Further studies should collect data across different time-periods to minimize this limitation.

Acknowledgments

Conflicts of Interest
None declared.

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