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DOI: 10.4103/jehp.jehp_175_21

# Perceived stress and quality of life among frontline nurses fighting against COVID-19: A web-based cross-sectional study

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## Abstract:

**BACKGROUND:** The coronavirus disease-2019 (COVID-19) crisis has changed many aspects of frontline nurses' lives. Nurses caring for patients with COVID-19 reported experiencing significant psychological distress and work-related anxiety. This study aimed to assess the perceived stress and quality of life among frontline nurses fighting against COVID-19.

**MATERIALS AND METHODS:** This web-based cross-sectional study was conducted on 322 frontline nurses fighting against COVID-19 in hospitals affiliated to Mazandaran University of Medical Sciences. Data were collected using the two following online questionnaires: the Perceived Stress Scale and World Health Organization Quality of Life-Brief. Data were compiled from October 23, 2020, to November 25, 2020. Data were analyzed using the independent sample *t*-test, Pearson's correlation test, and regression analysis test in the SPSS-21.

**RESULTS:** Average perceived stress scores was 30.27 (standard deviation [SD] = 7.01). Average quality of life subscale scores consist of physical health, psychological health, social relationships, and environment were 57.71 (SD = 12.74), 44.3 (SD = 15.58), 45.61 (SD = 16.99), and 47.6 (SD = 18.11), respectively. There was an inverse significant association between all the subscales of quality of life and perceived stress ( $P = 0.008$ ). Based on the multiple linear regression analysis, the variables of age, gender, marital status, and perceived stress were the significant predictors of quality of life subscales.

**CONCLUSIONS:** Paying serious attention to addressing the concerns of frontline nurses, especially those who are at high risk, is necessary. It is recommended to take action as soon as possible to reduce the perceived stress and improve quality of life on nurses who care for patients with COVID-19.

## Keywords:

Coronavirus disease-2019, nurse, perceived stress, psychological distress, quality of life, stress

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Received: 13-02-2021  
Accepted: 03-08-2021  
Published: 28-04-2022

## Introduction

Coronavirus disease-2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2.<sup>[1]</sup> The coronavirus pandemic has caused global physical-psychological health and social disruption.<sup>[2]</sup> With the rapid outbreak of COVID-19 pandemic, health-care systems around the world face many challenges and they have become overwhelmed.<sup>[3]</sup>

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COVID-19 affects people in several ways and symptoms of this virus are highly changeable and variable, ranging from none to severe disease.<sup>[4]</sup> A significant amount of infected patients will develop moderate-to-severe disease and recuperate with hospitalization.<sup>[5]</sup> Since COVID-19 initially emerged around the world, hospitals touched numerous challenges during such as severe shortages of health-care provider and difficulty in maintaining adequate staff,

**How to cite this article:** Amjadi S, Mohammadi S, Khojastehrad A. Perceived stress and quality of life among frontline nurses fighting against COVID-19: A web-based cross-sectional study. *J Edu Health Promot* 2022;11:128.

retaining institutional capacity, and lack of personal protective equipment as well as respiratory support materials and testing supplies.<sup>[6-8]</sup>

Nurses are the backbone of hospitals and nursing science, knowledge and consultation have been a pivotal section of the program to contain the COVID-19 pandemic, as well as their work has been basic and essential to the care and survival of people who have been severely affected by this virus.<sup>[9,10]</sup> Nursing staff are in direct contact with patients infected with coronavirus from admission in a hospital to discharge.<sup>[11]</sup> Nurses maintain to be on the front line combating COVID-19 every day and providing fundamental cares.<sup>[12]</sup> This situation puts nurses at the highest risk of contracting the virus. Nursing staff who spend the most time with the infected patients have come precariously close to disaster as the lack of nursing staff, chronic fatigue, and high rate of illness and death of them due to coronavirus pandemic.<sup>[13]</sup>

In Iran, a country with a high burden of COVID-19, from March 2019 to November 2020, coronavirus has affected more than 60,000 nurses across Iran, and unfortunately, around 100 nurses are losing their lives. This situation leads to different psychological pressure among frontline nurses fighting against COVID-19 in Iran.<sup>[14]</sup> Nurses who work in front line such as intensive care unit (ICU) nurses endure very big workload, high risk of infection, chronic fatigue, and disappointment for the dying of people whom they care.<sup>[15]</sup> A study in Iran showed that the emotional and psychological burden of coronavirus made some nurses leave nursing.<sup>[16]</sup> According to studies during pandemic, nurse staff experience huge anxiety, stress as well as they worried about transmitting the virus to their family members.<sup>[17]</sup> A descriptive study in China reported that the incidence of psychiatric diseases such as stress, anxiety, insomnia, depressive disorders, and sleep disorders was increasing high in frontline nurses.<sup>[18]</sup> Since the beginning of the pandemic in Iran, the northern cities of Iran have been facing a high incidence of coronavirus. Immediately after the outbreak of the coronavirus, these cities reported hospitals saturation due to heavy patient loads.<sup>[19]</sup> This stressful atmosphere created a big tension in the hospital of north provinces of Iran. Due to a high incidence of coronavirus in north provinces of Iran, the burden endured by nurses who work in these provinces is significant. The quality of life and the perceived stress among frontline nurses of these areas are still unknown. In this study, we evaluated the perceived stress and quality of life among frontline nurses fighting against COVID-19 in Iran.

## Materials and Methods

### Study design and participants

This was a web-based cross-sectional study. Participants were frontline nurses who worked in the 7 hospitals

affiliated to Mazandaran University of Medical Sciences. The inclusion criteria were nurses who worked in frontline fighting against COVID-19 (such as working in ICU, emergency ward, respiratory urgency ward, respiratory disease ward, and other general wards dedicated to COVID-19 patients) and access to social networks such as WhatsApp and Telegram. In terms of exclusion criteria, incomplete questionnaires were excluded from this study.

The total frontline nurses who worked in these seven hospitals were  $n = 712$ . The Krejcie and Morgan's table was used to determine the appropriate sample size.<sup>[20]</sup> The sample size was estimated to be 256 people. Finally, 322 frontline nurses fighting against COVID-19 participated in the study, accounting for a possible sample loss of up to 25%. Convenience sampling and snowball were adopted.

### Data collection

Data of the survey were collected online using Google Forms. Study subjects were contacted by the most popular messenger applications in Iran such as Telegram and WhatsApp, requesting them for their involvement. Participants, who declared their interest to participating in our study, were provided a link of online questionnaires. Data were compiled over 1 month from October 23, 2020, to November 25, 2020, and data were gathered by anonymous online questionnaires.

### Data collection tool

The online self-report questionnaires consisted of three parts: Demographic Characteristic Questionnaire, the 14-item Perceived Stress Scale (PSS), and World Health Organization Quality of Life-Bref (WHOQOL-BREF).

1. Demographic Characteristic Questionnaire includes questions of age, gender, educational level, years of work as a nurse, and marital status
2. The WHOQOL-BREF is a questionnaire for assessment of quality of life and it is developed by the WHOQOL Group. According to the WHO, quality of life is defined as "the peoples' understanding of their situation in life in the background of the value systems and culture in which they live and regarding their aim of life." This questionnaire consists of a total of 26 questions and a 4 domain structure, including physical health (7 items), psychological health (6 items), social relationships (3 items), and environment (8 items). Finally, there are two items about a person's overall perception of quality of life and health. Responses to items are on a 1–5 Likert scale from "disagree" to "extremely agree." The score is calculated by summing the point values for the items corresponding to each domain and then transforming the scores to a 0–100, and higher scores indicating a higher quality of life<sup>[21]</sup>

3. The 14-item PSS is the most commonly used scale to measure perceived stress in the world. PSS is an approved self-report scale created according to the psychological conceptualization of stress. This scale measures the level of perceived stress experienced by a person in the last month under some life situations. Scoring of the questionnaire is according to a 5-point Likert scale never = 0, almost never = 1, sometimes = 2, often = 3, and many times = 4 points. The lowest score of PSS is 0 and the highest score is 56. A higher score indicates higher perceived stress.<sup>[22]</sup>

### Data analysis

All statistical analyses in the current study were conducted using Statistical Package for the Social Sciences (SPSS) 21 software (IBM Company, Armonk, New York). Descriptive statistics were used to analyze characteristic variables, such as frequency, percentage, mean, and standard deviation (SD). Demographic characteristic differences in QOL domains and perceived stress were examined by conducting an independent sample *t*-test. Pearson’s correlation test was applied for relation between perceived stress and different quality-of-life domains. The differences between demographic characteristic groups were considered statistically significant when  $P < 0.05$ .

### Ethical issues

Our research was approved by the Ethics Committee of Babol University of Medical Sciences (ethical code: IR.MUBABOL.REC.1399.173). The aims of the study were described at the start of the survey. Study subjects had to answer a No or Yes to confirm their desire to participate voluntarily. After selection yes, they were directed to complete the questionnaires. Principles of confidentiality and anonymity and were applied in our study.

## Results

Table 1 presents descriptive statistics for baseline characteristics of the subjects. Most of the nurses participated in our study were female (61.8%), married (70.2%), aged between 31 and 40 years old (37.9%), with bachelor academic education (91.9%), and with experience of 6–10 years of work as a nurse (41%).

Table 2 presents total scores of the perceived stress and quality-of-life dimensions. The mean (SD) score for perceived stress was 30.27 (7.01). The mean (SD) scores for quality-of-life dimensions were physical health: 57.71 (12.74), psychological health: 44.3 (15.58), social relationships: 45.61 (16.99), environment: 47.6 (18.11), and overall perception of quality of life: 52.95 (13.72).

**Table 1: Baseline characteristics of study sample (n=322)**

Variable	n (%)
Gender	
Female	199 (61.8)
Male	123 (38.2)
Age (years)	
20-30	112 (34.7)
31-40	122 (37.9)
41-50	88 (27.3)
Years of work as a nurse	
1-5	111 (34.5)
6-10	132 (41)
11-15	40 (12.4)
Above 16	39 (12.1)
Marital status	
Single	96 (29.8)
Married	226 (70.2)
Education level	
Bachelor	296 (91.9)
Master	26 (8.1)

Table 3 shows the correlation between perceived stress and different quality-of-life domains. A significant negative association between perceived stress and physical health, psychological health, social relationships, environment and overall perception of quality of life were found,  $r = -0.418$ ,  $r = -0.435$ ,  $r = -0.605$ ,  $r = -0.430$ ,  $r = -0.466$  and  $P < 0.008$  respectively.

Table 4 shows the multiple linear regression of quality-of-life domains based on predictive factors. In terms of the first domain of quality of life, results showed that there is a significant relationship between physical health and gender ( $\beta = -0.200$ ,  $P < 0.000$ ), age ( $\beta = -0.596$ ,  $P < 0.000$ ), and marital status ( $\beta = 0.161$ ,  $P < 0.006$ ). According to the multiple linear regression model, three variables of age, gender, and marital status were able to predict 36% of the physical health variance.

The results of the multiple linear regression analysis showed three predictors of psychological health including perceived stress ( $\beta = -0.472$ ,  $P < 0.000$ ), gender ( $\beta = -0.350$ ,  $P < 0.000$ ), and marital status ( $\beta = 0.216$ ,  $P < 0.000$ ). These three variables were able to predict 34.7% of the psychological health variance.

Regarding the third domain of quality of life, results showed that there is a significant relationship between social relationships and perceived stress ( $\beta = -0.623$ ,  $P < 0.000$ ) and the perceived stress was able to predict 37.6% of the social relationships variance.

Multiple linear regression analysis indicated that perceived stress ( $\beta = -0.140$ ,  $P < 0.045$ ), gender ( $\beta = -0.461$ ,  $P < 0.000$ ), and age ( $\beta = -0.396$ ,  $P < 0.000$ )

**Table 2: Total scores of the perceived stress and quality-of-life dimensions**

Variable (score range)	Minimum	Maximum	Mean±SD
Perceived stress (0-56)	14	44	30.27±7.01
Quality of life			
Physical health (0-100)	19	75	57.71±12.74
Psychological health (0-100)	6	65	44.3±15.58
Social relationships (0-100)	25	75	45.61±16.99
Environment (0-100)	13	75	47.6±18.11
Overall perception of quality of life and health (0-100)	12	75	52.95±13.72

SD=Standard deviation

**Table 3: Correlation between perceived stress and different quality-of-life domains**

Variable	Physical health		Psychological health		Social relationships		Environment		Overall perception	
	r	P	r	P	r	P	r	P	r	P
Perceived stress	-0.418	0.008	-0.435	0.000	-0.605	0.000	-0.430	0.000	-0.466	0.000

**Table 4: Multiple linear regression of quality-of-life domains based on predictive factors**

Variables	Predictor variables	B	SE	β	T	P	CI (lower limit-upper limit)	F <sup>2</sup>
Physical health	Perceived stress	-0.209	0.127	-0.115	-1.649	0.100	-0.459-0.040	0.360
	Gender	-5.235	1.367	-0.200	-3.829	0.000	-7.924--2.545	
	Age	-9.674	1.018	-0.596	-9.505	0.000	-11.676--7.672	
	Marital status	4.485	1.629	0.161	2.752	0.006	1.279-7.691	
Psychological health	Perceived stress	-1.047	0.157	-0.472	-6.682	0.000	-1.356--0.739	0.347
	Gender	-11.195	1.688	-0.350	-6.631	0.000	-14.516--7.873	
	Age	-0.053	1.257	-0.003	-.042	0.966	-2.526-2.419	
	Marital status	7.362	2.012	0.216	3.659	0.000	3.403-11.321	
Social relationships	Perceived stress	-1.508	0.167	-0.623	-9.030	0.000	-1.837--1.180	0.376
	Gender	3.180	1.799	0.091	1.768	0.078	-0.359-6.720	
	Age	-0.780	1.339	-0.036	-0.582	0.561	-3.415-1.855	
	Marital status	0.850	2.144	0.023	0.396	0.692	-3.369-5.069	
Environment	Perceived stress	-0.362	0.180	-0.140	-2.016	0.045	-0.716--0.009	0.364
	Gender	-17.176	1.936	-0.461	-8.874	0.000	-20.985--13.368	
	Age	-9.125	1.441	-0.396	-6.332	0.000	-11.960--6.290	
	Marital status	4.282	2.307	0.108	1.856	0.064	-0.257-8.822	
Overall perception	Perceived stress	-0.338	0.141	-0.173	-2.392	0.017	-0.616--0.060	0.315
	Gender	-9.148	1.523	-0.324	-6.008	0.000	-12.144--6.152	
	Age	-5.957	1.134	-0.341	-5.255	0.000	-8.187--3.727	
	Marital status	-0.283	1.815	-0.009	-0.156	0.876	-3.854-3.287	

SE=Standard error, CI=Confidence interval

were statistically significantly related to environment dimension and these three variables were able to predict 36.4% of the environment dimension variance.

Finally, the variables of perceived stress ( $\beta = -0.173$ ,  $P < 0.017$ ), gender ( $\beta = -0.324$ ,  $P < 0.000$ ), and age ( $\beta = -0.341$ ,  $P < 0.000$ ) were the predictors of overall perception of quality of life and totally predicted 31.5% of the overall perception.

Scores achieved from different domains of QOL and perceived stress, according to demographic characteristics showed that perceived stress was higher among female, aged between 41 and 50 years old and married participants than other groups. Also, all domains of QOL were lower among the above groups than others [Table 5].

## Discussion

The present research aimed to analyze the QOL and perceived stress among frontline nurses fighting against COVID-19 and to assess the relationship between these two variables. Also in this study, we assessed the role of demographic variables on QOL and perceived stress.

The nurses in the study had an average score of  $19.33 \pm 7.21$ ; 22% of the participating nurses had a stress score above the positive threshold (>25 points), which was lower than the findings of other studies. The nurses in the study had an average score of  $19.33 \pm 7.21$ ; 22% of the participating nurses had a stress score above the positive threshold (>25 points), which was lower than the findings of other studies.



**Table 5: The mean score of quality-of-life domains and perceived stress, according to demographic characteristics (n=322)**

Variable	Mean±SD					
	Perceived stress	Physical health	Psychological health	Social relationships	Environment	Overall perception
Gender						
Female	31.7±5.6	56.6±11.3	38.6±14.3	44.6±15.2	41.6±16	49.6±9.8
Male	27.8±8.2	59.4±14.5	53.4±12.9	47.1±19.4	57.2±17	58.3±17
Age (years)						
20-30	25.9±7.5	65.9±9.4	45.3±16.4	53.2±18.7	58.5±14.3	59.7±13.5
31-40	29.8±3.6	56.9±14.2	45.6±13.9	45.7±13.5	40.1±20.5	51.5±14.6
41-50	36.4±5.1	48.2±5	41±16.3	35.6±13.5	44±10.7	46.3±7.6
Marital status						
Single	23.6±5.9	62±15.2	46.6±17.5	55.3±18.3	53.3±20.7	59.3±17.7
Married	33±5.3	55.8±11	43.3±14.5	41.4±14.6	45.2±16.3	50.2±10.4

SD=Standard deviation

Regarding the first aim of present study, perceived stress among frontline nurses was a relatively high. These results are consistent with a study in Spain, their result indicated that the average score of perceived stress in health-care providers during the COVID-19 was high.<sup>[23]</sup> The average score of perceived stress in the current study is higher than the results of some studies. A finding of a study in China showed that the average score of perceived stress among nurses who care patients with COVID-19 was  $19.33 \pm 7.21$ .<sup>[24]</sup> A study conducted before the pandemic in Iran reported that perceived stress levels among nurses were lower than the present study, ( $25.7 \pm 5.96$ ).<sup>[25]</sup> The responsibilities and workload of nurses increase due to COVID-19 epidemic. It is seen that, besides many work challenges that put nurses in psychological pressure and stress, many uncommon new circumstances experienced during COVID-19 pandemic may have extended level of the stress among the nurses.<sup>[26]</sup> According to the previous survey, some factors such as ongoing dealing with dying and death during pandemic play a key role in increasing the level of stress among nurses.<sup>[16]</sup>

Results of the current study regarding the second aim showed that the quality of life of nurses in all domains was not appropriate. Results of a related study showed low quality of life among health professionals, especially among nurses who cared patients with coronavirus.<sup>[27]</sup> In the present study, the lowest score was reported in two domains of the WHOQOL questionnaire; psychological health and social relationships. Nurses working with COVID-19 patients are under extreme psychological and social stress. Many studies showed that nurses have poor outcomes in handling COVID-19 outbreaks and their quality of life has been severely affected by the pandemic.<sup>[28-30]</sup>

In respect of third aim of the present study, a negative relationship between the level perceived stress and

QOL dimensions was determined. Sarafis *et al.* in their study indicated that occupational stress leads to the deterioration of nurses' health-related quality of life.<sup>[31]</sup> According to the previous survey, the COVID-19 pandemic has affected the psychosocial health of a noticeable proportion of nurses and health-care providers which may decrease their well-being.<sup>[32,33]</sup> A study in Australia showed that burnout and stress are evident in the nurses, as well as stressful situation in hospital has a serious negative and long-term impact on the quality of life of the nurses.<sup>[34]</sup>

As for the fourth aim of the study, the gathered data revealed that gender was a predictor of all domains of quality of life after adjusting for other variables. Actually, females showed lower levels of QOL than males. The finding of this study was in line with other research on the theme.<sup>[35]</sup> According to psychological studies, it is believed that men and women have different patterns of psychological reaction and that they respond to stress differently.<sup>[36]</sup> Numerous studies during the current pandemic found that perceived stress and psychological reactions among females are more severe than males.<sup>[35,37]</sup> This may be due to the high level of feminization of health professionals, which means that frontline care is mainly provided by women.<sup>[38]</sup> The present study showed that marital status can predict physical and psychological health after adjusting for other variables. In regard to marital status, there were differences between married and single nurses. Our finding is in agreement with other studies on epidemic which indicated that being single was predictive of negative psychological status and higher stress among health-care professionals.<sup>[39,40]</sup> Other studies during COVID-19 showed that marital status is a risk factor for insomnia among health-care providers.<sup>[40]</sup> Marriage seems to increase responsibility and workload in life and this leads to increased experience stress. Furthermore, a study showed that fear of transmission infection for a family is a predictor of nurses' stress.<sup>[41]</sup>

Based on results, older age negatively affects the physical health, environment, and overall perception of quality of life in frontline nurses and is a predictor of these variables after adjusting for other variables, which is supported by several investigations.<sup>[41,42]</sup>

### Limitation and recommendation

This study had some limitations. First, this is a cross-sectional study, which makes it difficult to determine the exposure and outcome relationships between the variables examined and the results. Second, the online collection of data can be considered a weakness and implies a selection bias, although due to health circumstances, it could not be done in a physical presence.

### Conclusions

The present study showed that the perceived stress of frontline nurses was moderate and high during COVID-19 outbreak, as well as, at the same time, their quality of life, generally and especially in the psychological health and social relationships dimension, was poor. Frontline nurses who were female, married, and between the ages of 41–50 were found to have lower level of quality of life and higher levels of perceived stress than others. Paying serious attention to addressing the concerns of frontline nurses, especially those who are at high risk, is necessary. It is recommended to take action as soon as possible to reduce the perceived stress and improve the quality of life on nurses who care for patients with COVID-19. The government and health-care institutions should continue to provide more comprehensive care involving frontline nurses and their families. Psychosocial support strategies such as counseling, training, and morale support interventions need to be implemented to improve well-being among nurses who care for patients with COVID-19.

### Acknowledgment

Our research was supported by the Student Research Committee of Babol University of Medical Sciences (MUBABOL.HRI.REC.1396.132). We would like to thanks all frontline nurses in sharing their experience.

### Financial support and sponsorship

This work was supported by the Student Research Committee of Babol University of Medical Sciences (ethical code: MUBABOL.HRI.REC.1396.132).

### Conflicts of interest

There are no conflicts of interest.

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