

Mental Health and Resilience among Nurses in the COVID-19 Pandemic: A Web-Based Cross-Sectional Study

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Abstract

Objective: Nurses exposed to COVID-19 could be psychologically stressed. The present study investigated the mental health and the resilience level in the nurses' population.

Method: This cross-sectional study was performed on 432 nurses in 27 hospitals working in Guilan province, north of Iran, between April 29, to May 14, 2020. Mental health and resilience were measured using the 12-item General Health Questionnaire-12 (GHQ-12) and the 10-item Connor-Davidson Resilience Scale (CD-RISC-10). Hierarchical multiple linear regression model was used to identify factors associated with mental health.

Results: The mean GHQ-12 and CD-RISC-10 scores were 15.72 (SD, 5.67) and 25.97 (SD, 6.88), respectively. Probable psychological distress (GHQ-12 score ≥ 15) was present in 57.2% of nurses. Among demographic and COVID-19-related variables, only educational level was significantly and negatively correlated with mental health. After controlling the variables, hierarchical regression analyses results showed that lower resilience was associated with poor mental health ($\beta = -0.49$; $P < 0.001$).

Conclusion: Regarding the nurses' mental health, appropriate psychological/psychiatric intervention is necessary, and resilience can play a role as a mental health promoter.

Key words: COVID-19; Mental Health; Nurses; Psychological Resilience

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Acute respiratory distress syndrome and pneumonia caused by the new coronavirus or coronavirus disease-19 (COVID-19) have recently spread to China and most countries around the world. As reported by the World Health Organization (WHO), a total of 6,629,790 cases of the virus have been confirmed worldwide since June 4, 2020. Based on the latest data, 160,696 confirmed cases of coronavirus and 8012 deaths have been registered in Iran since June 3, 2020. Nearly 20% of cases of this disease are severe and the mortality rate is approximately 3%. The WHO declared a state of emergency on January 30, 2020 due to the outbreak of the virus (1).

The health care system and medical groups are the largest anti-epidemic group and have been exposed to a wide range of stressors (2). In general, many known factors are involved in causing stress, including working stress, work environment, hesitation in treatment, long shifts, family and friends (3, 4), and other factors, such as the lack of protective equipment and prolonged working hours pending the last epidemic have made their mental health more vulnerable (2, 5, 6). The number of patients requiring acute care for COVID-19 will exceed hospital capacity, finally, it reduces the personal protective equipment available in the hospital. Nurses exposed to these high-stress situations are at risk for posttraumatic stress symptoms and burnout (7). Responses to stressors differ among the employees. Some people experience mental health challenges, while other person can manage their health when faced with events that are full of stress (8).

Nursing is an occupation that has been encountered to have high levels of stress (9). The effects of stressors and occupational challenges for nurses can expose them to mental health problems, for instance posttraumatic stress disorder (10). These problems not just affect precision and power of decision-making but also reduce their ability to fight the virus in medical worker society also decrease their ability to fight the virus (11). Furthermore, the health care system of Iran is facing a shortfall of nurses. Staffing inadequacy causes work-related stress and burnout and stress can influence nurses' mental health. Kakemam *et al.* found that nurses' occupational stress in Iran is a significant issue and has a high prevalence (9).

Likewise, Lai *et al.* investigated factors related to the mental health of medical staff during the prevalence of COVID-19 and reported 50.4% anxiety and 44.6% depression, which is a symptom of mental health (3). The results of a study in Iran showed that 65.6% and 42.3% of the treatment staff suffer from moderate symptoms of anxiety and depression (12).

People use different methods to adapt to problems and stresses, and not all strategies may be effective in this regard (13). However, some nurses have used adaptive mechanisms and responses to survive difficult years in the face of stress (14). Resilience is a psychological trait.

The meaning of resilience is promoting adjustment when person faced of stressful events (15). Nursing resilience is a positive adaptation to adverse conditions and stressors (10, 16), and is considered as an ability to overcome stress and create balance and balance in stressful and unpleasant work environments (16, 17). Resilience also acts as cognitive flexibility at high working pressure. Due to its multifaceted nature, several factors affect the resilience of nurses (16, 18), including living conditions, cultural background, and socio-demographic characteristics (15). Accordingly, resilience seems to be an important concept for managing mental health under stressful situations (19).

Nurses have been exposed to many stressors considering the widespread prevalence of COVID-19 worldwide and the high mortality rate due to the virus. Thus, paying attention to the mental health of these medical staff as well as the protective factors of mental health and the process of adaptation to stressful and unfavorable conditions is of great importance (3).

The mental health of nurses and other health care workers may also be an area that needs additional resources and attention (20). Among the 31 provinces of Iran, Guilan was the second one to be affected by the crisis in the first stage of the spread of the disease. This province located along the Caspian Sea and the coverage percent is about 1% (14711 kms). The population of Guilan is 2,530,696. Population density of Guilan is 180 people per square kilometer (21).

On the one hand, nurses were exposed to a contagious and unknown disease, and on the other hand, there was stress on themselves and their families. Thus, performing serious duties in the nursing profession was considered an important paradox. To the best of our knowledge, a similar research is not performed in Rasht (the Capital of Guilan Province, Northern Iran). Therefore, this study was performed to determine the mental health and resilience of nurses in northern Iran (Guilan) and Iran during the epidemic of COVID-19.

Materials and Methods

Study Framework

This analytical, multicenter cross-sectional study was conducted at Guilan University of Medical Sciences. Data were gathered from April 29 to May 14, 2020 and 432 nurses from hospitals affiliated with Guilan University of Medical Sciences, north of Iran participated in this study. The questionnaire was made online and sent to hospital nurses through social media; include WhatsApp, Telegram, and Instagram. Participants could leave the study at any time and consented by filling the questionnaire form. When the participant completed the questions in full, the next question or questions would be displayed on the web page. Therefore, there was no missing data in the present study; in other words, there were no lost data for all participants. The current original research was approved

by the Guilan University of Medical Sciences ethics committee (IR.GUMS.REC.1399.006).

Participants and Sample

Data were gathered from April 29, to May 14, 2020 and 432 nurses from hospitals affiliated with Guilan University of Medical Sciences, north of Iran, participated in our study. The inclusion criteria were as follows: nurses who fought against the epidemic on the frontline for over a week. Our study sample size was calculated on the principle of thumb “20 nurses per predictor” recommended by statisticians. In our study, based on 14 predictors (i.e., independent variables) at least 280 nurses were included.

Instruments

General characteristics

A researcher made questionnaire was devised, comprising items related to age, gender, marital status, parent status, place of residence, level of education, occupation, years of working experience, health status, chronic diseases (Yes vs No), Working in COVID-19 hospital, and contact with the cases that infected with COVID-19.

The 12-item General Health Questionnaire-12 (GHQ-12)

The GHQ-12 is a questionnaire for measuring mental health. The instrument identifies states of depression and psychiatric morbidity. It detects psychiatric problems that may refer to a medical clinic, so its attention should be on psychological compounds (22). The items of this questionnaire is rated on 4-point Likert scale (less than usual, no more than usual, rather more than usual, or much more than usual). Higher scores show greater levels of general psychiatric distress. In our country, the GHQ-12 questionnaire had an admissible validity and reliability (Cronbach's alpha of 0.87) (23). The Cronbach's alpha coefficient in the current study was 0.851.

The 10-item Connor-Davidson Resilience Scale (CD-RISC-10)

The CD-RISC-10 is a self-reported instrument of 10 items designed as a Likert type with 5 options (0 = never; 4 = almost always). The final score was the sum of the responses obtained on each item (range, 0-40) and the highest scores show the highest level of resilience. In Iran, the scale had an acceptable validity and reliability (Cronbach's alpha of 0.78) (24). The Cronbach's alpha coefficient in the current study was 0.889.

Statistical Analysis

In this study, continuous variables were expressed as mean \pm standard deviation (SD) and categorical variables as frequency (percentage). Pearson coefficient was performed to examine the relationship between GHQ-12 and CD-RISC-10 scores. In univariable analysis, the relationships between demographic/COVID-19 related variables and GHQ-12 score were examined by using independent samples t test, one-way ANOVA, and Pearson correlation coefficient. Then, in multivariable analysis, multiple

linear regression was used to examine the relationship of GHQ-12 with CD-RISC-10 score, controlling for demographic and COVID-19-related variables. In this approach, 2 steps were conducted: the demographic and COVID-19-related variables were entered in the block 1, while the CD-RISC-10 score was entered in the block 2. This analytical model was used for checking multicollinearity through the variance inflation factor (VIF) and tolerance. As a principle of thumb, a tolerance less than 0.1 and/or VIF more than 5 indicate(s) a difficulty with multicollinearity. Data analysis was done with SPSS, version 16.0 (SPSS Inc), and level of significance was set at 0.05.

Results

Participants' Characteristics

The demographic and COVID-19-related information of the nurses is presented in Table 1. The mean age of the responders was 35.80 (SD, 8.83) years and the mean of working experience was 10.98 (SD, 7.94) years. Of the 432 responders, 87.7% were female, 73.1% were married, 93.8% were resident in urban areas, and 86.3% had BSN degree (Table 1).

Distribution of GHQ-12 and CD-RISC-10 Scores

The mean GHQ-12 and CD-RISC-10 total scores were 15.72 (SD, 5.67) and 25.97 (SD, 6.88), respectively. A total of 247 nurses (57.2%) reported a GHQ-12 score of 15 or higher, indicating psychological challenges.

Relationship between CD-RISC-10 and GHQ-12 Scores

As shown in Figure 1, there was a significant negative correlation between CD-RISC-10 and GHQ-12 scores ($r = -0.598$; $P < 0.001$).

Relationship of GHQ-12 With Demographic/COVID-19-related Variables

Table 2 presents the relationships between the GHQ-12 scores and demographics/COVID-19-related variables of nurses using univariable analysis. Based on the Pearson coefficients, significant but low negative correlations were detected between age and GHQ-12 scores ($r = -0.107$; $P = 0.026$). The mean GHQ-12 score in BSN and MSN/Doctorate nurses was higher than the Diploma nurses. Overall the analysis did not show any significant differences ($P = 0.055$). Nurses who came in contact with infected people or experienced the death of a family member or friend had a higher GHQ-12 scores compared to other nurses, although these differences were not statistically significant ($P = 0.074$ and $P = 0.080$, respectively).

As presented in Table 3, in block 1, among demographic and COVID-19-related variables, only educational level was significantly related to GHQ-12 scores. The GHQ-12 score in BSN ($b = 3.89$; $P = 0.021$) and MSN/Doctorate ($b = 4.25$; $P = 0.024$) nurses was higher than the Diploma/ADN nurses. The model R² in this step was 0.06, indicating that 6.0% of the variance in the GHQ-12 score was explained by the demographic and COVID-19 related variables. In block 2, CD-RISC-10

score was negatively associated with GHQ-12 score ($b = -0.49$; $P < 0.001$). A 1-point increase in the CD-RISC-10 score was associated with a 0.49-point decrease in the GHQ-12 score. When the CD-RISC-10 measure were added in the model, there was a considerable

improvement in the model ($\Delta R^2 = 32.0\%$; $F = 14.06$; $P < 0.001$). The most striking, an additional 32.0% of the variance in the GHQ-12 score was explained by the CD-RISC-10 measure.

Table 1. Demographic and COVID-19-Related Characteristics of the Nurses (n = 432)

	Mean (SD) or n (%)
Age (years), Mean (SD)	35.80 ± 8.83
Sex	
Male	53 (12.3)
Female	379 (87.7)
Marital status, n (%)	
Single	116 (26.9)
Married	316 (73.1)
Parent status, n (%)	
No child	200 (46.3)
One or more children	232 (53.7)
Place of residence, n (%)	
Urban	405 (93.8)
Rural	27 (6.2)
Education, n (%)	
Diploma	13 (3.1)
Bachelor of Science in Nursing (BSN)	373 (86.3)
Master of Science in Nursing (MSN)	44 (10.2)
Doctorate	2 (0.5)
Job title, n (%)	
Nurse Aid	7 (1.6)
Nurse	345 (79.9)
Head Nurse	42 (9.7)
Supervisor	34 (7.9)
Matron	4 (0.9)
Years of working experience (y), Mean (SD)	10.98 ± 7.94
Chronic diseases, n (%)	
No	395 (91.4)
Yes	37 (8.6)
Working in COVID-19 designated hospital, n (%)	
No	134 (31.0)
Yes	298 (69.0)
Contact with suspected/confirmed COVID-19 cases, n (%)	
No	35 (8.1)
Yes	397 (91.9)
Families, relatives or friends infected with COVID-19, n (%)	
No	271 (62.7)
Yes	161 (37.3)
Death of families, relatives or friends due to COVID-19, n (%)	
No	377 (87.3)
Yes	55 (12.7)
Health status, n (%)	
Healthy	320 (74.1)
Suspected with COVID-19	75 (17.4)
Confirmed with COVID-19	37 (8.6)

COVID-19: Coronavirus Disease 2019; SD: Standard deviation

Table 2. Relationship of General Health Questionnaire-12 Total Score with Demographic and COVID-19 Related Variables

	Mean (SD) or r	P
Age (y)	-0.107	0.026
Sex		0.279
Male	15.83 (5.61)	
Female	14.92 (6.06)	
Marital status		0.301
Single	16.18 (6.11)	
Married	15.54 (5.49)	
Parent status		0.386
No child	15.97 (6.15)	
One child or more	15.50 (5.21)	
Place of residence		0.692
Rural	15.74 (5.65)	
Urban	15.30 (5.99)	
Education		0.055
Diploma	12.00 (4.34)	
BSN	15.84 (5.77)	
MSN/ Doctorate	15.74 (4.85)	
Job title		0.146
Nurse/Nurse Aid	15.97 (5.84)	
Head Nurse	14.48 (4.99)	
Supervisor/Matron	14.74 (4.37)	
Years of working experience	-0.089	0.065
Chronic diseases		0.987
No	15.71 (5.69)	
Yes	15.73 (5.49)	
Working in COVID-19 designated hospital		0.543
No	15.96 (5.29)	
Yes	15.60 (5.83)	
Contact with suspected or confirmed COVID-19 cases		0.105
No	14.23 (4.33)	
Yes	15.85 (5.75)	
Families, relatives or friends infected with COVID-19		0.074
No	15.34 (5.94)	
Yes	16.35 (5.13)	
Death of families, relatives or friends due to COVID-19		0.080
No	15.53 (5.65)	
Yes	16.96 (5.63)	
Health status		0.311
Healthy	15.47 (5.60)	
Suspected with COVID-19	16.40 (5.45)	
Confirmed with COVID-19	16.46 (6.40)	

COVID-19: Coronavirus Disease 2019; BSN: Bachelor of Science in Nursing; MSN: Master of Science in Nursing.

Table 3. Relationship of General Health Questionnaire-12 and Connor-Davidson Resilience Scale Scores with Demographic/COVID-19-Related Variables Using Hierarchical Multiple Linear Regression

	b	SE	P
Block 1: Demographics			
Age	-0.11	0.07	0.128
Sex (Female vs Male)	1.03	0.83	0.216
Marital status (Single vs Married)	0.50	0.81	0.539
Parent status (One child or more vs No Child)	0.45	0.79	0.570
Place of residence (Rural vs Urban)	-0.81	1.17	0.488
Education			
BSN vs Diploma	3.89	1.69	0.021
MSN/Doctorate vs Diploma	4.25	1.87	0.024
Job title			
Head Nurse vs Nurse Aid/Nurse	-1.43	1.02	0.160
Supervisor/Matron vs Nurse Aid/Nurse	-1.11	1.12	0.325
Years of working experience	0.07	0.09	0.434
Chronic diseases (Yes vs No)	0.01	1.00	0.997
Working in COVID-19 designated hospital	-0.68	0.61	0.265
Contact with suspected or confirmed COVID-19 cases	0.62	1.06	0.558
Families, relatives or friends infected with COVID-19	0.92	0.60	0.128
Death of families, relatives or friends due to COVID-19	1.05	0.86	0.223
Health status			
Suspected with COVID-19 vs Healthy	1.20	0.75	0.107
Confirmed with COVID-19 vs Healthy	1.41	1.01	0.165
Model characteristics			
	R ² = 6.0%, F = 1.55, P = 0.075		
Block 2: CD-RISC-10			
CD-RISC-10	-0.49	0.03	< 0.001
Model characteristics			
	R ² = 38.0%, ΔR ² = 32.0%, F = 14.06, P < 0.001		

b: regression coefficient; SE: Standard Error; COVID-19: Coronavirus Disease 2019; BSN: Bachelor of Science in Nursing; MSN: Master of Science in Nursing.

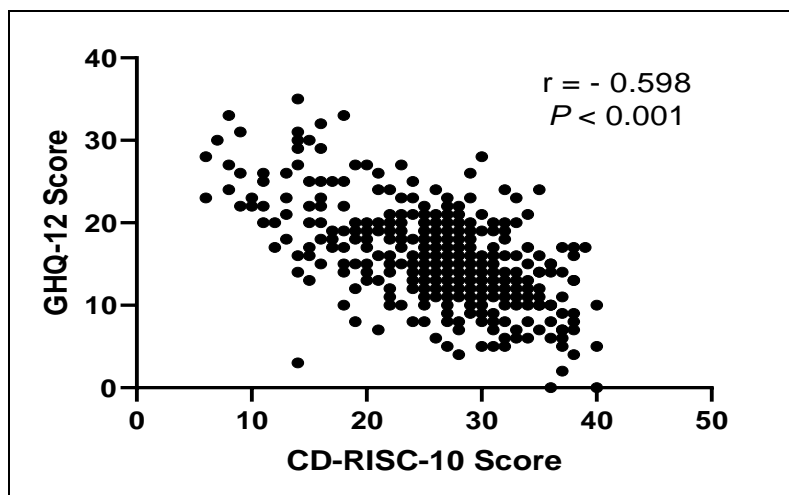


Figure 1. Relationship between Connor-Davidson Resilience Scale- and General Health Questionnaire-12 Scores among Nurses during the COVID-19 Pandemic

Discussion

The aim of this study was to investigate relationship between mental health and resilience of nurses in northern Iran during the outbreak of coronavirus disease, 432 nurses from Guilan province participated in this cross-sectional analytical study. The results of this cross-sectional study demonstrated that more than half of the nurses working in the hospitals and having contact with patients with COVID-19 were exposed to psychological damage and their average resilience score was moderate. Based on the findings, most nurses working in the hospitals had a bachelor degree, and their level of education had a significant relationship with the mental health of nurses working in epidemics. Our results also suggested that mental health is associated with nurses' resilience and showed concerns about mental health and the average resilience of nurses who were involved with COVID-19.

In this study, a significant negative relationship was observed between nurses' mental health and resilience. Accordingly, any increase in the resilience score can reduce a person's mental health score by 0.49. In the COVID-19 pandemic, Khanal *et al.* reported that nurses had higher anxiety compared to other health professionals. This might be attributed to the higher amount of time spent by them in patient care in comparison with other health professionals (25). Foster *et al.* concluded that mental health and resilience in nurses are related to each other and resilience also promotes self-efficacy in nurses (10). Likewise, Mealer *et al.* and Cooper *et al.* found that higher resilience in nurses is related to psychological distress such as burnout, fatigue, anxiety, depression (8, 19). In another study, Labrague *et al.* demonstrated the protective role of resilience in reducing COVID-19 anxiety levels in nurses (26). In a review study by De Brier *et al.*, maximizing resilience in health care workers during the last pandemic was considered vital in helping them safeguard their mental and psychological health (27). Similarly, Ríos-Risquez *et al.* explained that nursing students with higher levels of resilience showed fewer symptoms of psychological challenges and reported that improving the level of resilience and imply of the learning of this psychological capacity can increase the psychological well-being (28). In addition, resilience plays an important role in promoting people's mental health through a mechanism. It reduces the negative effects of injury from exposure to traumatic events, protects against the negative effects of everyday events, and improves a person's ability to cope with potential threats. In fact, resilience to external factors is relatively stable and can provide a relatively stable prediction of a person's mental health. Therefore, individuals can be classified based on their levels of resilience aiming at creating appropriate preparedness for problems (29). Resilience is a personality property, it enables an individual to manage to stressful situations, and therefore contributing to good effects (19). Therefore, it

is possible to reduce the psychological effects of problems (stressful factors in the workplace) while greatly increasing the self-efficacy of nurses by measuring the resilience of nurses and providing targeted and appropriate training and interventions for each class.

The results of current research revealed that age may affect the mental health of nurses. More precisely, nurses' mental health has a significant negative relationship with age so that their mental health decreases during the prevalence of COVID-19 as age increases, and individuals with higher levels of education have lower mental health levels. Bozdağ *et al.* found a positive relationship between age and psychological resilience, indicating that health care workers better cope with crises as they grew older. In other words, health care workers become skilled at handling negative situations and as they gain more experience, their resilience increases (30).

In a review research, Muller *et al.* reported that younger age is a risk factor for psychological distress (31). This is because those with higher levels of academic education generally have less experience compared to paramedics who have lower levels of education and are more proficient at analyzing issues and somehow dealing with problems, which is consistent with the findings of Sun *et al.* (32). In this study, it was stated that the status of psychiatrists has a significant negative relationship with age while a positive relationship with the education level. High levels of anxiety can be considered a sign of low-risk mental health in women younger than 40 years (33).

Based on the results, 97% of nurses in the epidemic represented poor mental health, and nurses whose friends and families developed the disease showed poor mental health compared with other nurses, although no significant relationship was observed in this regard. Approximately 83% of participants in this study were women who demonstrated low levels of mental health. In a study by Lai *et al.*, nearly 44.6% of nurses involved in COVID-19 reported high levels of anxiety. In this study, 76.6% of all participants were women. According to the findings of the study, women had more severe symptoms of depression, anxiety, and stress. It was found that nurses are at the forefront of treating patients and are at risk of infection due to close, frequent, and prolonged contact with patients (3). In line with this study, Di Tella *et al.* reported a higher prevalence of mental health symptoms in women than men during the COVID-19 pandemic among health care workers (34). Furthermore, women are more vulnerable to psychological problems than men (35) and need social support to protect their psychological well-being (34).

Hong Kong medical workers such as nurses being talented to high level of anxiety in the COVID-19 outbreak (20). In the Middle East respiratory syndrome epidemic, the findings of Alshahaf *et al.* showed that 61.2% of medical staff suffered from high levels of

anxiety (36). Additionally, Kaveh *et al.* aimed to determine the anxiety level of hospital staff and reported that 39.6% of people showed moderate to severe levels of anxiety (33). Moreover, the health care system should support nurses in the face of moral or ethical challenges regarding patients with COVID-19 (37).

Relevance for Clinical Practice

Health care systems have the responsibility to provide strategies to maintain resilience in nurses. Organizations are responsible for developing and maintaining staff resilience with making professional development opportunities and motivational approaches to ensure a safe and flexible work environment. Specific interventions should be taken to promote the levels of mental health of medical health workers such as nurses in dealing with COVID-19. Also, to increase and promote resilience in nurses, workshops should be designed and special attention should be paid to the mental health of nurses.

Limitation

The one of the limitations of the study are relevant to the nature of online-based. Similar to other study in this field, the limitation of this study were, demographic bias, and diversity in Internet access. Another limitation of the present study is bases on the nature of cross-sectional, which precludes the ability to causal inferences between general characteristics variables and mental health.

Conclusion

The study looked at the mental level and resilience of nurses as the first line of control for COVID-19 disease. Due to the positive effect of resilience on the nurses' mental health to maintain them at a good level, targeted interventions can be performed to increase the resilience of nurses. Also, by increasing social and organizational support in the epidemic of infectious diseases, it is possible to improve their mental health and resilience, which will ultimately increase the quality of care services.

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Conflict of Interest

None.

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