Original Article

Resiliency and its Relationship with Secondary Traumatic Stress among Nursing Staff during COVID-19 Pandemic

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ABSTRACT

Background: Nurses are front-line health-care workers for patients with severe Coronavirus disease (COVID-19) symptoms. The aim of this study was to determine the resiliency of nurses and its relationship with secondary traumatic stress (STS) in pandemic conditions.

Methods: This cross-sectional study was performed on 233 nurses working in a medical center providing services to patients with COVID-19 in southeast Iran from May to August 2020. Data were collected using demographic questionnaire, Connor-Davidson Resilience Scale (CD-RISC) and The Secondary Traumatic Stress Scale (STSS). Pearson correlation coefficient was used to determine the relationship between variables and data were analyzed through SPSS22.

Results: The mean STS score of nurses was 40.82 ± 11.7. The results showed a significant relationship between STS score and Job satisfaction. The mean score of resilience was 60.91± 17.1 in nurses. The resiliency score showed significant difference based on work experience and exposure to COVID-19 disease. The results of correlation test showed that the overall stress score was significantly related to all aspects of resilience except trust ($p < 0.05$). Also, based on the multiple regression model, positive acceptance (one of the dimensions of resilience) and exposure to COVID-19 disease were the predictors of STS.

Conclusion: The results showed that there is a significant and inverse relationship between resiliency score and STS. Therefore, according to the present conditions, it is recommended to design programs to improve resilience and reduce stress of nurses during COVID-19 pandemic.

Keywords: Resiliency, COVID-19, Health Personnel, Secondary traumatic stress, Nursing staff

Introduction

On March 11ᵗʰ 2020, the World Health Organization (WHO) confirmed the epidemic of COVID-19 and the disease spread rapidly around the world, causing a wave of anxiety and fear among members of the community including medical staff (1-3). Conditions such as increase of patients (4), quarantine (5), anger (6), disease problems and lack of definitive treatment for the disease (1) increased anxiety and fear. The outbreak of COVID-19 poses a major challenge on global healthcare systems and if overcoming it does not succeed, the health of front-line care staff can be severely endangered (4). Nurses are front-line care staff for patients with severe COVID-19 symptoms who require hospitalization (7) and they make up the bulk of the health care workforce in an epidemic disease (8). Nurses caring COVID-19 patients often face inadequate support against high risk of infection, burnout, fear, anxiety, and depression. Studies have reported a high prevalence of fear and anxiety caused by COVID-19 (9, 10).

In addition to nurses' physical health, their mental health is at high risk in COVID-19 crisis (11). Caring patients in crisis situations is considered as a stressful or traumatic event and may lead to negative consequences such as burnout and secondary traumatic stress (STS) (12). STS is a concept similar to post-traumatic stress disorder (PTSD) and is primarily determined by symptoms of infiltration (return of thoughts and trauma dreams), avoidance (trying to get rid of emotions and thoughts related to the traumatic event), and arousal (increased alertness and anxiety) (13). Moreover, STS has a devastating effect on nurses' personal lives and their professional performance (14). The WHO recommends health systems that are in crisis caused by COVID-19 disease to protect all employees against chronic stress and promote their mental health, so that they will have a better capacity to perform their duties (15).

Numerous studies have emphasized on the role of resiliency in preventing the consequences of stress such as STS in emergency medical personnel (16), participants with PTSD symptoms (17) and refugees (18). In a study on a group of emergency medical personnel, resilience was negatively associated with infiltration symptoms (16). Similarly, Gan considered psychological resiliency as a predictor of stress-related injuries (17). Olema *et*

al., also highlighted the protective role of resiliency (18). In a crisis state, the concept of resiliency is defined as a return to the pre-crisis state (19). considering that resilience is one of the important sources of stress control, It is necessary to examine the degree of resilience in nurses during these conditions and its relationship with STS should be examined to suggest strategies for controlling stress and promoting resiliency by determining these factors and identifying at-risk groups. So far, most studies have been conducted in China; therefore, their results may not be generalizable to other regions and countries. Also, most studies conducted in Iran have focused on measuring anxiety and mental health of medical staff (11, 20, 21), while less attention has been paid to resilience. Therefore, the present study was conducted to investigate the resiliency and its relationship with STS during COVID-19 pandemic among nursing staff in Rafsanjan city in Kerman province. The results of this study can provide information about the mental health condition of nursing staff during the COVID-19 pandemic and the necessary evidence for planning and implementing the essential interventions to improve their mental health.

Materials and Methods
Study design and study population

This descriptive cross-sectional study with a non-probability-based sampling method was carried out to investigate the relationship of resiliency with STS during COVID-19 pandemic among nursing staff during the COVID-19 outbreak in one central hospital in south Iran. The study population was 400 front line nurses working in Ali-Ibn Abi-Talib Hospital at the time of the outbreak of COVID-19. The sampling method was census. Health care workers taking care of COVID-19 patients with one year of work experience were included. Those who answered incompletely to more than ten percent of the questionnaire and health care workers with a history of mental disorders were excluded.

Data were collected using three questionnaires including socio-demographic form, Connor-Davidson Resilience Scale (CD-RISC) and the Secondary Traumatic Stress Scale (STSS). Participants' demographic information included gender, marital status, residence status, education, work shift and exposure to COVID-19 disease.

In this study, resilience was measured using the CD-RISC (22). The tool consists of 25 questions covering five dimensions: perception of individual competence, trust in individual instincts, positive acceptance of change, control, and spiritual impact. The scoring of this instrument is in a five-point Likert scale (completely incorrect = 0, completely correct= 4) and its overall score is in the range of 0-100, and higher scores indicate higher resiliency on this scale. According to Samani *et al.* study, Cronbach's alpha coefficient was 0.75 in students (23). In the present study, the Cronbach's alpha for CD-RISC was 0.92.

STSS was used to determine STS to trauma (13). This scale has 17 items that are answered on a five-point Likert scale from one (never) to five (too much). STSS has three subscales of harassment, avoidance, and arousal, and the overall score of the scale is obtained from the total score of these subscales. Brid *et al.* showed that this scale has reliability, convergent and divergent validity and acceptable structure (13). In the research of Mirsaleh *et al.*, Cronbach's alpha coefficient of the whole scale and subscales of harassment, avoidance and arousal were 0.89, 0.75, 0.74 and 0.77, respectively. Desirable content validity and structure of the questionnaire were reported (24). In the present study, the Cronbach's alpha for CD-RISC was 0.89.

Data collection

Data collection lasted from May to August 2020 and sampling was done after obtaining the necessary permits. The researcher went to the hospital and began sampling when front-line nurses had the opportunity to complete the questionnaire. Two hundred fifty-seven out of 400 questionnaires distributed among eligible nurses were returned with a response rate of 64.25%. After removing the incomplete questionnaires, the data of 233 participants were used in the final analysis.

Statistical analysis and Ethical considerations

The collected data were analyzed through SPSS 22 software. Frequency, percentage, mean and standard deviation were used to describe the sample characteristics, the resiliency score and the STS score. A chi-square test was used to check the association of demographic variables with the resiliency score and the STS score. The Pearson correlation coefficient test was used to check the association between the resiliency score and the STS score. Multiple regression was used to determine the association between significant variables and the risk of STS. Ethics Committee of Rafsanjan University of Medical Sciences approved the study protocol (IR.RUMS.REC.1399.018). Information about the objectives of the study, confidentiality and anonymity of the information, and the voluntary participation were explained to the participants.

Results

The data of 233 nurses were analyzed in this study; the majority of them were women (65.2%) with a bachelor's degree (66.5%). The majority of participants in this study were native nurses of Rafsanjan city. The average age of nurses was 34.25 ±7.13 years and 71.6% of nurses were satisfied with their job. More than sixty percent of nurses stated that they were in direct contact with people with suspected COVID-19. A high percentage of staff (79.5%) thought that they were at risk of the COVID-19 disease. The results of independent t-test showed that the stress score was not significantly different between men and women. Also, there was no significant relationship between STS score and demographic characteristics such as marital status, residence status, education and work shift except Job satisfaction. While, there was a significant relationship between Job category and STS; so that people in the nursing management positions reported higher stress scores. Resiliency score was significantly different according to work experience and exposure to COVID-19 disease. The results of post hoc test showed that the resilience score was significantly lower in people with less than 5 years of work experience (Table 1). The majority of nurses (73.3%) expressed that transmission of Infection to family members is their most important concern. Also, 33% of nurses stated that this disease has caused them many problems in doing household chores and communicating with others.

Table 1. Secondary traumatic stress and resiliency score based on demographic characteristics of studied nurses (N = 233)

Variables	Frequency (Valid percent)	Secondary Traumatic stress Mean± SD	P value	Resilience Mean± SD	P value
Gender					
Male	80 (34.3)	40.98±11.98	0.98	62.11±15.98	0.41
Female	152 (65.5)	40.91±11.56		60.14±16.41	
Marital status					
Unmarried Divorced/widow	54 (17.9)	40.09±11.60	0.71	58.80±16.01	0.40
Married	242 (80.5)	40.86±12.5		61.28±17.01	
Residence					
Native	214 (91.7)	40.86±11.75	0.80	60.99±17.28	0.64
Non native	18 (7.7)	41.44±11.33		59.05±15.40	
Level of education					
Diploma	32 (14.6)	44.57±10.80		56.81±16.06	
Associate degree	11 (5.2)	40.75±12.77	0.19	59.45±18.28	0.40
Bachelor	150 (66.5)	40.36±11.50		60.96±16.51	
Work experience (yr.)					
< 5	58 (24.9)	40.01±12.9		55.66±12.69	
5 – 10	58 (24.9)	40.90±12.71		62.11±15.98	
11 -15	54 (23.2)	36.12±11.9	0.90	66.94±18.48	0.03
16 - 25	32 (13.7)	39.23±14.54		62.11±15.98	
> 25	21 (9.1)	36.21±9.05		67.25±22.88	
Exposure to COVID-19 disease					
Yes	193 (82.8)	41.24±12.06	0.315	62.79±16.08	0.002*
No	35 (15.0)	39.00±10.27		53.05±19.86	
Job satisfaction					
Yes	168 (72.7)	39.60±11.58	0.005*	62.34±17.48	0.055
No	63 (27.0)	44.47±11.40		57.45±15.71	

In the present study, the mean and standard deviation of STS in nurses was 40.82 ± 11.7. In regard to the dimensions of STS, the highest stress score according to the maximum achievable score was related to the dimension of harassment. Most participants had severe scores for STS (27.5%). The results showed that a high percentage of nurses had sever STS (Figure 1). The mean score of resiliency was 60.91 ±17.12 (Table 2).
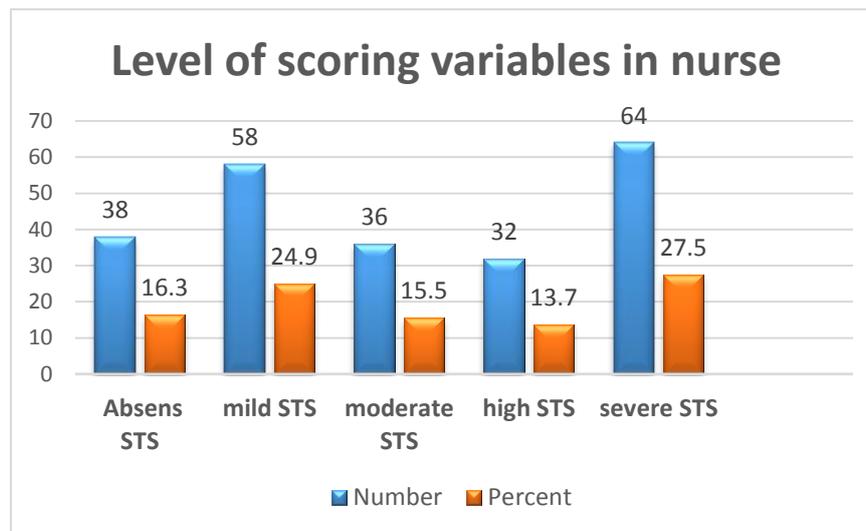
Figure 1. Level of scoring variables in nurses
STS: Secondary Traumatic Stress

Table 2. Mean and standard deviation of secondary traumatic stress and resilience dimensions in the studied nurses (N=233)

Variable	Mean ±SD	minimum	maximum	Range
Influence dimension (STS)	12.80±4.22	5	37	1-25
Avoidance dimension (STS)	16.27±4.88	7	30	1-35
Arousal dimension (STS)	11.79±3.91	5	23	1-25
Overall Secondary Traumatic Stress	40.82±11.7	17	72	1-85
individual competence (R)	21.80±6.57	3	40	0-32
spiritual influences (R)	6.45±2.02	0	10	0-8
Control (R)	8.32±2.66	1	15	0-12
Positive acceptance (R)	11.65±3.57	1	32	0-20
Trust (R)	12.71±5.01	2	45	0-28
Overall resilience	60.91±17.12	12	100	0-100

R: resilience, STS: Secondary Traumatic Stress

According to the correlation test, the overall stress score was statistically and significantly related to all dimensions of resilience except trust in individual instincts. Table 3 shows Pearson's correlation coefficients between STS score and the resilience underlying factors. Significant association was observed between STS and resilience (r = -0.218, p < 0.001). The multiple regression with backward method was conducted for further analysis. All variables with p value < 0.2 in bivariate analysis were included in the multiple regression model. In regard to the dimensions of resilience, the results showed a significant association only between positive acceptance (95% Confidence Interval for odds ratio: -1.35- 0.51, P < 0.001), exposure to COVID-19 disease and STS (95% Confidence Interval for odds ratio: -5.77- 0.28, P = 0.031).

Table 3. The correlation between the dimensions of secondary traumatic stress and resiliency in the studied nurses (N = 233)

Variable	Spearman's rho Correlation Coefficient								
	1	2	3	4	5	6	7	8	9
1. Influence dimension (STS)	1								
2. Avoidance dimension (STS)	0.66** (< 0.001)	1							
3. Arousal dimension (STS)	0.69** (< 0.001)	0.79** (< 0.001)	1						
4. Overall Secondary Traumatic Stress	0.86** (< 0.001)	0.92** (< 0.001)	0.91** (< 0.001)	1					
5. Individual competence (R)	-0.06 (0.316)	-0.25** (< 0.001)	-0.22** (< 0.001)	-0.20** (< 0.001)	1				
6. Spiritual influences (R)	-0.07 (0.242)	-0.18** (0.006)	-0.15* (0.020)	-0.15* (0.022)	0.632** (< 0.001)	1			
7. Control (R)	-0.09 (0.172)	-0.21** (0.001)	-0.21** (0.001)	-0.19** (0.003)	0.83** (< 0.001)	0.59** (< 0.001)	1		
8. Positive acceptance (R)	-0.14* (0.029)	-0.27** (< 0.001)	-0.29** (< 0.001)	-0.25** (< 0.001)	0.71** (< 0.001)	0.61** (< 0.001)	0.68** (< 0.001)	1	
9. Trust (R)	-0.02 (0.754)	-0.14* (0.029)	-0.15* (0.020)	-0.11 (0.077)	0.64** (< 0.001)	0.44** (< 0.001)	0.58** (< 0.001)	0.54** (< 0.001)	1
10. Overall resilience	-0.08 (0.194)	-0.25** (< 0.001)	-0.27** (< 0.001)	-0.21** (0.001)	0.93** (< 0.001)	0.71** (< 0.001)	0.87** (< 0.001)	0.83** (< 0.001)	0.80** (< 0.001)

R: resilience, STS: Secondary Traumatic Stress, **: Correlation is significant at the 0.01 level (2-tailed). *: Correlation is significant at the 0.05 level (2-tailed)

Discussion

The aim of this study was to determine STS and resiliency in nurses involved in patient care during the COVID-19 crisis. The results showed reverse relationship of STS score and resiliency. The results of the present study are consistent with some previous studies conducted on nurses (11, 25, 26). The Zakeri *et al.* study showed significant association of non-resilience with psychological disorders such as STS in Iranian nurses (11). In Ang *et al.* study, resilience increase was consistent with lower STS in Canada and Singapore nurses (26). Ogińska *et al.*, too, have reported a negative correlation of

resilience with burnout and STS and a positive correlation between STS and burnout in Poland nurses (25). Moreover, studies show that the implementation of interventions to promote resiliency is effective in reducing STS in nurses (27). Nurses should strengthen their resilience and develop resilience skills to deal with difficulties, adapt to new critical conditions such as COVID-19 disease. The concept of resilience is very important for nursing managers because it can help nursing leaders understand how to improve nurses' resilience to problems. Resilience may play an important role in protecting nurses against crises, including

COVID-19. Future research should focus on better understanding of nurses' coping mechanisms such as resilience and related factors in the face of crises.

The results of our study showed that a low percentage of nurses did not show any STS based on the criteria. Nursing and care of critically ill patients with COVID-19 can cause STS symptoms in nurses. The results of a review study by Beck *et al.* showed that in all studies performed on nurses in clinical wards, there had been some degree of STS (28). Also, in the study of Duffy *et al.*, a high percentage of nurses in emergency department (67.64%) mentioned the criteria of STS (29), which is consistent with the results of the present study. Studies in COVID-19 crisis also show high levels of stress and anxiety in nurses; for example, in the study of Hu *et al.* (30), more than half of nurses in COVID-19 crisis had moderate and high STS. This is consistent with the present study that 56.7% of nurses had higher level of STS than the average. However, a study by Zakeri *et al.* Showed no significant difference between stress before and during the outbreak of coronavirus infection in nurses (21). However, we did not find further studies in this regard and it is necessary to consider the level of stress of nurses in times of crisis. Therefore, as studies show, it is necessary to reduce STS and pay attention to the psychological issues of nurses during the COVID-19 crisis (31).

The study of nurses' resiliency score showed that the average resiliency score of nurses is in the moderate level (60.92), which is consistent with the results of Amini study in which 62.51 was the average resiliency score of nurses (32). However, it is lower than the results of Zakeri *et al.*, who have reported the average resilience score of 70.09 in their studied nurses (11).

Resiliency is defined as readiness to face challenges and events and to maintain focus and readiness for the future (33). Due to the prolonged COVID-19 crisis, nursing managers and policy makers in this field should predict interventions for self-care and techniques for promotion of resiliency in nursing. Some studies have pointed to the role and importance of promoting resiliency in nurses during the COVID-19 crisis (34). The scores of the resiliency dimensions in nurses showed that the highest resiliency score is in the spiritual dimension and the lowest score is related to the trust dimension, which shows that resilience interventions should be focused on emotion-based adaptation and emotion control methods in nurses. The results of resiliency dimensions, in the present study, are almost consistent with the results of Gerami *et al.* study (35). However, the resilience score in the emotion control dimension was lower in the present study. The reason for this difference can be explained by the different conditions of the COVID-19 crisis and the incompatibility with these conditions in nurses.

In this study, there was no statistically significant relationship between STS score and demographic characteristics such as gender and level of education and work shift which is consistent with the results of the studies of Babaei *et al.* (36) Zakeri *et al.* (37) and Hooper *et al.* (38). In contrast to the present study, a study by Griffith *et al.* showed the relationship of education level and the score of stress in nurses (39). In justifying this difference, we can point to the differences of organizational cultures in different studies. However, these results indicate the presence of stress in the majority of nurses with different characteristics.

Also, in the present study, the illness of a family member has been the most important cause of concern in nurses. The results of the present study are consistent with similar studies in this field. In the study of Nemati *et al.*, nurses had high level of anxiety and worry about the risk of infection for themselves and their family members (40). In this study, the majority of nurses in different wards thought that they were at risk, and the high level of concern in nurses can be due to this thinking and attitude. In the study of Kang *et al.*, the level of worry and anxiety in patient care providers was significantly higher than that in the normal population (41). Therefore, it seems that providing appropriate protective equipment for nurses in different wards and reassuring about the effectiveness of these equipment and protective principles will be effective in reducing nurses' concerns. A number of nurses stated that patient care had created problems in their relationship with the community. Due to the being at risk of this group, this reduction in social interactions may be voluntary or even unintended for nurses. Xue Yin, in his study of the psychological needs of nurses in the COVID-19 crisis, concluded that the reduction of social interactions and relationships is a concern in nurses and alternative measures should be taken to address the problem of nurses' interpersonal communication (42).

This study had some limitations, including the fact that due to the severe involvement of the nursing staff and their concerns, not all nurses participated in the study, and on the other hand, some of the information entered was distorted and excluded from the study. Therefore, studies on a larger population and other hospitals can lead to the greater validity of the results. Participants were working in a public hospital of one of the southeastern provinces of Iran that makes it difficult to generalize our results to other regions. This study lacks longitudinal follow-up and does not address long-term outcomes of the coronavirus in resiliency and STS in nurses. The STS and risk factors associated with the COVID-19 infection for nurses should be considered in future long-term studies. Our study was performed at the beginning of the outbreak of COVID-19, so not all variables were examined in this regard, which should be considered in future studies. Mental response using self-report questionnaires is another limitation of this study that should be supported by objective measurement of the psychological outcomes.

Conclusion

The results of this study showed that due to the stressful nature of pandemic COVID-19 disease, STS score in nurses will be high and increase in the number of patients and nurses' workload can cause a negative effect on nurses' physical and mental health. The results of this study also showed that there is a significant and inverse relationship between resiliency and stress score. Therefore, according to the created conditions, in order to improve the performance of nurses and their readiness to adapt to the crisis caused by COVID-19 disease, it is recommended to design and implement programs to promote resilience and reduce stress and ultimately maintain and improve nurses' mental health.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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