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Original Article:

Impact of Virtual-based Resilience Training on Perceived Stress in Family Caregivers of COVID-19 Patients

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Abstract

Introduction: Stress is a psychological trauma that the family caregivers of COVID-19 patients may experience that can impair the caregivers' positive adaptation to stressful experiences, i.e., their resilience, leading to a decline in the quality of patient care. This study aimed to determine the effect of virtual-based resilience training on perceived stress levels among family caregivers of COVID-19 patients.

Materials and Methods: Twenty family caregivers of COVID-19 patients discharged on the same day from 22nd-Bahman Hospital of Khaf were recruited by census and assigned randomly to experimental or control groups in a quasi-experimental study. Before and after the intervention, data on the caregivers' demographic characteristics, resilience, and perceived stress were collected using electronic questionnaires. One month of training was given to the experimental group via the WhatsApp application. Data were analyzed by SPSS-22 using the Kolmogorov-Smirnov, Levine's, and analysis of covariance tests. The level of significance was set to $\alpha = 0.05$.

Results: In this study, 20 family caregivers of COVID-19 patients were allocated to experimental (4 men and 6 women) and control (3 men and 7 women) groups. Post-test scores for perceived stress ($F = 290.34$, $P < 0.001$) and resilience ($F = 799.794$, $P < 0.001$) revealed a significant difference between the experimental and control groups.

Conclusion: The results demonstrated that virtual-based resilience training is an effective method for minimizing perceived stress and enhancing the resilience of COVID-19 patients' family caregivers.

Keywords: COVID-19, Education, Family caregivers, Online, Resilience, Stress

1. Introduction

As a large group of viruses, coronaviruses are members of the Coronaviridae family, which range from the virus causing the common cold to those causing more severe diseases such as SARS, MERS, and COVID-19. The most recent of these, the novel coronavirus, emerged as a pandemic in December 2019 in Wuhan, China. The virus entered Iran in late February 2020 and has

affected every province and city in the country. This disease was later announced as a pandemic by the World Health Organization [1].

Disease outbreaks can have a significant impact on mental health. The more widespread a disease's epidemic, the greater its effects. Epidemics cause panics that may persist even after the disease has been cleared. Ineffective control of a coronavirus results in hospitalization, high prevalence in the community, diminished quality of life, and increased stress. Coronaviruses and their complications impose a financial burden on the patient and their family and affect their quality of life, stress levels, and social and familial ties. Coronaviruses impair not only the lives of the patients but also those of their caregivers [2].

Caregivers are the people most involved in caring for the patient and assisting them in adapting and managing the illness in the course of the disease and its treatment [3,4].

The transition from hospital care to home care could cause family caregivers to undergo multiple stresses. Perceived stress is one of these stress types, which is the degree to which a situation in an individual's life is perceived to be stressful. It is a situation that reflects one's overall evaluation of the significance and severity of environmental and personal challenges [5].

Despite the growing interest in the positive aspects of family caregiving [6-8], caregivers are regarded as invisible patients because they experience psychological problems such as depression, anxiety, and stress [9,10]. Perceived stress is described as the outcome of events or needs that exceed an individual's ability to cope [11].

Caregivers are expected to provide multidimensional, all-inclusive care with minimal facilities or support. Caregivers feel overwhelmed and stressed when the caregiving role demands exceed their limited resources [10]. Family caregivers' physical and mental health may be negatively impacted by their caregiving responsibilities, according to studies [12].

There are some factors that can help family caregivers and have a significant impact on their stress levels. External factors, such as economic issues and social and family support, as well as internal factors, such as resilience, may reduce stress levels [13,14].

Resilience refers to the capacity of individuals to effectively cope with stressful situations and transform them into an opportunity to create physical and mental adaptation. It is a personality trait that mitigates the negative effects of stress [15,16] and one of the concepts of the strengths-based approach, which is based on the capacity of individuals to overcome adversity [15].

The term resilience is frequently used to indicate adaptation and coping with stressful factors, seen in four types: 1- psychological resilience, 2- emotional resilience, 3- physical resilience, and 4-social resilience. The term "psychological resilience" describes a person's ability to persevere in the face of adversity and bounce back from difficult situations. Psychologically resilient individuals are able to remain calm and focused during a crisis and continue working without being affected by negativity.

Emotional resilience is an individual's capacity to imagine, envision, plan, and create. Stress and adversity can be emotionally endured by individuals of varying degrees of tolerance. Some people are more sensitive to change than others, and a person's reaction to a situation can affect their emotions. Emotionally resilient individuals are better able to regulate their emotions. Even when confronted with a crisis, they maintain their optimism and realism, which they employ to manage the situation. As a result, they are able to manage their stressors and emotions in a healthy and constructive manner.

Physical resilience is the body's capacity to adapt to setbacks, maintain endurance and strength, and recuperate rapidly and effectively. This ability aids a person's performance and recovery from illness, injury, or other physical problems. Choosing a healthy lifestyle, connecting with others, resting and recovering, taking deep breaths, and engaging in enjoyable activities all contribute to the development of physical resilience.

Social resilience is the capacity of groups to respond to adversity, such as natural disasters, acts of violence, economic woes, and other societal challenges [17,21].

Overall, resilience encompasses qualities and traits that help a family to develop the necessary resistance to adversity and crisis [22].

Family training entails systematic, structured, and educational information about the disease and its treatment, whereby the patients and their families are potentially empowered to cope with the disease [23]. It intends to provide family members and caregivers with education and support [24]. Family training can be a group or individual program that

involves interaction between the information provider and the participant(s) and is presented in a variety of modes, including face-to-face, online virtual forums, and a mix of modes [25]. The effectiveness of virtual education has been highlighted in the studies of Khosravi et al. (2017), Salehmoghadam et al. (2013), Kadivar et al. (2017), and Rotondi et al. (2010) [26-29].

Accepting the role of a caregiver can be stressful for family caregivers of patients with COVID-19 disease. Resilience and perceived stress in family caregivers of COVID-19 patients, on the other hand, affect the quality of care provided to patients. To our knowledge, there has been no research into the impact of virtual resilience training on perceived stress in family caregivers of COVID-19 patients to date. Therefore, this study was conducted to determine the impact of virtual-based resilience training on caregivers of COVID-19 patients discharged from 22nd-Bahman Hospital in Khaf in terms of perceived stress and resilience.

2. Materials and Methods

The current study applied a quasi-experimental design with random sample allocation (pretest-posttest and control group). The family caregivers of COVID-19 patients discharged from Khaf's 22nd-Bahman Hospital served as the population of study. All 20 patients discharged on a specific day from the coronavirus ward were selected, and their family caregivers were randomly allocated to an experimental group and a control group. The family member who played the largest role in the patient's care was identified and recruited.

For random allocation, the lottery method was employed. This method utilizes a large block the size of the total sample size, ensuring a balance in the number of individuals assigned to each group. Identical cards bearing the numbers 1 through 20 (corresponding to the sample size, i.e., n = 20) were placed in identical envelopes and in a lottery container. The cards were removed at random, and the numbers of the first 10 cards were assigned to the experimental group, while the numbers of the remaining 10 cards were assigned to the control group.

The ethics committee granted permission to conduct the research, and the education vice-chancellery issued an introduction letter, which was presented to the officials of the 22nd-Bahman Hospital of Khaf. Before recruitment, each participant was given a thorough explanation of the research purpose and objectives. Afterward, they provided oral consent for parti-cipation. In this regard, all ethical principles of working with human subjects were considered, and all aspects of the research were disclosed to the subjects, who were free to withdraw at any time.

The age range of 18 to 40 years, caregivers with the most contact and care services to the patients in the 14 days after patient discharge, lack of psychiatric disease in the primary caregiver, literacy, access to smart-phones and WhatsApp, lack of membership in online medical or psychology groups, and willingness to participate in the study were the inclusion criteria for family caregivers. Exclusion criteria included: failure to provide feedback on messages sent during the intervention, the patient's death, and the caregiver's hospitalization.

The researchers started visiting inpatient wards and reviewing COVID-19 patients' medical records (those with positive PCR test results). Twenty patients discharged from the COVID-19 ward on the same day were selected. A research colleague contacted their families and explained the study's purpose, procedure, and confidentiality concerns. Finally, after receiving informed consent from the eligible family caregivers, the researchers chose a sample from among them. Two WhatsApp groups were created for eligible family caregivers (one group for the experimental group and one for the control group).

Since there was no way to contact the patients' family caregivers directly in light of the current climate (amid the COVID-19 pandemic), researchers had to resort to using the WhatsApp social media platform to recruit family caregivers for intervention and control groups in order to collect the required data. Among the reasons for using WhatsApp to conduct the research are the ability to survey the participants, their agreement to conduct the research in the virtual space of WhatsApp, the availability of this virtual network, the ability to have questions and answers, its ease of use by the participants, and the capacity to send audio and video messages. What was stated regarding the rationale for utilizing the virtual space of WhatsApp to conduct the present study is one of the reasons for the superiority of using the research procedure in the virtual space of WhatsApp over other educational methods, such as the telephone-based method, video conference, etc. Regarding the pretest, two weeks after the patients were discharged from the hospital, demographic characteristics form (including age, gender, marital status, occupation, education, and caregiver-patient

relationship), Connor-Davidson Resilience Scale (2003), and Cohen et al.'s Perceived Stress Scale (1983) were provided electronically for the experimental and control groups using links cited in the WhatsApp groups.

The experimental group received resilience-related educational content on a daily basis for four weeks. The content's validity and reliability were confirmed formally using the opinions of ten faculty members who specialized in this subject. Messages consisting of written text, photos with texts, and educational video clips were sent to the caregivers during the day. In the beginning, the audience was provided with a general list of the topics, and at the beginning of each week, they were sent a list of the week's educational materials.

Two days per week were devoted to questions and answers regarding the submitted materials; the audience asked questions and received responses in the virtual group setting. The final day of each week (Friday) was devoted to summarizing the entire week's events. During this period, there was no contact between the control and experimental group members.

Four weeks after the intervention, the experimental and control groups received the Connor-Davidson Resilience Scale (2003) and Cohen et al.'s Perceived Stress Scale (1983) electronically. In order to comply with ethical considerations, all training provided to the intervention group was provided to the control group in the form of an electronic training package at the conclusion of data collection.

The tools used in this study were the followings:

1- Demographic characteristics form including age, gender, marital status, occupation, education, and caregiver-patient relationship

2- Perceived Stress Scale: Cohen et al. (1983) developed the Perceived Stress Scale for a general assessment of perceived stress in the past month. The first version of this instrument includes four questions, the second version contains ten items, and the third one contains fourteen items. In this study, the third version was utilized. The options of the items are distributed on a Likert scale and scored as 0 (never), 1 (rarely), 2 (occasionally), 3 (frequently), and 4 (always). Remarkably, the scores for positive items (4-5-6-7-9-10-13) are scored reversely. The total score ranges from 0 to 56. This scale has been used in several studies in Iran and has been shown to be both reliable and valid [15,30]. As this tool has not yet been applied in the context of the COVID-19 disease, we assessed its content and face validity based on expert opinion. Ten specialists and experts were given the scale, and modifications were made based on their feedback. Then, the reliability of the instrument was obtained using Cronbach's alpha coefficient of 0.92.

3- Resilience Scale: Created by Connor and Davidson (2003)[31], the 25-item instrument measures the resilience structure on a five-point Likert scale ranging from 0 to 4. On this scale, the minimum score for resilience is 0, and the maximum score is 100. The scale has been standardized for use in the Iranian context by Mohammadi (2005). The cutoff score for normal people is 4.80. In order to determine the validity of this scale, the correlation between each item and the total score was first calculated, followed by factor analysis on the scale items using the principal components analysis. Cronbach's alpha method determined that this test's reliability was 87% [32-34].

Data were analyzed using SPSS-22 by Kolmogorov-Smirnov, Levine's, and analysis of covariance statistical tests. The significance level was considered at $\alpha = 0.05$.

3. Results

In this study, 20 family caregivers of COVID-19 patients were recruited for experimental and control groups. The groups were similar in terms of age, gender, marital status, education, caregiver-patient relationship, and occupation ($P > 0.05$) (Table 1).

Table 1 summarizes the descriptive indices of participants in terms of age, gender, marital status, occupation, education, caregiver-patient relationship, and the mean and standard deviation of perceived stress and resilience scores in the control and experimental groups.

The data distribution's normality was examined using the Kolmogorov-Smirnov test, and the homogeneity of variances hypothesis was assessed using Levine's test. The analysis of the covariance test examined the effect of the independent variable (i.e., resilience training course) on dependent variables (namely, perceived stress and resilience) among COVID-19 patients' caregivers. As Table 2 illustrates, a significant difference is seen between the mean scores of the experimental and control groups in post-test perceived stress scores ($F = 290.34$, $P < 0.001$). The Eta coefficient represents the impact of group resilience training on perceived stress.

Table 1. Comparison of demographic characteristics, perceived stress, and resilience scores in experimental and control groups

Characteristic		Group		P-value
		Control	Intervention	
Age		34.70 ± 4.81	35.30 ± 4.74	0.782
Gender	Male	3 (30.0%)	4 (40.0%)	1.00
	Female	7 (70.0%)	6 (60.0%)	
Marital status	Single	6 (60.0%)	6 (60.0%)	1.00
	Married	4 (40.0%)	4 (40.0%)	
Occupation	Self-employed	3 (30.0%)	2 (20.0%)	0.766
	Employee	1 (10.0%)	2 (20.0%)	
	Housewife	6 (60.0%)	6 (60.0%)	
Relationship with the patient	Daughter	4 (40.0%)	4 (40.0%)	1.00
	Son	1 (10.0%)	1 (10.0%)	
	Spouse	5 (50.0%)	5 (50.0%)	
Education	Non-tertiary	4 (40.0%)	4 (40.0%)	1.00
	Tertiary	6 (60.0%)	6 (60.0%)	
Baseline perceived stress		42.10 ± 5.17	41.60 ± 4.43	0.819
Baseline resilience		36.80 ± 4.00	31.30 ± 4.06	0.007

Table 2. Comparison of mean scores of perceived stress in experimental and control groups after the intervention

Source	Type III Sum of Squares	DF	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4176,050 [a]	1	4176,050	290,340	0.000	942
Intercept	15624.050	1	15624.050	1086,261	0.000	984
Group	4176,050	1	4176,050	290,340	0.000	942
Error	258,900	18	14,383			
Total	20059,000	20				
Corrected Total	4434,950	19				
a. R-Squared =.942 (Adjusted R-Squared =.938						

The data presented in Table 3 reveal a statistically significant difference between the experimental and control groups' post-test resilience scores (F = 799.791, P <0.001). The magnitude of the Eta coefficient is equal to the effect of group resilience training on resilience.

Table 3. Comparison of mean scores of resilience in experimental and control groups after intervention

Source	Type III Sum of Squares	DF	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14418.450 [a]	1	14418.450	799,791	0.000	.978
Intercept	81792.050	1	81792.050	4537.001	0.000	.996
Group	14418.450	1	14418.450	799,791	0.000	.978
Error	324,500	18	18,028			
Total	96535,000	20				
Corrected Total	14742.950	19				
a. R-Squared =.978 (Adjusted R-Squared =.977.						

4. Discussion

This study examined the impact of virtual-based resilience training on perceived stress and resilience among COVID-19 patients' family caregivers. The training was found to significantly impact resilience and perceived stress variables (P <0.05).

The findings indicated reduced perceived stress, decreased anxiety, and enhanced resilience. Family resilience is resulted from the family's efforts to achieve a new level of equilibrium and performance in times of stress and crisis. By influencing thought processes as a fundamental sense of personal control, resilience training could lead to draw and access a list of resilient strategies, thereby playing an important role in coping with stressful life events and acting as a source of resistance and protection in stressful

situations [34]. In other words, caregivers can resist and overcome stressors through fostering resilience. As such, resilience ensures psychological well-being by modifying and alleviating factors such as stress and anxiety [35].

Two categories emerged in the research by Asghari et al. (2021) regarding family caregivers of COVID-19 patients: *nostalgia* and *dread of the future*. These indicate that the presence of a sick family member causes the caregiver to experience fear and anxiety, followed by a decrease in energy and a negative mood [36]. Fear of losing the patient or contracting the virus traps family caregivers in a state of anxiety [37]. In a study by Abbasi et al. (2013) , increased pressure on caregivers was found to be associated with outcomes such as family isolation, disappointment with social support, disruption of family relationships, inadequate patient care, and the eventual ignorance of the patient [38]. Indeed, research showed that 70% of caregivers face two major challenges: patient care problems and adaptation to the resulting responsibilities [39].

On the other hand, any change in human life, whether positive or negative, necessitates some form of readjustment, and the care burden is an issue that is hugely problematic for the patients and their families [40]. Both the patient and the caregiver are in agony, since care pressure is invisible and not recognized as a disease. They desperately need community support and must be understood [39]. These individuals are suddenly confronted with a life-threatening situation and the fear of losing loved ones. In a study by Navab et al. on the experiences of family caregivers caring for Alzheimer's patients, findings showed that caregivers experienced this stress with fear of the future, particularly the dread of their infliction with the same disease [41].

The results of the present study comply with the research of Wang et al, who studied the effect of educational programs on reducing stress and enhancing the life quality of caregivers of older adults with Alzheimer's disease [42]. Likewise, our results are consistent with those of Rosa et al., who reported that resilience skills training mitigated caregivers' perceived stress and enhanced their physical and mental health [43].

In line with the present study, Khodabakhshi et al. (2016) investigated the effectiveness of resilience training on the mental well-being of patients with type 2 diabetes, and they found that that resilience training is significantly effective at enhancing well-being in patients with type 2 diabetes [44]. In addition, in Bahrami et al's. study (2016), the effect of psychological training on the resilience of family caregivers of patients with bipolar disorder was investiged . In their study, the effectiveness of psychological training in enhancing the resilience of family caregivers of patients with bipolar disorder was demonstrated by the absence of a statistically significant difference between the experimental and control groups' mean resilience scores at baseline but there was a significant difference after the intervention, indicating that the psychological training was effective in enhancing the resilience of family caregivers [45]. By increasing positive emotions and decreasing negative emotions and feelings, resilience makes it easier to deal with challenging life events and reinforces the capacity to overcome obstacles. Alongside this, research indicates that resilience can help individuals experience more positive emotions [46]. Educational programs also help patients experience meaningful lives by enhancing their capacity for future planning. Additionally, systematic psychotherapy programs can improve patients' lives by increasing their endurance and tolerance of life's difficulties [47].

Given our findings and the paucity of research in this area, the resilience of caregivers of COVID-19 patients warrants further investigation. Although this study demonstrates that caregivers possess a high level of resilience, there was no statistically significant correlation between resilience and demographic characteristics.

The study's limitations included financial issues, confinement to a single city and a single center, the cross-sectional nature of the research, and the small sample size. In order to improve the generalizability of findings, it is suggested that future research utilize larger samples and be conducted over a longer period. Given the importance of resilience for patients' family caregivers, it is suggested that larger studies be conducted to identify other factors related to resilience, as well as other psychological problems such as depression and anxiety, in these caregivers to improve their life skills in coping with psychosocial stress.

5. Conclusion

These findings help broaden our perception and knowledge of these patients' psychological needs and potential problems. As such, they can promote the mental health of this population and their families, as well as designing and implementing major psychosocial interventions. Upon resilience training, it can be argued, each individual could become more aware of how to control the stress caused by disease exposure and therefore cope with

the disease more effectively.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the University of Mashhad University of Medical Sciences with the ethics code IR.MUMS.REC. 1400.195. Also, the ethics committee granted permission to conduct the research, and the education vice-chancellery issued an introduction letter, which was presented to the officials of the 22nd-Bahman Hospital of Khaf. Before recruitment, each participant was given a thorough explanation of the research purpose and objectives. Afterward, they provided oral consent for participation. In this regard, all ethical principles of working with human subjects were considered, and all aspects of the research were disclosed to the subjects, who were free to withdraw at any time.

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Author's contributions

Conceptualization and Supervision: Rasoul Raesi, Marjan Moradi, and Kiavash Hushmandi; Methodology: Rasoul Raesi, Mohammad Hossein Gholami, and Sam Saghari; Investigation, Writing – original draft, and Writing – review and editing: All authors; Data collection: Rasoul Raesi, Marjan Moradi, and Sam Saghari; Data analysis: Rasoul Raesi, Seyyedeh Mona Taghdisi Heydarian and Eisa Nazar.

Conflict of interest

The authors have no conflict of interest to declare.

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