Original Article
2024, 14(2): 49-58
DOI: 10.22038/EBCJ.2024.75968.2933

Received: 06/12/2023
Accept & ePublished: 09/06/2024

Evidence Based Care Journal
http://ebcj.mums.ac.ir
Online ISSN: 2008-370X

The Effect of an Online Self-Care Training Program on Perceived Stress in COVID-19 Patients: A Randomized Control Trial

Arash Marzban [1], Zahra Farsi [2], Effat Afaghi [3]*, Mehdi Rezaei [4], Mohsen Moradi [5]

Abstract

Background: The coronavirus disease 2019 (COVID-19) caused many adverse effects, including increased stress in patients.

Aim: The present study was conducted with aim to determine the effect of an online self-care training program on perceived stress in COVID-19 patients.

Method: This randomized control trial study was fulfilled by recruiting 132 COVID-19 patients, referred to two hospitals in Isfahan, Iran, 2021. The patients were selected using the purposive sampling method and were then randomly allocated into experimental and control groups (n=63 in each group). The online self-care training program was presented to the experimental group in six 30-minute sessions over two weeks. The data were collected through an individual characteristic form and the Perceived Stress Scale (PSS) at three stages before, immediately, and one month after the intervention. P<0.05 was considered statistically significant.

Results: The mean scores of perceived stress before, immediately, and one month after the intervention in the experimental group were 30.51±6.31, 24.59±4.66, and 26.57±3.82, respectively and in the control group were 29.78±4.81, 29.4±4.57, and 29.11±4.73, respectively. Moreover, no significant difference was observed between the two groups at the pre-intervention stage (p=0.467), while the mean scores of perceived stress in the experimental group were lower compared with the control group immediately (p<0.001) and one month after the intervention (p=0.001).

Implications for Practice: The online self-care training program led to a reduction in perceived stress in COVID-19 patients. Thus, implementing this self-directed program may be considered as a safe and useful method to relieve perceived stress in similar conditions.

Keywords: E-Learning, Mental Health, Public Health, SARS-CoV-2, Self-Care, Telemedicine

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1. MSc, Psychiatric Nursing, Nursing School, Aja University of Medical Sciences, Tehran, Iran
2. Professor, Research and Ph.D. Nursing Departments, Nursing School, Aja University of Medical Sciences, Tehran, Iran
3. Instructor, Critical Care Nursing Department, Nursing School, Aja University of Medical Sciences, Tehran, Iran
4. BC in Nursing, Imam Reza Hospital, Aja University of Medical Sciences, Tehran, Iran
5. MSc in Psychiatric Nursing, School of Nursing and Midwifery, Shahrekord University of Medical Sciences, Shahrekord, Iran

* Corresponding Author Email: afaghi8181@gmail.com

Introduction

The Coronavirus disease 2019 (COVID-19) infected over 702 million people worldwide and led to the death of about 7 million people from the beginning of the pandemic until January 28, 2023 (1). With reference to the statistics of the Worldometer, 7,625,812 people have been also infected with this virus and 146,767 people have died in Iran until January 28, 2023 (1).

The World Health Organization (WHO) has suggested implementing public health measures like isolation, quarantine, social distancing, and lockdowns to reduce the spread of COVID-19. Quarantine has been identified as an effective measure to control the virus (2). A rapid review found that in the absence of effective drugs or vaccines, non-pharmacological measures such as isolation, distancing, and quarantine are the only effective ways to cope with the outbreak (3,4). These approaches impede individuals' mobility, daily activities (5,6), and social interactions (7). Also, participation in acute and chronic physical activity (PA), which has been shown to improve overall health, may be compromised during confinement periods (5–8). Therefore, evidence suggests that along with physical and physiological complications, such as headache, sore throat, gastrointestinal symptoms, diarrhea, and vomiting, COVID-19 has further given rise to some major psychosocial issues in patients and health care providers (HCPs) (9–11). For example, it has been reported that COVID-19 results in higher levels of stress, anxiety, depression, irritability, sleep disorders, particularly insomnia, post-traumatic stress disorder , grief, as well as panic and fear in patients (12,13). In addition, people with mental illnesses are more likely to be affected by emotional reactions due to COVID-19, which may give rise to recurrence or deterioration of their mental health conditions (14). In this regard, Mohammadi et al. reported a high prevalence rate of mental health problems, particularly depression and anxiety, in Iranian COVID-19 patients (15). Most affected countries have thus underlined the need to pay much more attention to mental health in individuals, especially depression and anxiety during the COVID-19 pandemic (16,17).

Perceived stress affects patients, their families, and HCPs. Here, perceived stress refers to the feelings or thoughts that each patient has regarding the stress as they interact with themselves and their environment over a period of time, and how they feel about life stressful events and their ability to cope with them (13,18). The results of one study in Colombia revealed that 14.3% of adults had experienced high levels of perceived stress associated with the COVID-19 epidemic (19). Shokri et al. also demonstrated that perceived stress caused by this condition was high among Iranian population, and receiving news and information from social networks could play a significant role in intensifying perceived stress among most individuals (20). As well, Zandifar et al. found that 73.6% of COVID-19 inpatients had faced a high level of perceived stress, demanding more attention to their mental health status (18). Most studies have further shown that improving self-care skills can significantly reduce perceived stress in patients. For example, Saeidnia et al. established that self-care training could help prevent COVID-19, manage its signs and symptoms, relieve stress, improve personal hygiene, and better communicate with HCPs (21).

Self-care has been accordingly defined as the ability of individuals, families, and communities to promote and maintain health, prevent diseases, and cope with illnesses and disabilities with or without the support of HCPs (22). In other words, self-care means reviewing, planning, and performing some measures that are often of importance for daily living (23,24). Evidence has further shown that the COVID-19 pandemic has short- and long-term consequences for mental health, and it is likely to bring devastating individual and social effects. Some researchers have also noted that the psychological effects of disasters can last for many years (11,25). Therefore, appropriate interventions are essential to modify the effects of COVID-19 on physical and mental health in infected patients. The use of effective training methods can play a decisive role in controlling the COVID-19 complications. Therefore, it is of utmost importance to employ fitting strategies in the training process to improve patient health (26). The implementation of virtual learning and face-to-face training approaches to provide educational content during the COVID-19 pandemic has been thus advocated by most researchers (27). Today, the use of e-learning by health professionals has similarly increased around the world (28) and its positive consequences have been reported in various studies. For example, Klimova et al. reported that e-learning could reduce perceived stress in the caregivers of patients with dementia (29). Di Giacomo et al. also demonstrated that e-learning could relieve anxiety, stress and depression and improve the mental health status in students during the COVID-19 pandemic (30).

Providing long-term post-crisis mental health services should be thus a priority for health care organizations in the course of the COVID-19 outbreak. Considering no eradication of COVID-19 in some countries, including Iran, as well as the value of self-care in preventing this condition and higher level of perceived stress in patients, the present study was performed with aim to determine the effect of an online self-care training program on perceived stress in COVID-19 patients.

Methods

This randomized control trial study was performed in two specialized hospitals (Sadoughi & Khanevadeh) in Isfahan, Iran, from February 20 to August 22, 2021. The inclusion criteria were a definitive diagnosis of COVID-19 infection in patients using positive polymerase chain reaction (PCR) test, ability of reading and writing in Persian, having WhatsApp and Telegram on a smartphone, and participating in no self-care training programs associated with COVID-19 over the past year. The exclusion criteria were simultaneously participation in a similar training program and unwillingness to continue contributing to the study.

The sample size was estimated as 60 patients in each group according to the mean score of perceived stress in the study by Khadivzadeh et al. (31), with a 95% confidence interval (CI) and 90% test power, using the sample size formula (32). Considering the 10% probability of attrition, 132 patients included using the purposive sampling method. The subjects were randomized into experimental (n=66) and control (n=66) groups by the simple random allocation through tossing coins. During the study, three cases in the experimental group and three patients in the control group were excluded due to unwillingness to continue participating in the study. Finally, the data related to 126 patients (63 cases in the experimental group and 63 in the control group) were analyzed (Figure 1).

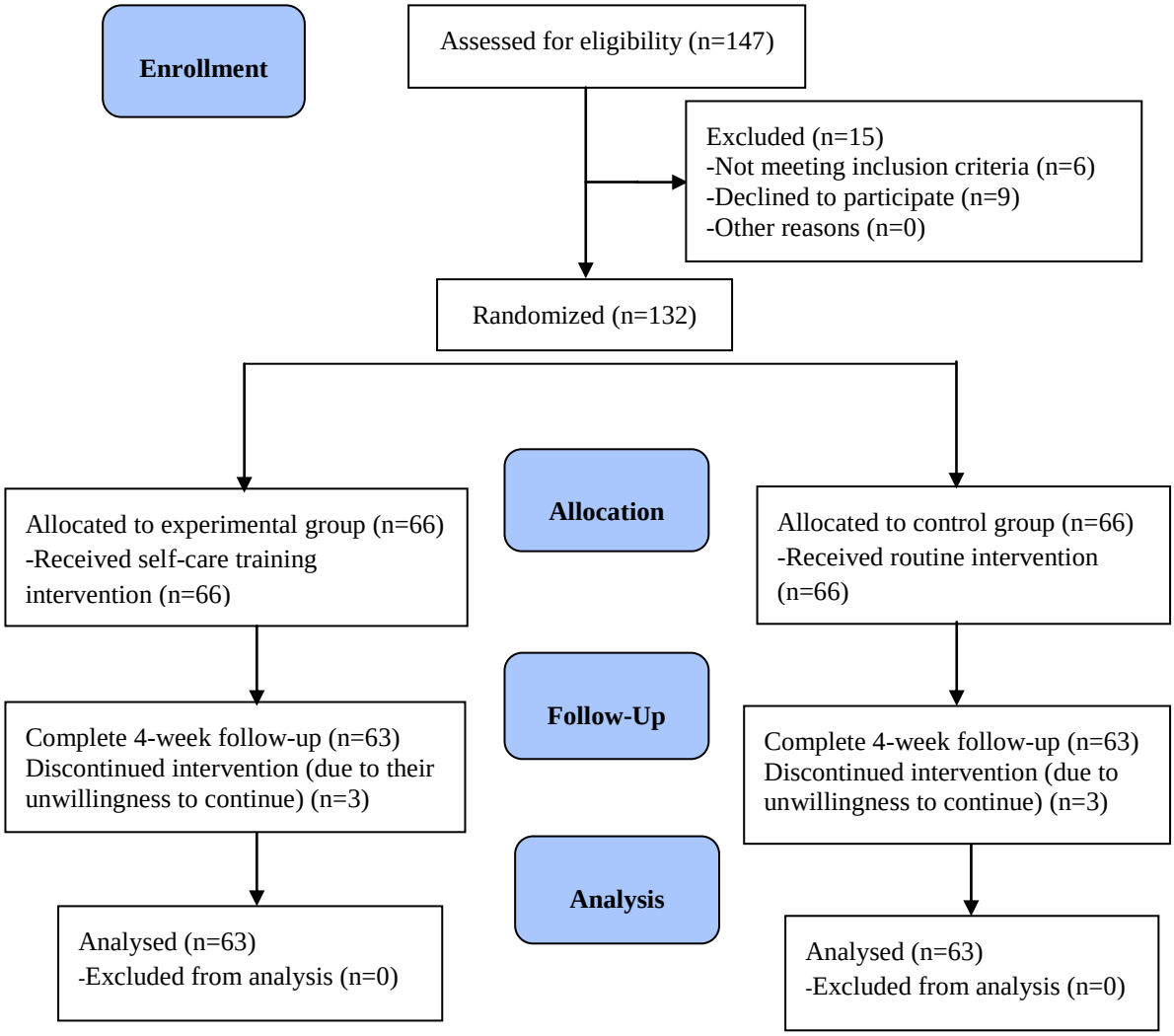

Figure 1. Flow diagram of the study process

The researcher assisted in creating a random allocation sequence, enrolling participants, and assigning them to interventions. The study participants consisted of COVID-19 patients referred outpatient to the selected hospitals who were trained and studied at home for the intervention along with a follow-up period of one month.

The data collection tools included the individual characteristics form, the Perceived Stress Scale (PSS) (33), and the researcher-made Self-Care Checklist.

The individual characteristics form was comprised of items, including age, gender, marital status, occupation, economic status, level of education, a history of underlying diseases such as diabetes and hypertension, a previous history of COVID-19, and a history of influenza vaccine injection in the past six months.

Perceived Stress Scale was developed by Cohen, Kamarck, and Mermelstein in 1983 (33) in order to evaluate how stressful is a person's life. The PSS has 14-item, which is scored on a five-point likert scale (none, low, medium, high, and very high as scored 0, 1, 2, 3, and 4, respectively). The scores also ranged from 0 to 56, so that the scores 0-27 indicate low perceived stress and the scores equal to or higher than 28 indicate high perceived stress. Higher scores accordingly indicated higher levels of perceived stress. The PSS also measured two dimensions of (a) negatively stated items (1, 2, 3, 4, 11, 12, and 14), and (b) positively stated items (5, 6, 7, 8, 9, 10, and 13), scored in reverse. The validity and reliability of this questionnaire had been already confirmed in the studies by Cohen and Khadivzadeh with the Cronbach's alpha coefficients reported to be 0.72 and 0.85, respectively (31,33). The patients' perceived stress was further collected at three stages before, immediately, and one month after the intervention.

The researcher-made self-care checklist was recruited to ensure that the online self-care training program, which was trained to the patients in the experimental group, was fulfilled after the intervention. The checklist included four dimensions, i.e., physical, psycho-emotional, social, and spiritual. The items in the physical dimension were doing gentle workouts three times a day, having proper nutrition, observing sleep and rest hygiene, providing a brief report of symptoms on a daily basis, and maintaining hygiene by hand-washing. The items in the psycho-emotional dimension also included exploiting coping strategies for stress, such as engaging in favorite activities, e.g., watching movies and listening to music, performing meditation techniques, and practicing mindfulness two times a day. As well, the items of the social dimension comprised of maintaining relationships through making voice or video calls with other people and observing home quarantine instructions. Moreover, the spiritual dimension consisted of items in which each person could recorded one's spiritual strategies, such as communicating with God through prayers and worship, and any other spiritual tactics. The checklist was also scored in a two-point likert scale including yes and no, reviewed item by item by the researcher on a daily basis.

Upon obtaining the written informed consent from the patients, the individual characteristics form and the PSS were completed by the patients in both experimental and control groups. The experimental group then received some explanations on how to complete the Self-Care Checklist by one of the researchers (Master's degree in psychiatric nursing). At the onset of the intervention, the self-care training package, which included a pamphlet and an educational booklet, was provided to the patients in the experimental group in the form of a hard copy and in person at the hospital. Then, in the early days of the disease, before the appearance of severe symptoms such as fever above 38 degrees, shortness of breath and severe breathing problems, severe body pain, chronic and long-term headaches, some self-care behaviors (according to the checklist) were taught to the patients of the experimental group in six 30-minute sessions for two weeks with electronic training methods as well as audio and video calls through WhatsApp. It should be noted that the participants of the control group received routine training. The first training session was held as an online lecture with slides prepared in the PowerPoint software on WhatsApp. Other training sessions were also presented in the form of PowerPoint audio along with training videos and related images on WhatsApp and Telegram. Besides, a researcher and an infectious disease specialist daily answered the patients' questions using the mentioned applications. The content of this package, taken from the WHO handbook, "Self-Care for Health: A Handbook for Community Health Workers and Volunteers" categorized self-care into several dimensions, i.e., physical dimension (familiarity with the signs and symptoms of the disease, proper nutrition principles, sleep hygiene, and correct hand-washing methods), psycho-emotional dimension (practicing meditation and mindfulness techniques, coping strategies for stress, and

adapting to adverse conditions), social dimension (communicating and maintaining long-distance social relationships during home quarantine), and spiritual dimension (feeling connected to a larger power, for example through prayers or communication with art or nature, searching for the meaning of life, and communicating with God) (22). The content of the package was reviewed according to the context of Iranian population. Thus, the validity of the content of the self-care training package was confirmed by ten faculty members, as infectious disease specialists, emergency medicine specialists, as well as individuals with doctorate degree in nursing education, and a master's degree in nursing. The patients in the experimental group were further asked to apply the self-care principles they at home and record daily self-care behaviors in checklists provided to them in hard copy. This checklist was daily completed in writing by the patients and was then checked by the researcher after sharing a photo on the mentioned applications. Upon reviewing the checklist based on the patients' educational needs, after making coordination, the researcher communicated with them online at an appropriate interval and reconsidered their educational needs to improve their self-care behaviors and reduce their levels of stress.

Then, immediately and one month after the accomplishment of the intervention, the patients in the experimental and control groups were once again asked to complete the online PSS. It should be noted that the researcher was in contact with the patients in the experimental group after the intervention until one month later, and answered their questions through phone calls and social networks.

The data were analyzed using SPSS Statistics software (version 20) and descriptive tests, including mean, SD, frequency, and percentage as well as Chi-square test, Fisher's exact test, independent t-test, repeated measures analysis of variance (RM-ANOVA), and the post hoc least significant difference (LSD) test. Kolmogorov-Smirnov test was also recruited to check the normality of the data. As well as Mauchly's test of sphericity was used to assess whether the assumption of sphericity was met, while the Greenhouse-Geisser correction was applied for lack of sphericity. $P<0.05$ was considered statistically significant.

Ethical Consideration

This study was approved by the Supreme Research Council of the Vice Chancellor's Office for Research and Technology at Aja University of Medical Sciences, Tehran, Iran (IR.AJAUMS.REC.1399.235). The study was registered in the Thai Clinical Trials Registry (TCTR) (No TCTR20230613006). Before completing the questionnaires, the main purpose of the study was described to the COVID-19 patients and the informed written consent to participate in the study was obtained. The principles of the Declaration of Helsinki, including voluntary participation, patient information confidentiality, and withdrawal right at any time, along with the provisions of the Committee on Publication Ethics were observed in this study.

Results

The mean age of the COVID-19 patients was 39.08±14.99 (18-78) years. As well, 52.4% of the cases were female, 63.8% were married, 46.8% had bachelor and master's degrees, and 33.3% were homemakers. The independent t-test, Chi-square test, and Fisher's exact test showed that the experimental and control groups were homogeneous in terms of individual variables such as age, gender, marital status, occupation, economic status, level of education, history of underlying diseases, previous history of COVID-19, history of influenza vaccine injection over the past six months ($p>0.05$) (Table 1).

The mean score of perceived stress at the pre-intervention stage in the experimental and control groups was 30.51±6.31 and 29.78±4.81, respectively, and there was no significant difference between the two groups ($p=0.467$). Nevertheless, the mean score of perceived stress in the experimental and control groups immediately after the intervention was 24.59±4.66 and 29.4±4.57, respectively ($p<0.001$) and one month after the intervention was 26.57±3.82 and 29.11±4.73, respectively ($p=0.001$), which was lower in the experimental group than the controls (Table 2).

The study results revealed that the level of perceived stress was high in 74.6% of the patients in the experimental group and in 61.9% of those in the control group before the intervention. However, most patients in the experimental group reported low levels of perceived stress immediately (69.8%) and one month after the intervention (55.6%). The Fisher's exact test also showed that the level of perceived stress in the experimental and control groups did not differ

significantly before the intervention, while there was a significant difference immediately and one month after it (Table 3).

Table 1. Individual characteristics of the patients in the two groups

Characteristics	Groups		t/χ^2	P-value
	Intervention	Control		
Age(years)	36.59±15.18	41.57±14.49	t= -1.855 df=124	0.062*
Gender				
Male	26(41.3)	34(54)	$\chi2$= 2.036	0.212**
Female	37(58.7)	29(46)	df=1	
Marital status				
Married	42(66.7)	44(69.8)	$\chi2$= 0.147	0.848**
Single	21(33.3)	19(30.2)	df=1	
Level of Education				
Under diploma	5 (7.9)	5 (7.9)	$\chi2$= 3.017	0.555***
Diploma & Associate	30 (47.6)	29 (46)	df=4	
Bachelor	20 (31.7)	20 (31.7)		
Master	6 (9.5)	3 (4.8)		
Doctoral	2 (3.2)	7 (9.5)		
Economic situation				
Poor (less than the cost of living)	13 (20.6)	7 (11.1)	$\chi2$= 5.937	0.051 ***
Medium (at the cost of living)	40 (63.5)	52 (82.5)	df=2	
Good (more than the cost of living)	10 (15.9)	4 (6.3)		
Occupation				
Self-employment	10 (15.9)	12 (19)	$\chi2$= 4.306	0.366 ***
Official employee	17 (27)	25 (39.7)	df=4	
Informal employee	4 (6.3)	3 (4.8)		
House wife	26 (41.3)	16 (25.4)		
Unemployed	6 (9.5)	7 (11.1)		
History of an Underlying disease				
Yes	12(19)	13(20.6)	$\chi2$= 0.05	1**
No	51(81)	50(79.4)	df=1	
Previous history of Covid-19 disease				
Yes	19(30.2)	12(19)	$\chi2$= 2.096	0.214**
No	44(69.8)	51(81)	df=1	
History of influenza vaccine injection in 2020-2021				
Yes	8(12.7)	9(14.3)	$\chi2$= 0.068	1**
No	55(87.3)	54(85.7)	df=1	

*Independent t-test; **Fisher's exact test; ***Chi-squared test

Table 2. The scores of patients' perceived stress before, immediately, and one-month after the intervention in the two groups

Stage	Groups (Mean±SD)		Independent *t*-test		
	Experimental	Control	*t*	df	*p*-value
Before intervention	30.51±6.31	29.78±4.81	0.73	124	0.467
Immediately after the intervention	24.59±4.66	29.4±4.57	-5.85	124	<0.001
One month after the intervention	26.57±3.82	29.11±4.73	-3.32	124	0.001
Mauchly's test of sphericity	p<0.001				
RM-ANOVA	Time: F: *38.19, df: 1.58, p<0.001 Group: F: *8.89, df: 1, p<0.003 Time×Group: F: *24.12, df: 1.58, p<0.001				

*Greenhouse-Geisser

The RM-ANOVA results also demonstrated that the mean score of perceived stress significantly diminished in the patients of the experimental group (p<0.001), while no significant difference was observed in the control group (p=0.143) (Table 2). The effect size of the intervention for perceived stress in the experimental group was 0.60 (ES=0.60). The post hoc LSD test outcomes additionally established that the mean score of perceived stress before and immediately after the intervention, before and one month after the intervention, and immediately and one month after the intervention was significantly different in the experimental group, while there was no significant difference in the control group in this regard (p<0.001) (Table 4, Figure2).
Cronbach's alpha coefficient was used to measure the internal consistency of the PSS scale, which was calculated as 0.752 in this study.

Table 3. The patients' perceived stress levels at three stage in the two groups

Stage	Perceived stress levels	Groups		Fisher's exact test	
		Experimental	Control	χ^2	*p*-value
Before intervention	Low (28-56)	16 (25.4)	24(38.1)	2.344	0.180
	High (0-27)	47(74.6)	39(61.9)		
Immediately after intervention	Low (28-56)	44(69.8)	21(33.3)	16.811	<0.001
	High (0-27)	19(30.2)	42(66.7)		
One month after intervention	Low (28-56)	35(55.6)	22(34.9)	5.414	0.031
	High (0-27)	28(44.4)	41(65.1)		

Table 4. The difference between the mean scores of patients' perceived stress at different stages of the study

Levels	*p*-value	
	Experimental	Control
Before and Immediately after the intervention	<0.001*	0.466*
Before and one month after the intervention	<0.001*	0.312*
Immediately after and one month after the intervention	<0.001*	0.501*

*post hoc LSD test

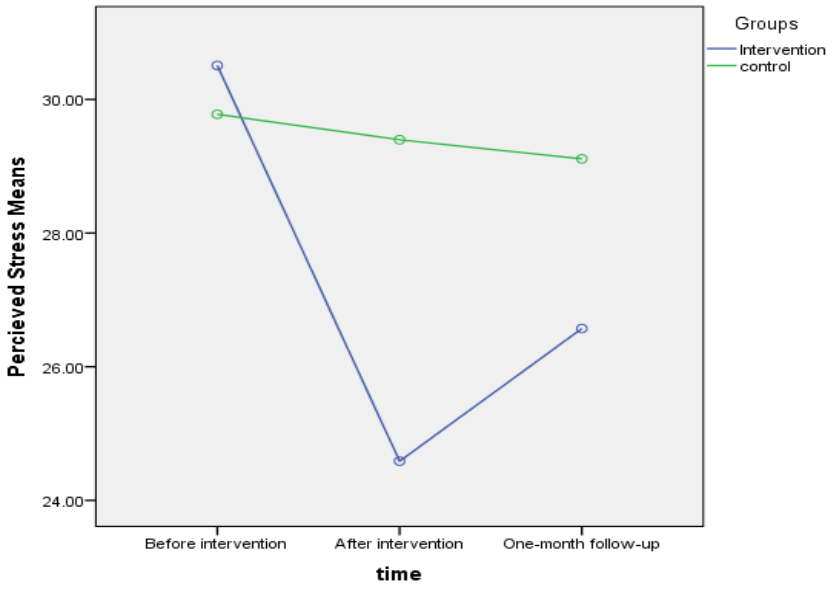

Figure 2. Trend of changes in the mean scores of perceived stress in the experimental and control groups before, immediately, and one-month after the intervention

Discussion

The purpose of the present study was to determine the effect of an online self-care training program on perceived stress in COVID-19 patients. The findings of the current study confirmed that perceived stress was high in most COVID-19 patients, which was consistent with the results reported by Zandifar et al. in 2020 (18). In the present study, patients' perceived stress also reduced after implementing the online self-care training program. In other words, the COVID-19 patients in the experimental group experienced less perceived stress compared with those in the control group immediately and one month after the intervention. Also, according to the results, the effect size of our intervention was large effect. The researchers did not find a study examining the effect of an online self-care program training on perceived stress in COVID-19 patients, but several surveys had already reflected on the effect of such programs on perceived stress in patients with other diseases. For example, Khadivzadeh et al. 2015 had described that self-care training could reduce perceived stress in women with gestational diabetes treated with insulin (31). As well, the findings of the present study were in line with the results reported by some other studies (34-36). In contrast, Masjoudi et al. had established a weak negative correlation between self-care and perceived stress in pregnant women (37). Accordingly, the transfer of self-care knowledge and skills through e-learning could augment the patients' sense of self-sufficiency and self-confidence regarding their ability to cope with life stressful events, and thus give rise to more control over thoughts and feelings while facing stress (38).

Given the prevalence of COVID-19 and the time constraints of HCPs, especially nurses, to train infected patients, the use of e-learning methods can be thus a good solution for implementing patient health promotion programs. Therefore, it is recommended to utilize e-learning to teach self-care in order to promote health and reduce perceived stress in COVID-19 patients.

Among the limitations of this study was the recording of self-care behaviors by the participants themselves in the daily checklists, completed at home according to their conditions. Therefore, the accuracy of the interventions was based on trusting the patients' statements. Also, the use of an investigator developed tool and a convenience sample was another limitation of this study.

Implications for practice

The results of the present study revealed that an online self-care training program reduced perceived stress in COVID-19 patients. It is thus recommended to implement this self-directed, cheap, safe, and efficient method to train patients to relieve perceived stress in such cases.

Acknowledgments

This study was approved by the Supreme Research Council of the Vice Chancellor's Office for Research and Technology at Aja University of Medical Sciences, Tehran, Iran (ID: 97001442, February 17, 2021). The researchers hereby extend their gratitude to the relevant authorities and all COVID-19 patients participating in this study.

Conflicts of interest

The authors declared no conflict of interest regarding the publication of this study.

Funding

This research is supported by the Supreme Research Council of the Vice Chancellor's Office for Research and Technology at Aja University of Medical Sciences, Tehran, Iran (ID: 97001442, February 17, 2021). The funding source had no involvement in design of the study, data collection, data analysis, etc**.**

Authors' Contributions

A.M. was involved in the study conception, planning, data analysis, interpretation, writing the first draft of the manuscript and data collection. Z.F. and E.A. were involved in the study interpretation and critically revising the manuscript. M.R. and M.M. involved in the data collection. All authors contributed to the writing of the manuscript and discussed on the manuscript.

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