

The effect of online multimedia psychoeducational interventions on the perceived stress and resilience of hospitalized patients with COVID-19: a quasi-experimental study

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Research article

Keywords: online multimedia psychoeducational intervention, resilience, perceived stress, COVID-19

Posted Date: July 17th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-36980/v1>

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Version of Record: A version of this preprint was published on February 11th, 2021. See the published version at <https://doi.org/10.1186/s12888-021-03085-6>.

Abstract

Background

There are evidence suggesting that quarantine might have undesirable psychological impacts on the patients. Therefore, it is important to seek for ways to alleviate the psychological pressure as well as increase the resilience of the patients who are quarantined due to infection with COVID-19. The present study was conducted to examine the effect of an online multimedia psychoeducational intervention on perceived stress and resilience of patients hospitalized with confirmed COVID-19.

Method:

Participants in this fully online trial were 50 consecutive patients who were hospitalized in 2 hospitals in Shiraz, after being diagnosed with COVID-19. Before the start of intervention, four inpatient wards of two hospitals were randomly assigned to either experimental or control condition. All eligible participants in wards allocated to the intervention condition received online multimedia psychoeducational interventions during 2 weeks, whilst patients in wards allocated to the control condition only received face-to-face or telephone based psychological counseling in case of need. Psychoeducational interventions mainly included cognitive-behavioural techniques, mindfulness-based stress reduction and positive psychotherapy. Patients were assessed on perceived stress and resilience at baseline and 2 weeks later.

Results

Compared with the control group, patients who used online multimedia psychoeducational interventions reported fewer perceived stress and greater resilience after 2 weeks.

Discussion

The findings of the present study provide a successful first attempt at implementing online multimedia psychoeducational interventions to promote resilience and mitigate stress of patients who are hospitalized due to infection with COVID-19. The present results could help mental health professionals to determine which psychological techniques should be emphasized to promote patients' resilience in the context of COVID-19 disease.

Introduction

Psychological health is one of the most neglected aspects of the coronavirus disease 2019 (COVID-19) pandemic [1]. There are evidence suggesting that quarantine might have undesirable psychological impacts on the patients [1]. The most prevalent psychological problems that patients develop following quarantine are known to be fear [1], PTSD [2], stress, insomnia, irritability and low mood [3, 4].

According to the emotion hypothetical model of psychological crisis intervention in COVID-19 pandemic, lack of psychological coping methods and isolation can lead to widespread anxiety and fear among patients with COVID-19 [5]. Anxiety about potential exposure of the family members to infection and concern about the health of oneself and significant others add to the distress of patients [6–8]. On the other hand, isolation reduces access to support from family, friends and normal social support systems, which results in worsening the resilience and perceived stress among patients [5, 7]. These psychological and mental health consequences will add to the cost of managing the illness, if left untreated [9]. Therefore, it is important to seek for ways to alleviate the psychological pressure as well as increase the resilience of the patients who are infected with COVID-19.

Resilience is a multidimensional construct that varies with context, culture and time [10, 11]. Despite that the operationalization of this construct has considerably varied within the literature [12], various empirical findings and models have described resilience as having three important components: successful adjustment to stress, the propensity to experience positive emotions in the face of stressful situations, and optimism [13, 14]. It is suggested that cognitive interpretations of individuals about a stressful situation and the way they cope with adverse circumstances seem to be associated with their resilience in the face of distressing events [13, 14]. Given that psychological resilience is a crucial factor reflecting positive adaptation despite adversity, it is imperative to increase resiliency in hospitalized patients to reduce psychological consequences of COVID-19.

However, due to fast transmission of the coronavirus, it restricts any face-to-face psychological interventions for patients who are quarantined at hospitals. By contrast, use of online multimedia education may provide a safe, innovative opportunity to maintain communication with quarantined patients in order to increase their ability to adapt with this adversity.

To our knowledge, there have been no published original research on the effect of multimedia education on mental health of the infected patients with COVID-19 who are quarantined at hospitals. Moreover, type and severity of stressful situation, cultural norms, social support and government policies are known to be the key factors influencing perceived stress and resilience levels in the face of stressful situations (Connor, Davidson, & Lee, 2003; Ungar, 2015). Research is required to identify psychological interventions that can be used to enhance resilience levels in the face of the COVID-19 pandemic and to determine, if the goals of pandemic resilience training could be accomplished with internet-based multimedia education that could be widely distributed and self-administered. The current study was conducted to examine the effect of an online multimedia psychoeducational intervention on perceived stress and resilience of patients hospitalized with confirmed COVID-19. It is hypothesized that the provision of online multimedia psychoeducational interventions might help patients to promote resilience against stress in the context of the COVID-19 disease.

Material And Method

Participants

This quasi-experimental study was performed with a non-equivalent control group pretest-post-test design. The participants were 50 consecutive patients who were hospitalized in 2 hospitals in Shiraz, Iran, after being diagnosed with COVID-19. Patients were included in the study, if they met the following criteria: age over 18 years, willingness to take part in the study, being literate, having internet access and ability to work with the media. The following exclusion criteria were applied: previous experience of quarantine, unwillingness or inability to continue contributing to the study, having a history of psychiatric disorders or taking psychiatric medications, and death or transfer to the ICU.

Online multimedia psychoeducational intervention

We used WhatsApp as a tool to deliver multimedia psychoeducational contents (videos, podcasts, texts and pictures) to patients. Psychoeducational interventions mainly included cognitive-behavioural techniques, mindfulness-based stress reduction and positive psychotherapy.

Cognitive-behavioural techniques were used to teach patients how to recognize and mitigate their cognitive biases, especially in relation to disease and the likelihood of adverse events due to disease [15]. In addition, various types of relaxation techniques including progressive muscle relaxation, imagination exercises, and diaphragmatic breathing were taught to the patients *via* video clips and audio files. Mindfulness techniques were incorporated to help patients recognize their **negative thoughts and emotions** about the disease and reduce the intensity and impact of those thoughts and emotions on their level of stress [16]. In this technique, the patients were trained to allow their negative emotions just be, without attempting to alter them or trying to push them away. Patients were encouraged every day to practice these techniques and provide feedback on which techniques work best for them as well as adapt to their condition. The patients were informed that they were not required to do all the techniques every day. Instead, they were advised to choose the most effective technique for themselves and practice it daily. In order to increase positive emotions and optimism in patients, positive psychotherapy exercises such as “Positive Reminiscence”, “Hope, Optimism, and Posttraumatic Growth” and “Finding Meaning”, were taught to the patients. For example, during the “Positive Reminiscence Exercise”, patients were encouraged to think about events from their past that evoke positive emotions, visualize the events in detail, and focus on the pleasant feelings arising during the exercise [18]. During “Hope, Optimism, and Posttraumatic Growth” exercise, patients were encouraged to think about times when important things were lost, but other opportunities transpired [19].

Measures

Data were collected using online questionnaires and forms. Socio-demographic and clinical assessment form developed by the researchers was used to assess sociodemographic characteristics (age, gender, marital status and educational level) and clinical features (dyspnoea, fever, cough, tiredness, anorexia, nausea, diarrhea and hemoptysis) of the patients. Other measures were as follows:

Connor-Davidson resilience scale: The resilience of the patients was evaluated by the Connor-Davidson resilience scale (CD-RISC) [20]. It consists of 25-items rated on a 5-point Likert scale, ranging from 0 (not

true at all) to 4 (true nearly all the time). The CD-RISC score can range from 0 to 100, with higher scores reflecting greater resilience. Internal consistency (Cronbach's alpha) for the full scale is 0.89 [20]. The scale demonstrated good convergent validity, and factor analysis yielded five factors [20]. The Persian version also showed high internal consistency (Cronbach's alpha=0.89) and sufficient validity [21, 22].

Perceived Stress Scale (PSS): Perceived stress was estimated employing the Perceived Stress Scale. The PSS was designed to measure the degree as to which situations in one's life are appraised as stressful [23]. It is a self-report 14-items questionnaire rated on a 5-point Likert scale, ranging from 0 (never) to 4 (very often). The total score of the scale can range from 0 to 56, with higher scores indicating higher levels of perceived stress. This measure has exhibited sufficient reliability (Cronbach's alpha =0.84-0.86) and validity [23]. The Persian version also showed excellent internal consistency (Cronbach's alpha=0.90) and convergent validity [24].

Procedure

Ethical approval was obtained from the local Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1399.011). Eligible participants were informed about the study objective, and the voluntary nature of their participation. Electronic informed consent form was filled out by all the patients. The data were collected anonymously without name lists.

Before the start of intervention, four inpatient wards of two hospitals were randomly assigned to either intervention or control condition so that one ward in each hospital was assigned to intervention and the other to control condition. All eligible participants in wards allocated to the intervention condition received online multimedia psychoeducational interventions during 2 weeks, whilst patients in wards allocated to the control condition received face-to-face or telephone-based psychological counseling in case of need. Random assignment of wards was performed by an independent observer not involved in this study, using a coin toss. Patients were blinded to patient group assignment. Evaluators were not informed of patient's treatment assignment. The risk of contamination was minimized by the fact that the hospitalized patients in the intervention and control hospital wards were not in contact with each other.

Patients were requested to complete the baseline questionnaires within 48 h of admission to the ward. Immediately at the end of the second week, the online instruments of the perceived stress and resilience were reapplied and the posttreatment scores were obtained (Figure 1).

Statistical analysis

Compliance test for normal distribution with Kolmogorov–Smirnov test was applied. Levene's test was used to examine the heterogeneity of the variances. Chi-square tests were performed to compare the groups concerning demographic and clinical variables. Since there was no interaction between dependent variables with socio-demographic and clinical variables (p value >0.05), the assumptions of Analysis of covariance (ANCOVA) were not established to control the effects of these variables as covariates [25]. Therefore, Student's t -tests were carried out to evaluate the differences between the two groups with

regard to dependent variables (perceived stress and resilience). Between group effect size for mean differences of groups with unequal sample size within a pre-post-control design (dppc2) was calculated according to Morris's recommendations [26]. A p value <0.05 was considered to be statistically significant. The analyses were conducted with SPSS® for Windows® version 22.0 (SPSS Inc, Chicago, IL, USA).

Results

Of the 50 eligible patients who started the study, 48 (96%) completed it. Two patients had to be excluded from the study: one patient because of insufficient post-test data for further evaluation and one patient due to transfer to the ICU. The mean age of the patients was 36.77 years old [standard deviation (SD) = 11.81], and the highest percentage of patients (33.3%) belonged to the age group between 31 to 40 years old (Table 1). The majority of patients were male (56.2%), married (75%) and about 62.4% of them had primary education (Table 1). Tiredness was the most common symptom in patients in this study (43.8%). There were no significant differences between the groups regarding age group, gender, marital status, educational status and clinical symptoms (Table 1).

Table 1

Comparison of demographic and clinical variables between control and intervention groups (n = 48)

Variables		Group		χ^2 (df)	P-value
		intervention (n = 26)	Control (n = 22)		
Age group, n (% of total)	18–30 years	8 (16.7%)	7 (14.6%)	3.08 (3)	0.37
	31–40 years	11 (22.9%)	5 (10.4%)		
	41–50	6 (12.5%)	7 (14.6%)		
	50 < years	1 (2.1%)	3 (6.3%)		
Gender, n (% of total)	Male	13 (27.1%)	14 (29.1%)	0.90 (1)	0.34
	Female	13 (27.1%)	8 (16.7%)		
Marital status, n (% of total)	Single	7 (14.6%)	5 (10.4%)	0.11 (1)	0.73
	Married	19 (39.6%)	17 (35.4%)		
Education, n (% of total)	High school or less	16 (33.3%)	14 (29.1%)	4.11 (3)	0.24
	Diploma	2 (4.2%)	5 (10.4%)		
	Bachelor	6 (12.5%)	3 (6.3%)		
	M.Sc./ Ph.D	2 (4.2%)	0		
Clinical symptoms, n (% of each group)	Dyspnoea	7 (26.9%)	8 (36.4%)	0.49 (1)	0.48
	Fever	11 (42.3%)	6 (27.3%)	1.17 (1)	0.27
	Cough	10 (38.5%)	6 (27.3%)	0.67 (1)	0.30
	Tiredness	13 (50%)	8 (36.4%)	0.90 (1)	0.34
	Anorexia	6 (23.1%)	10 (45.5%)	2.68 (1)	0.10

	Group				
Nausea/Vomiting	2 (7.7%)	2 (9.1%)	0.03 (1)	0.86	
Diarrhea	4 (15.4%)	1 (4.5%)	1.5 (1)	0.22	
Haemoptysis	0	2 (9.1%)	2.46 (1)	0.11	

The Kolmogorov-Smirnov test showed a normal distribution of quantitative variables. Levene's tests were not significant, and therefore, equal variances were assumed. Based on the results of the independent t-tests, both groups were homogeneous and comparable with respect to their resilience ($P=0.23$) and perceived stress ($P=0.77$) scores at baseline. However, immediately after the intervention, there were significant differences between groups with regard to resilience ($t(46) = 2.10$; $p < 0.04$; $d_{ppc2} = 0.84$) and perceived stress scores ($t(46) = 2.66$; $p < 0.01$; $d_{ppc2} = -0.77$) (Table 2). In this study, compared with the control group, the intervention group had significantly greater improvements in the scores of resilience and perceived stress after 2 weeks (Figs. 2 and 3).

Table 2

Comparison of resilience and perceived stress scores between control and intervention groups before and after intervention (n = 48)

variable	Time	Intervention group (n = 26)	Control group (n = 22)	T (46)	P-value	Effect Size d_{ppc2}
Resilience (Mean ± SD)	Before intervention	68.85 ± 19.50	75.09 ± 16.09	1.19	0.23	0.84
	After intervention	83.38 ± 11.80	74.32 ± 17.83	2.10	0.04	
Perceived stress (Mean ± SD)	Before intervention	27.65 ± 10.12	26.77 ± 10.82	0.29	0.77	-0.77
	After intervention	22.15 ± 7.95	29.45 ± 10.96	2.66	0.01	

Discussion

The contagious diseases outbreak might lead to irreparable psychological trauma amongst patients and society, which imposes heavy financial burden on the healthcare system. Therefore, finding ways to relieve this damage can improve mental health and reduce psychological distress, both at the individual and social level. In the present study, we aimed to investigate the beneficial effects of an online multimedia psychoeducational intervention on perceived stress and resilience of patients hospitalized with confirmed COVID-19.

As hypothesized, online multimedia psychoeducational interventions targeting cognitive appraisals (specially in relation to disease), stress management, positive emotions and optimism, could significantly promote resilience and mitigate stress level in patients who were hospitalized due to infection with COVID-19. A growing body of research supports the efficacy of technology-based (i.e., computer/Internet) interventions on resilience, wellbeing, quality of life, optimism, coping strategies, anxiety, stress and depression among university students, dementia carers, burn patients, chronically ill adolescents and patients with cancer [27–31]. The present findings are consistent with those of Parks et al., showing a reduction of anxiety, and increased resilience amongst participants in a web based psychological intervention grounded in positive psychology, cognitive–behavioural therapy and mindfulness–based stress reduction [14]. Our study extended previous research in this area, because we investigated the beneficial effects of online multimedia psychoeducational interventions to promote patients’ resilience in the context of contagious diseases, such as the novel coronavirus disease.

According to the literature, there are different ways in which the present educational package might influence resilience and stress in patients hospitalized with COVID-19. Resilience is defined as the ability of an individual to cope positively with adversity [13]. It has been suggested that cognitive appraisals substantially influence how an individual cope with stressful events [32]. Researchers identified positive appraisals as an important influencing factor in psychological resilience [13, 33]. Therefore, teaching patients to recognize and mitigate their negative appraisals, especially regarding their disease might be helpful in promoting their resilience in the face of such distressing event. Moreover, enhancing positive emotions and optimism through positive psychotherapy exercises might lead to acceleration of patients’ ability to adjust with novel coronavirus disease. These findings are in line with other research indicating that positive emotions and optimism facilitate resilience under stressful circumstances [14]. We believe that stress reduction techniques could be helpful in reducing perceived stress, which in turn facilitate resilience among patients (Connor & Davidson, 2003; Parks et al., 2018). In addition to educational benefits of program, a sense of availability of resources [13] and connectedness [13, 34] with mental health professionals might contribute to relieving the patients’ stress and elevating their resilience in this tough situation. Receiving online psychoeducational interventions and feeling connected to mental health professionals could provide reassurance to patients hospitalized with COVID-19 that they are not forgotten and that their needs are just as important as patients with non-contagious diseases.

We believe that the present findings are significant, as they support implementing online psychological interventions to promote resilience and mitigate stress level in patients with COVID-19 who have limited access to face-to-face communication and traditional psychological interventions. However, we also acknowledge several limitations. The small sample size is the main limitation of the present study. Therefore, further studies with larger sample sizes are required to confirm the findings of the present study. The other remarkable limitation of this study is that there was no long-term follow up to identify the stability of the obtained therapeutic benefits. And the last but not the least, the current study only examined two psychological outcomes i.e. resilience and perceived stress. However, there are many other outcomes that may be affected by online psychoeducational interventions for patients with COVID-19, and further studies can shed light on this.

Conclusions

In summary, our findings support the beneficial effects of an online multimedia psychoeducational intervention grounded in cognitive–behavioural therapy, mindfulness–based stress reduction and positive psychotherapy on the perceived stress and resilience of patients hospitalized with confirmed COVID-19. The present results could help mental health professionals to determine which psychological techniques should be emphasized to promote patients' resilience in the context of COVID-19 disease. Given that fast transmission of the coronavirus between people hinders traditional face-to-face psychological interventions, online interventions can provide cost-effective and convenient tool that protect the patients from undesirable psychological damages of the quarantine.

Declarations

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethical approval was obtained from the local Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1399.011). Eligible participants were informed about the study objective, and the voluntary nature of their participation. Electronic informed consent form was filled out by all the patients. The data were collected anonymously without name lists.

Consent for publication

Not applicable.

Acknowledgment

The authors wish to thank Mr. H. Argasi at the Research Consultation Center (RCC) of Shiraz University of Medical Sciences for his invaluable assistance in editing this manuscript.

Financial Support: This study was funded by the inter-university cooperation between the Shiraz University of Medical Sciences (Grant number: 22029) and Fasa University of Medical Sciences (Grant number: 97535) for COVID-19.

Conflict of interest

The authors declare no conflict of interest.

Authors' contributions

MS and AV formulated the research question. MS designed the study. MS and ZY carried out the study. MS analysed the data. MS and AV contributed to the writing of the article. All authors have read and approved the manuscript.

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Figures

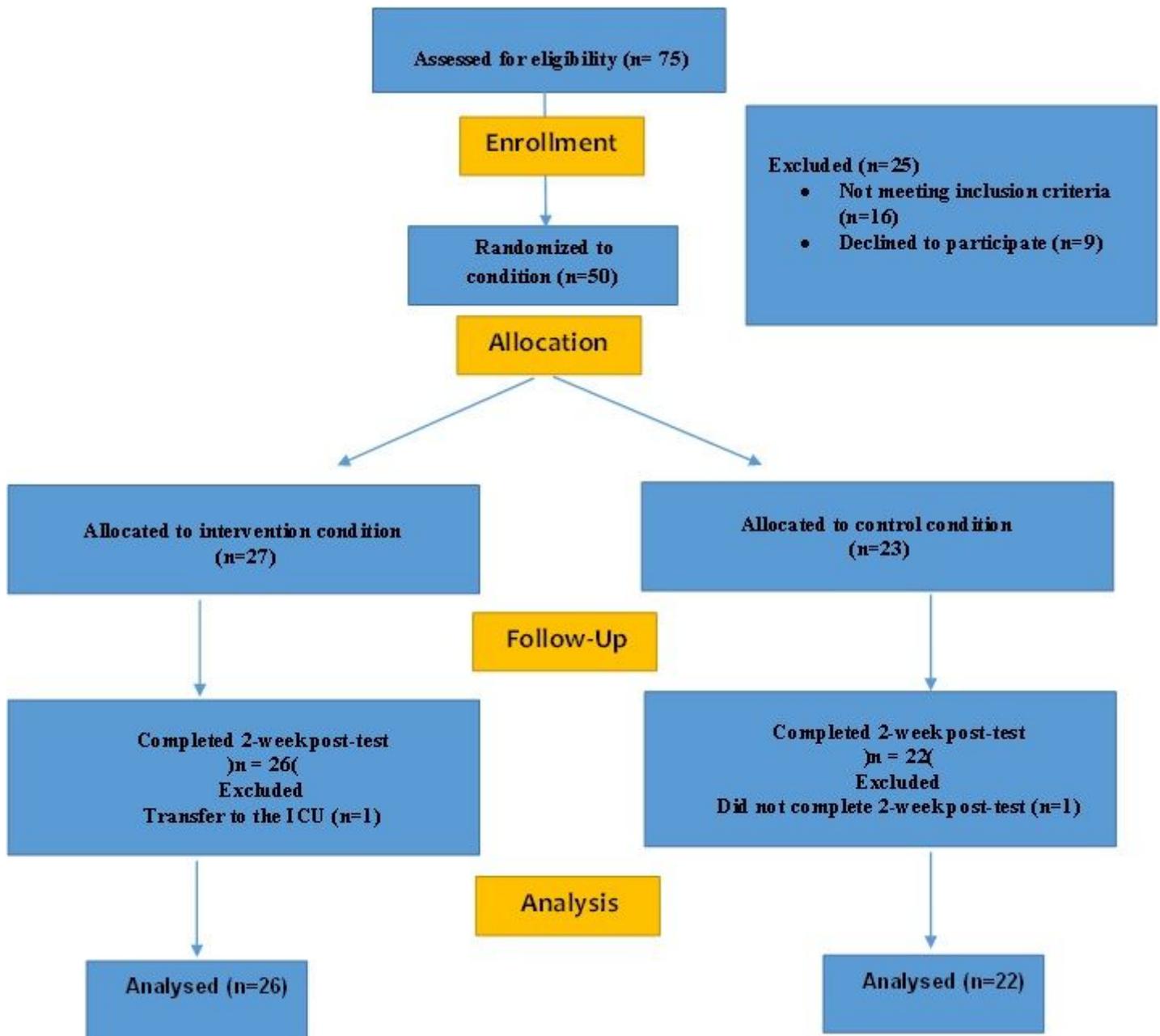


Figure 1

CONSORT Flow Diagram

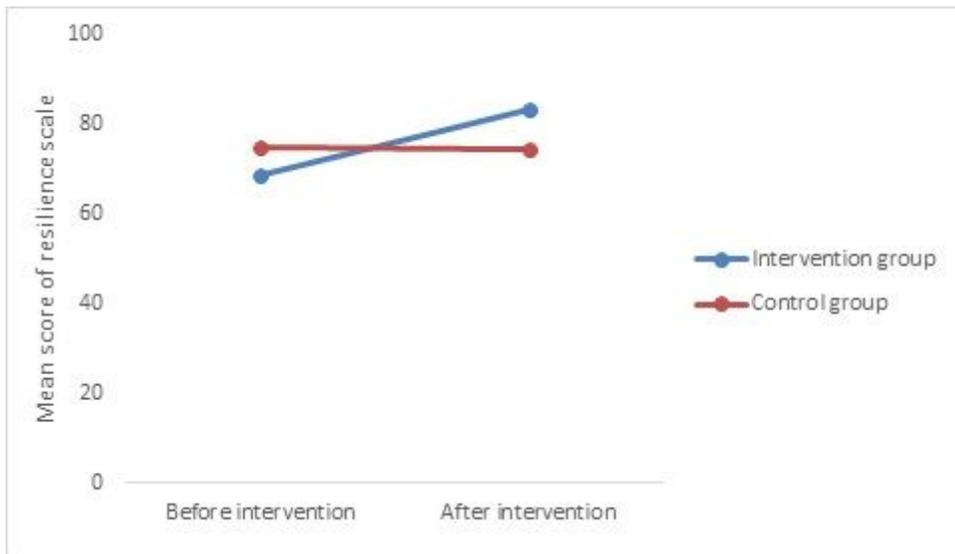


Figure 2

Changes of mean scores of resilience scale before and after intervention

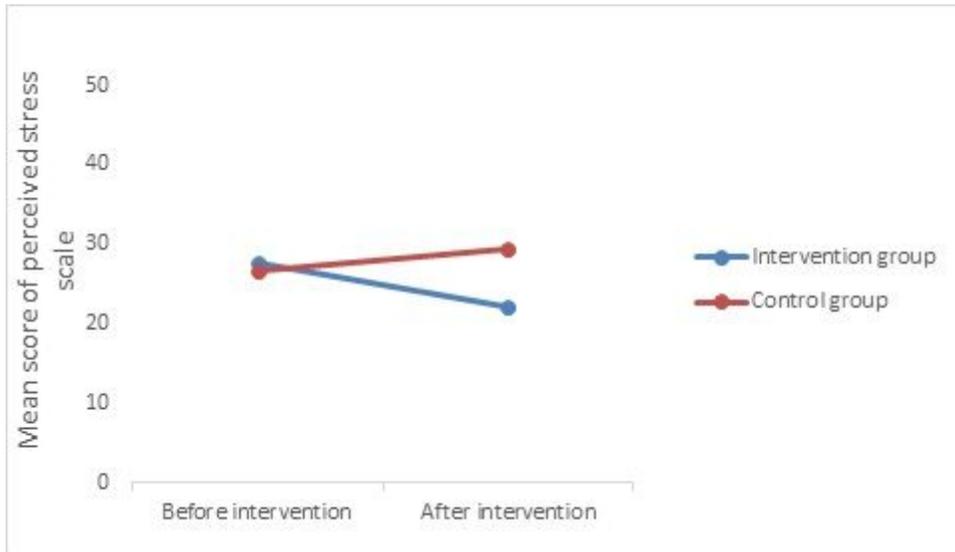


Figure 3

Changes of mean scores of perceived stress scale before and after intervention