Research Article

The Effect of Cognitive-Emotional Training on Post-traumatic Stress and Growth in Discharged Patients with COVID-19

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Abstract

Background: The COVID-19 pandemic has led to various psychological consequences. Its sudden emergence has caused widespread confusion, disrupted people's daily lives, and inflicted severe psychological trauma.

Objectives: This study seeks to explore the effectiveness of emotional cognitive training in reducing stress and promoting post-traumatic growth among COVID-19 patients discharged from Zahedan hospitals in 2021.

Methods: This quasi-experimental study involved 70 COVID-19 patients who were discharged from Zahedan hospitals in 2021. The participants were selected using a convenience sampling method and randomly assigned to either the intervention or control group, with each group consisting of 35 patients. The intervention group received seven online sessions of cognitive-emotional training in groups of 4 to 6 people. The patients completed the Post-traumatic Growth Inventory (PTGI) and the post-traumatic stress disorder (PTSD) checklist before and 12 weeks after the cognitive-emotional training. The data were analyzed using SPSS version 22 and statistical tests such as analysis of covariance, chi-square, and independent *t*-tests. The significance level was considered < 0.05.

Results: The independent *t*-test and analysis of the covariance test revealed that the mean score of post-traumatic stress in the intervention group (32.34 ± 5.75) was significantly lower than that in the control group (57.88 ± 4.28) following the cognitive-emotional training (P = 0.001). Additionally, the mean post-traumatic growth score in the intervention group (69.8 ± 11.73) was significantly higher than that in the control group (48.71 ± 5.08) after the training (P = 0.001).

Conclusions: The results suggest that emotional cognitive training has a positive and significant impact on reducing stress and promoting post-traumatic growth among COVID-19 patients. Therefore, incorporating this online training into the standard treatment is recommended to enhance the well-being and welfare of patients with COVID-19 after discharge.

Keywords: Emotional, Cognitive Training, Post-traumatic Growth, Post-traumatic Stress, COVID-19

1. Background

COVID-19, caused by the SARS-CoV-2 virus, was initially discovered in Wuhan, China, in December 2019. Within a short period, it rapidly spread to all parts of the world, causing a pandemic (1). This disease significantly affected Iran, resulting in widespread confusion and changes in living conditions. According to the Ministry of Health, Treatment, and Medical Education, millions of people were infected with this disease in Iran (2).

The COVID-19 pandemic has a significant impact on mental health, resulting in a range of psychological, social, behavioral, and interpersonal issues. One major consequence of the pandemic is its psychological effects (3). The rapid spread and high contagion rate of COVID-19 triggered a variety of stress-related responses, including anxiety and depression (4). The spread of infectious diseases generally causes psychological contagion, leading to fear, anxiety, and various psychological and social problems, including stigma (5). The COVID-19 pandemic caused stress due to feelings of being helpless and uncertain about the future, fears of getting sick and dying, concerns about losing loved ones, long-term

physical and social distancing, disruptions in daily life, work and education, job loss, financial consequences, and a lack of trust in organizations' ability to manage the crisis effectively. According to the ICD-11 criteria, the COVID-19 pandemic has become a traumatic event, creating a perfect storm of stress (6).

Patients with COVID-19 are inflicted with a high prevalence of disorders such as anxiety, depression, fear, emotional changes, insomnia, and post-traumatic stress disorder. Post-traumatic stress disorder can negatively affect the mental health of patients (6). Cai et al. reported that 31% of COVID-19 patients had stress, 22.2% reported symptoms of depression, and 38.1% reported symptoms of anxiety (7). Post-traumatic stress disorder can occur after experiencing or witnessing a traumatic event and has four key characteristics: (1) experiencing or witnessing a traumatic event, (2) re-experiencing the symptoms of that event through sleep and nightmares, (3) avoiding people, situations, and places that remind the patient of the traumatic event, and (4) symptoms of arousal such as irritability and difficulty concentrating (8). In addition to reducing the quality of life and impairing work performance, post-traumatic stress disorder can also lead to a significant medical and economic burden and increase the risk of suicide. If left uncontrolled, PTSD can cause permanent damage, including intrusion, avoidance, irritability, and emotional numbness for patients (9).

Traumatic events and illnesses can result in two types of reactions: negative reactions, which mainly involve post-traumatic stress symptoms, and positive reactions, which are known as post-traumatic growth (PTG) (10). PTG refers to positive psychological changes that deal with challenging circumstances and traumatic events. These changes are not solely caused by the trauma (11). Growth does not necessarily indicate the end of pain and turmoil, nor does it imply a positive attitude toward crisis, loss, or trauma (12). PTG is characterized by a better appreciation for life, improved interpersonal communication, changes in life priorities and personal power, identification of new coping strategies, and spiritual development (13). More than 83% of individuals who survived dangerous diseases, natural disasters, and accidents reported at least one positive change (10). During the regional epidemic of SARS, positive and significant mental health outcomes were also reported, including increased perceived support from family and friends, greater attention to one's mental health, and adoption of a healthier lifestyle (14). Lau et al. found that 28.4% of sufferers reported PTSD, of whom 18 percent observed significant PTG (15).

Appropriate interventions can help improve post-traumatic stress disorder (PTSD) and post-traumatic growth. A clinical trial by Fan et al. and a study by

Ramos et al. indicated that interventions could reduce stress and increase post-traumatic growth following severe illnesses (8, 16). Hamidian et al. and Shakiba et al. suggested that while psychological interventions can reduce post-traumatic stress, they may also have a positive and significant impact on post-traumatic growth (17, 18).

Given the risk to the mental health of all members of society, especially COVID-19 patients, it is advisable to use appropriate remote educational and psychotherapeutic methods. This can be achieved by using modern facilities such as video conferencing, online programs, telephone counseling, and suitable applications. Patients should be provided with appropriate treatment protocols. Lau et al. (15) believed that low-cost and accessible interventions such as distance counseling and education could be effective in raising awareness of distress and confusion symptoms, promoting positive coping mechanisms, incorporating spirituality into daily life, and facilitating new changes occurring in everyday life. Such interventions can serve as a starting point to promote post-traumatic growth and reduce stress resulting from COVID-19. Therefore, this study aimed to investigate the impact of online cognitive-emotional training programs on post-traumatic stress and post-traumatic growth among patients recovered from COVID-19.

2. Methods

This quasi-experimental study was conducted on COVID-19 patients discharged from Zahedan hospitals in 2021, and less than 3 months had passed since their infection. The inclusion criteria included patients with a definite diagnosis of coronavirus who were admitted for 1-3 months, had no known history of psychiatric or physical illness, and had no use of narcotics or psychiatric medications before contracting COVID-19. Additionally, patients had to be at least 18 years old, educated, able to use a mobile phone, and have no underlying disease, history of death, or hospitalization of another family member due to COVID-19. Exclusion criteria included a patient's failure to respond to video and telephone calls, inability to participate in offline sessions, and experience of any distressing incidents during the study. The sample size was calculated based on the following formula in Hamidian et al.'s study (17) with a confidence coefficient and test power of 95%, and 35 participants were assigned to each group.

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right)^2 \left(S_1{}^2 + S_2{}^2\right)}{\left(\bar{x}_1 - \bar{x}_2\right)^2} \tag{1}$$
$$= 9.29$$

$Z_{1-\frac{\alpha}{2}}$ = 1.96, S_1= 8.51, $(\bar{X_1})$= 32.13, $Z_{1-\beta}$ = 1.64, S_2= 13.91, $(\bar{X_2})$= 51.38

A demographic and background questionnaire (age, length of hospital stay, gender, marital status, occupation, education, ethnicity, living place, and type of department), the Post-traumatic Growth Inventory (PTGI), and the post-traumatic stress disorder (PTSD) checklist were used to collect the information.

The PTGI consists of 21 items designed to measure post-traumatic growth. Responses are recorded on a six-point Likert scale, with 0 indicating no change and 5 indicating a significant change. Scores range from 0 to 105, with lower scores indicating less growth and higher scores indicating more growth. The questionnaire consists of five subscales: (1) relating to others, (2) new possibilities, (3) personal strength, (4) spiritual changes, and (5) appreciation of life. In the study by Tedeschi and Calhoun, the questionnaire exhibited an overall alpha coefficient of 0.90, with alpha values for each subscale ranging from 0.67 to 0.85. The divergent and convergent validity and reliability of the PTGI have been investigated in Iran by Mahmoudi et al. (19), who estimated the Cronbach's alpha coefficient for the entire questionnaire to be 0.92 (20). In this study, the questionnaire reliability was determined with a Cronbach's alpha coefficient of 0.84.

The post-traumatic stress disorder checklist is used to screen individuals for PTSD symptoms. The checklist includes four dimensions: intrusions, avoidance, numbing or dysphoria, and hyperarousal. Responses are recorded on a 5-point Likert scale, with 1 indicating "not at all" and 5 indicating "very much." The checklist has a score range between 17 and 85, with lower scores indicating less perceived stress and higher scores indicating more perceived stress. Weathers et al. conducted 2 studies on the PTSD Checklist and reported internal consistency coefficients of 97% and 96% for the entire scale (21). The reliability and validity of the checklist were confirmed by Godarzi in Iran, who found Cronbach's alpha coefficient to be 0.93 (22). To determine the validity index of the checklist, its correlation with the life events checklist was calculated (P = 0.0001, n = 117, r = 0.37) (8). In this study, the checklist reliability was determined by Cronbach's alpha of 0.77.

After obtaining permission from the Ethics Committee and a letter of introduction from the vice chancellor for research and technology, the researcher visited hospitals affiliated with Zahedan University of Medical Sciences, including Khatam Al Anbia, Imam Ali, and Bu Ali hospitals, where patients with COVID-19 were hospitalized. First, the researcher identified all patients with COVID-19 who were discharged from the hospitals in 2021, and no more than 3 months had passed since their infection. The researcher visited and explained to them the study goals and methods and obtained their informed consent before the study. The questionnaires were completed by the participants, who were selected by convenience sampling. They were placed randomly into the intervention and control groups using the random allocation rule. First, 70 colored cards, including 35 red intervention cards and 35 white control cards, were prepared. Then, a list of 70 participants was created, indicating the group of each individual. Once eligible patients were determined, one of the list numbers was assigned to each selected patient.

The patients in the intervention group participated in an online cognitive-emotional training program using the WhatsApp application. To ensure access to the program, patients were instructed to install the software on their phones if they did not already have it. If a patient was unfamiliar with the software or did not have a smartphone, they were encouraged to seek assistance from a family member or friend. This ensured that all patients had the necessary resources for the training. To foster interaction and collaboration among the patients during the intervention, WhatsApp groups consisting of 4 to 6 individuals were created. A total of 7 short-term training sessions were conducted, following the content outlined in Table 1. The sessions were facilitated by the researcher, who presented PowerPoint slides to the patients. At the beginning of each session, patients were encouraged to discuss the previous session and share what they had learned, allowing the researcher to receive feedback from the group. The cognitive-emotional training program had been previously utilized with patients facing serious illnesses. At the end of each session, the subsequent session was scheduled. Patients were informed that they could have access to the researcher for any question or concern, either through WhatsApp or the provided contact number. The intervention spanned 12 weeks, with 2 sessions per week. In the final week, 3 sessions were held. The intervention took place between the beginning of November and the middle of December. Following the completion of the intervention, online questionnaires were administered to both the intervention and control group patients. Patients in the control group did not receive any training during this period. A post-test was conducted on them simultaneously, and if desired, online educational content was also provided for the control group through WhatsApp after the study.

2.1. Ethical Considerations

This study was approved by the Ethics Committee of Zahedan University of Medical Sciences in Iran with the

Table 1. The Structure of Sessions and Content of the Cognitive-Emotional Training Program

Session	Content
1	Familiarity, review of the disease, and psychological consequences
2	Normalization of emotional reactions in severe diseases.
3	Training and practicing emotional disclosure and emotional release techniques.
4	Fears and concerns related to the experience of illness, facilitation and practice of cognitive processing, and deliberate rumination.
5	A review of the gains (positive dimensions) and losses (negative dimensions) following the illness experience.
6	Developing values, prioritizing new values, redefining goals, and creating a new philosophy for life.
7	Spirituality, positive thinking, and teaching of patience, conclusion

code of ethics IR.ZAMUS.REC.1400.378. Informed consent, confidentiality of information, and the right to withdraw from the study at any stage were among the ethical considerations of this research.

2.2. Statistical Analysis

The data were analyzed using SPSS version 22 and descriptive and inferential statistics. The paired *t*-test was used to compare the mean scores within each group before and after the intervention, while the independent *t*-test was used to compare the mean scores of the two groups before and after the intervention. The chi-square test was used to compare the frequency of qualitative variables between the two groups. The analysis of the covariance test was used to control for the pre-test effect and evaluate the effectiveness of the intervention. A significance level of $<$ 0.05 was considered in this study.

3. Results

The mean ages in the intervention and control groups were 34.37 ± 7.31 and 33.06 ± 6.73 years, respectively. The mean lengths of hospital stay in the intervention and control groups were 6.98 ± 1.30 and 6.34 ± 2.01 days, respectively. An independent *t*-test indicated no significant difference in terms of these 2 variables between the two groups ($P > 0.05$). Table 2 presents other individual characteristics of the patients. The results of the chi-square test showed no significant difference in terms of the mentioned variables between the 2 groups ($P > 0.05$).

The study found that the intervention group, which received non-attendance cognitive-emotional training, experienced significant reductions in stress scores compared to the control group. The intervention group's stress scores decreased from 67.71 ± 6.62 to 32.34 ± 5.75 (P = 0.001), while the control group's scores decreased from 62.62 to 57.88 ± 4.28 (P = 0.001). The post-traumatic stress scores also showed significant differences between the two groups before and after the intervention (P = 0.001).

Table 2. Comparison of Demographic Information of Patients with COVID-19 Discharged from the Hospital in the Intervention and Control Groups [a]

Group Variables	Intervention	Control	P-Value
Age (y)	34.37 ± 7.31	33.06 ± 6.73	0.43 [b]
Length of stay (day)	6.98 ± 1.30	6.34 ± 2.01	0.89
Sex			0.71 [c]
Male	30 (85.7)	29 (82.9)	
Female	5 (14.3)	6 (17.1)	
Marital status			0.61
Single	11 (31.4)	13 (37.1)	
Married	24 (68.6)	22 (62.9)	
Job			0.43
Unemployed	12 (34.3)	9 (25.7)	
Employed	23 (65.7)	26 (74.3)	
Education			0.69
Elementary	13 (37.1)	10 (28.6)	
Diploma	12 (34.3)	15 (42.8)	
Higher	10 (28.6)	10 (28.6)	
Ward type			0.67
Intensive	2 (5.7)	4 (11.4)	
General	33 (94.3)	31 (88.6)	

[a] Values are expressed as Mean ± SD or No. (%).
[b] Independent-*t*-test
[c] Chi-square test

Additionally, the intervention group showed significant increases in post-traumatic growth scores, with scores rising from 53.51 ± 7.12 to 69.11 ± 8.73 (P = 0.001). In contrast, the control group's scores decreased from 56.11 ± 5.65 to 48.71 ± 5.08 (P = 0.001). The post-traumatic growth scores differed significantly between the intervention and control groups both before (P = 0.02) and after (P = 0.001) the intervention, with the intervention group showing higher scores (Table 3).

The results from Table 4 and the covariance analysis

Table 3. Comparison of the Mean (SD) Scores of Post-traumatic Stress and Growth of Patients with COVID-19 Discharged from the Hospital Before and After Online Cognitive and Emotional Training [a]

Time Period Group	Before Intervention	After Intervention	Variances	Paired t-Test
Post-traumatic stress				
Intervention	67.71 ± 6.62	32.34 ± 5.75	-35.37 ± 7.17	0.001
Control	62.42 ± 4.48	57.88 ± 4.28	-4.54 ± 1.96	0.001
Independent t-test	0.001	0.001	0.001	
Post-traumatic growth				
Intervention	53.51 ± 7.12	69.11 ± 8.73	15.64 ± 9.55	0.001
Control	56.11 ± 5.65	48.71 ± 5.08	-7.40 ± 2.05	0.001
Independent t-test	0.02	0.001	0.001	

[a] Values are expressed as Mean ± SD.

revealed a statistically significant difference in the average scores of post-traumatic stress and post-traumatic growth between the two groups of patients after emotional cognitive training (P = 0.001). This analysis was conducted to control for the significant effect of pre-test scores.

4. Discussion

The results of this study indicated that cognitive-emotional training had a positive and significant effect on the post-traumatic growth of patients with COVID-19. Cognitive-emotional interventions, such as the one used in this study, offer patients an opportunity to express their personal experiences, present models, examine cognitive schemas, and reconstruct core beliefs that are predictive of post-traumatic growth.

Shakiba et al. and Hamidian et al. found a positive and significant effect of cognitive-emotional intervention on post-traumatic growth among children with cancer and women with breast cancer (17, 18). Additionally, Ramos et al. and Bae et al. (23) observed that group psychological interventions could facilitate post-traumatic growth in patients (16). Masoum Abadi et al. found that a group educational intervention improved post-traumatic growth, mental well-being, and adherence to treatment (24). Overall, these studies, along with the current one, suggest that psychological interventions and psychotherapy can increase post-traumatic growth in patients with severe and traumatic diseases despite any differences in the studied populations and intervention methods. Furthermore, Knaevelsrud et al. suggested that internet-based cognitive-behavioral training may be particularly effective in stimulating and facilitating post-traumatic growth (25).

The therapeutic components of the intervention used in this study included activating deep cognitive processing and encouraging conscious rumination, which may partially explain its effectiveness in facilitating post-traumatic growth. Rumination is often associated with negative and distressing thoughts. At the same time, emotional and cognitive interventions activate conscious rumination, which can increase awareness of the positive aspects of an experience and promote post-traumatic growth (17). Emotional regulation training, which is a kind of cognitive-emotional therapy, involves exercises that help individuals increase their understanding of positive emotions. This can contribute to strengthening positive feelings and promoting growth (26, 27). Coping styles are also important components of post-traumatic growth. Both emotion-oriented and problem-oriented coping styles have been found to have a positive relationship with post-trauma growth, while coping styles involving denial, suppression, and emotional inhibition are associated with negative mental health outcomes. The emotional cognitive training used in this study emphasized exposure to trauma, expressing emotions and deliberate rumination, and using problem-oriented approaches instead of denial, escape, intrusive rumination, and suppression of emotions. This mechanism may have contributed to the improvement and increase in the level of growth among patients with COVID-19.

The results of the current study also showed that the cognitive-emotional intervention significantly reduced post-traumatic stress in patients with COVID-19. This finding is supported by the clinical trial conducted by Fan et al., which found that patients who received narrative exposure intervention had a significant reduction in post-traumatic stress symptoms compared to the control group (8). Additionally, Bloukian and Vatankhah found that mindfulness-based cognitive therapy, which involved improving cognitive processing, conscious attention, acceptance, and conscious behaviors, could be an effective

Table 4. The Result of the Analysis of Covariance Test Regarding Post-traumatic Stress and Growth Scores of Patients with COVID-19 After Online Cognitive and Emotional Training

	Sum of Squares	Freedom Degree	Mean Squares	F	Significance	Test Power
Source of variance (stress)						
Pre-test	481.63	1	481.63	25.41	0.001	0.99
Group	9774.46	1	9774.46	515.74	0.001	1
Error	1269.79	67	18.95			
Total	155640	70				
Source of variance (growth)						
Pre-test	165.64	1	165.64	3.53	0.071	0.43
Group	2130.08	1	2130.08	114.45	0.001	1
Error	3307.04	67	49.35			
Total	305598	70				

treatment for reducing post-traumatic stress symptoms in these patients (28). These studies emphasize the importance of education in reducing post-traumatic stress symptoms, which is consistent with the results of the present study.

Bottche et al. found that cognitive-behavioral intervention had a positive effect on reducing post-traumatic stress in older people (29). Merati et al. also reported that cognitive-behavioral therapy was effective in reducing post-traumatic stress disorder in earthquake victims (30). Leiva-Bianchi et al. reported a significant effect of cognitive-behavioral therapy on post-traumatic stress symptoms (31). Shakiba et al. found that the cognitive-emotional intervention used in their study had a positive and significant effect on post-traumatic stress in mothers of children with cancer (18). Although there were some differences in the study populations and types of interventions used, these studies are consistent with the present study in terms of the positive effect of educational interventions on reducing post-traumatic stress symptoms.

Kazemi Rezaei et al. found that group therapy, such as memory specificity training, had positive effects on reducing negative emotional dysregulation, attention bias, and inhibition deficits in individuals with post-traumatic stress disorder (32). Similarly, Samimi and Hassani showed that emotional working memory training was effective in improving cognitive emotion regulation strategies in teenagers with post-traumatic stress disorder (33). Although these studies differ in terms of the study population and the type of training, their results confirm the importance of cognitive-emotional regulation training in individuals with post-traumatic

stress disorder, which is consistent with the results of the present study. Furthermore, Sadeghi et al. showed that online, telephone, chat, and voice message interventions can effectively reduce psychological problems, including stress, anxiety, and depression, in infertile individuals. It is also worth noting that online interventions may be a suitable and preferred method during the COVID-19 outbreak (34).

The therapeutic aspect of the cognitive-emotional intervention used in the present study was to activate deep cognitive processing and encourage deliberate rumination, which may explain its effectiveness in reducing the severity of post-traumatic stress (35). Furthermore, cognitive emotion regulation strategies need to be transformed into verbalization of emotions in the brain so that individuals can have control over their emotions. Continuity and repetition are also essential for individuals to verbalize their emotions (33). Therefore, the 7 sessions of emotional cognitive training offered in the present study may have provided the subjects with a good opportunity to internalize emotion regulation strategies through practice, repetition, and feedback.

There are several limitations to the present study. Firstly, the effect of the intervention was limited to post-traumatic stress symptoms, and other psychological outcomes related to the disease, such as psychological distress and depression, were not examined. Secondly, the effect of early initiation of training during hospitalization was not investigated. Finally, the study did not include a long-term follow-up evaluation of the effect of the cognitive-emotional intervention.

4.1. Conclusions

The results of the present study suggested that emotional and cognitive training was a highly effective intervention for reducing post-traumatic stress and increasing post-traumatic growth in patients with COVID-19. The techniques and methods used in the intervention, such as emotional disclosure and release, conscious cognitive processing, and cognitive training, can help reduce the negative psychological consequences of facing this difficult disease and improve the quality of life of patients. Therefore, it is recommended that psychological interventions, including emotional cognitive training, should be integrated into the management of patients with COVID-19.

Acknowledgments

Footnotes

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