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# The effect of online cognitive behavioral therapy on depressive symptoms in recovered patients with COVID-19

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## Abstract:

**BACKGROUND:** COVID-19 virus is on the rise globally, and people with the disease experience a variety of physical and mental problems. According to studies, depression can be a complication of the virus. So far, limited measures have been taken to prevent and treat emotional–psychological complications of COVID-19. The aim of this study was to evaluate the effect of online cognitive behavioral therapy (CBT) on depressive symptoms in recovered patients with COVID-19.

**MATERIALS AND METHODS:** This study was conducted in a quasi-experimental design. A sample of 150 recovered patients with COVID-19 who referred to Imam Reza Hospital in Tabriz city, were selected by random sampling method. The patients' emotional–psychological status was assessed by the Beck Depression Inventory, and they entered the treatment process according to the inclusion criteria. As a therapeutic intervention, a scientific and valid approach called CBT was implemented, which two occupational therapists performed in eight treatment sessions in the context of a social communication application. Paired sample *t*-test was used to analyze the time sequence of quantitative data due to its normality.

**RESULTS:** After the last session of the intervention, the effect of this therapeutic approach on reducing the depressive symptoms of patients was evaluated. According to the findings, the Beck score of the participants decreased significantly after the intervention ( $MD = -45/9$ ,  $P < 0/001$ ).

**CONCLUSION:** Therefore, in order to promote the recovery of patients with COVID-19 and help health authorities to develop preventive measures and effective treatment of emotional–psychological problems caused by this virus, it is recommended to use the online CBT approach.

## Keywords:

Cognitive behavioral therapy, COVID-19, depression

## Introduction

COVID-19 virus has spread with a significant outbreak worldwide.<sup>[1]</sup> In addition, patients have faced a plethora of other problems including anxiety over complications, physical discomfort, and discrimination propagated through mass media.<sup>[2,3]</sup> These negative emotions can increase the risk of mental health problems, especially depressive

symptoms (depression after illness).<sup>[4-6]</sup> In addition, because patients are treated in separate wards, loneliness and the resulting social isolation can also provoke depression.<sup>[7]</sup> Depression can worsen the prognosis of COVID-19 because depression and psychological distress wreak havoc on the immune system responses in patients.<sup>[8]</sup> Research shows that patients may experience long-lasting depression even in the postpandemic era. For instance, the prevalence of depression was estimated

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at 18% among patients with severe acute respiratory syndrome (SARS) 1 month after their discharge;<sup>[9]</sup> in the assessment 30 months after the outbreak of SARS, the rate was 15.6%.<sup>[10]</sup> In addition, a recent study by Ma *et al.* (2020) on patients with clinically stable coronary reported that almost half of the participants (43.1%) reported depression;<sup>[11]</sup> these results were similar to Zhao's study (49.06%).<sup>[12]</sup>

On the other hand, the weighted mean score of fear and rumor beliefs among the Iranian population is much more than the median<sup>[13]</sup> and probably, this can endanger the mental health of patients with COVID-19. Preliminary reports indicate that the mental health of COVID-19 patients is not well-controlled.<sup>[14]</sup> Few measures have been taken to implement psychological interventions in China, and strict measures to control infection have limited access to mental health providers.<sup>[15]</sup> Despite, Li *et al.* reported the effect of cognitive behavioral therapy (CBT) on improving the mental health of patients with COVID-19 in their study.<sup>[16]</sup> In China, online mental health resources have been used instead of traditional therapies,<sup>[17]</sup> although none have been specifically designed or tested for use in clinical settings.

CBT is a widespread and evidence-based treatment for depression in the general population and may even be superior to antidepressants.<sup>[18]</sup> Furthermore, it has been widely used in the treatment and prevention of physical and mental distress in the community and inpatients.<sup>[16]</sup> On the other hand, online CBT has many benefits that help the patient to communicate with the therapist at any time and place, and the therapist can communicate with the patient indefinitely.<sup>[19]</sup> Therefore, in the current situation of COVID-19, where there is limited physical contact, the use of this type of treatment is appropriate.

Remote CBT, in which the patient speaks to a therapist directly via Internet-based video conferencing or telephone, may increase accessibility, acceptance, and service capacity for patients with corona. In addition, digitally administered psychological therapies are usually more effective than nonguidance or self-guidance if supported by a therapist.<sup>[17,20]</sup>

Such therapeutic interventions are not widespread in our society and the educational content of these interventions is not compatible with our culture.<sup>[21]</sup> Furthermore, their effectiveness is not comprehensively reviewed through scientific methods. This study is one of the first works in this field in Iran to try to examine CBT on depressive symptoms in patients who recovered from COVID-19. Educational Imam Reza Hospital is the main referral center for patients with COVID-19 in East Azerbaijan in Iran and as a result, recovered patients could be identified there.

## Materials and Methods

### Study design and setting

This study was conducted in a quasi-experimental design. As educational Imam Reza Hospital is the main referral center for patients with COVID-19 in East Azerbaijan, it was selected as the setting where this study was implemented.

### Study participants and sampling

A sample of 150 recovered patients with COVID-19 who referred to Imam Reza Hospital in Tabriz city, were selected by random sampling method using a table of random numbers from the list of discharged patients. Twenty of them were included in the study according to the following inclusion criteria: (1). detection of COVID-19 by physician and laboratory, (2) Achieve a higher score of 14 in Beck Depression Inventory, Second Edition. (3) Completion of the active stage of the disease (at least 2 weeks after infection), and (4) having an account in social communication programs.

In addition, participants were excluded from the study if they did not wish to continue participating in the study or were absent for more than two sessions.

### Data collection tool and technique

#### *Beck Depression Inventory II*

The second version of the Beck Depression Inventory is one of the most popular and common self-reporting tools for screening for depression in people over 13 years of age. It is available in two items of 21 items and 13 items and has the ability to assess the type and severity of depression.<sup>[22]</sup> As a general rule, a score of 19–14 is defined as mild depression, 20–28 as moderate depression, and 63–29 as severe depression.<sup>[23]</sup> This questionnaire, which is an updated and revised model of the original version of the Beck Depression Inventory, has cognitive, motivational, emotional, physiological, and other dimensions.<sup>[22,24,25]</sup> In Iran, Hamidi *et al.* investigated the psychometric properties of this questionnaire. According to their report, the intraclass correlation coefficient was 0.81. The internal consistency of the test was obtained from Cronbach's alpha and halving methods of 0.93 and 0.64, respectively.<sup>[26]</sup> In this study, the Google Form was used to provide the questionnaire online to the participants by sending the questionnaire link in the WhatsApp application. It is worth mentioning because of moral considerations, data were collected online with informed consent from all participants.

In order to carry out the work, first, the code of study ethics was obtained from the Deputy of Research and Technology affiliated with Shahid Beheshti University of Medical Sciences. After that, a letter of introduction was sent to the Deputy for Education at Tabriz University of

Medical Sciences residing in Imam Reza Hospital in Tabriz and with their approval, information about the contact numbers of discharged patients who were affected with COVID-19 was extracted from their medical records. Then, the patients were contacted, and the study process was explained to them, and the number with which they had an account in one of the social communication programs was taken. In the context of that program, consent form and Beck Depression Inventory-II questionnaire<sup>[24]</sup> were sent, and if they had the conditions to enter the study, the program of treatment sessions, which were held in the form of video calls, was sent to each patient.

This intervention consisted of eight treatment sessions for each participant, with two sessions per week. The duration of each session was set at 45 min. Treatment sessions were held for each patient in pairs on Saturday–Wednesday, Sunday–Tuesday, and Monday–Thursday. On Sunday–Tuesday and Monday–Thursday with six patients and on Saturday–Wednesday with eight patients, video calls were made in the WhatsApp application space. The contact hours were commensurate with the patients' free time, which ranged from 9 a.m. until 6:45 p.m. In addition, patients agreed to be provided with a free internet package for 3 months by the researchers in this study. As occupational therapy students are introduced to the theoretical and practical concepts of CBT in their courses, two occupational therapists who are also the authors of this article were used to perform the interventions.

The pretest and posttest assessments were performed by the Beck Depression Inventory, Second Edition. Then, by comparing its scores, the effectiveness of the intervention was determined. In this study, the principles of CBT for people with depressive symptoms were used.<sup>[27]</sup> This treatment was performed at two levels of behavioral activation and cognitive interventions.

### Behavioral activation

#### Session 1

The first step of intervention included teaching patients how to monitor themselves to evaluate their level of activity. Along with the patient, the therapist classified activities that used to be of great value to the patient but has lost their value recently. The daily activities avoided by patients were also identified. Finally, the patient was asked to perform the identified activities at certain times of the day, significantly when depressive symptoms increase. This is an activity that happens according to a plan, not that the patient waits to get the motivation and energy to do it and then perform it.

#### Session 2

After the first stage, patients were required to monitor mood changes during planned activities. This experiment

tests the patient's incorrect predictions about success or failure and evaluates the effect of the activity on the patient's mood. Aside from assigning delightful activities, the therapist may aid the patient to develop detailed schedules for activities that appear to be overwhelming, and help the patient with planning, performing, and troubleshooting such activities (e.g., assign a graded assignment). When patients are depressed, behavioral activation is an excellent tool with or without medication in primary care.<sup>[27]</sup> In this treatment, it is essential to ensure that the activity is important to the patient and its prescribed severity is not too high. The more specific the task, the more likely it is to be done. Furthermore, written notices of the activities the patient is planning to do are so important that the therapist wrote a prescription for a particular activity and with whom and when to do the activity.

In all sessions, asking the patient about the assigned tasks was of paramount importance to the therapist because otherwise, the patient would not value the tasks well enough.

#### Session 3

Another benefit of behavioral activation is that the patient's erroneous thought patterns (including avoidance and withdrawal patterns) are evident.<sup>[27]</sup> Examples of these patterns include "useless," "I have no energy," "If I try and fail, I get worse." By raising the level of activity, these thoughts could be assessed and tested. In this session, misconceptions were identified, and based on them, the amount and type of activities were increased.

#### Session 4

Behavioral activation also targets skills deficits. In this way, patients who lacked strong communication or showed poor social skills were placed in complex social interactions. This training ensures that social interactions would be gratifying in future and boost the patient mood.<sup>[27]</sup>

### Cognitive interventions

After patients became involved in behavioral activation, the therapist continued to work with the patient to achieve treatment goals, focusing on identifying, reviewing, and producing more rational and practical approaches to personal experiences because cognitive changes are associated with patient recovery. In CBT, several mechanisms can make changes in thinking. As patients try to arrive at new conclusions derived from real-life experiences, behavioral changes may modify cognitive processes at various levels.<sup>[27]</sup>

#### Session 5

The process of recognizing automatic thoughts (thoughts that are just below our level of consciousness) often

becomes more accessible when the patient is instructed to seek to identify these thoughts when mood swings appear. Mood swings are easily recognizable because one of the functions of human emotions is to attract attention.<sup>[27]</sup> Therefore, during mood swings, the patient was instructed to ask, "What is going through my mind?"<sup>[28]</sup> Other clinical tools used to help patients recognize automatic thoughts cover a list of cognitive distortions.<sup>[28]</sup> There are also various kinds of mind change records<sup>[28,29]</sup> that help patients identify such thoughts and understand how they are linked to moods and behaviors.

#### Session 6

When the patient gained the ability to recognize automatic thoughts quickly, the next step involved logical analysis to understand whether these thoughts were true, somewhat true, or untrue. When the patient realized that he/she could change his/her mind, and when more believable and accurate options were substituted, he/she felt better and functioned, and eventually, the treatment pattern was strengthened.<sup>[27]</sup> Finally, the patient was instructed to practice negative thinking assessment outside of the treatment session in typical situations where he/she feels difficult.

#### Session 7

When the patient could change automatic thoughts with a bit of skill, the therapist shifted his/her attention to unraveling rules, beliefs, and assumptions that made the patient susceptible to negative thinking and life events. The therapist and the patient shared their perceptions of how patients viewed the world, themselves, and others, thus facilitating their self-knowledge and motivation for change.<sup>[27]</sup>

#### Last session

The final session on cognitive behavioral treatment for depression is slightly distinct from other therapeutic methods. In this session, the therapist constantly provided written material and summarized what the patient had learned during treatment. The early process of treatment conclusion involved a review of the patients' learning. The patient and therapist then predicted conditions that might cause problems for the patient (relapse prevention) and offered solutions.

#### Statistical analysis

Data were analyzed using SPSS software version 26 produces by IBM (New York State, New York city, USA). The normality of the data was checked using the Kolmogorov–Smirnov test. Frequency (percentage) was used to describe qualitative data and mean (standard deviation) was used for quantitative data due to normality. Paired sample *t*-test was used to analyze the time sequence of quantitative data due to its normality. The level of statistical significance was also considered 5%.

#### Ethical consideration

Before the commencement of the study, formal ethical approval was obtained from the Iran National Committee for Ethics in Biomedical Research. Prior to registration, all respondents gave online written permission.

#### Results

In this study, twenty patients were studied with a mean (standard deviation) age of 44.95 ( $\pm 8.7$ ) years. Moreover, most of the subjects were women with 11 cases (47.8%). Furthermore, most of the subjects were married, with 16 cases (69.6%). And, most of the people's status of education and employment was a bachelor with 10 cases (43.5%) and an employed with 13 cases (56.5%) [Table 1].

Beck score in the subjects decreased significantly after the intervention (MD=  $-9/45$ ,  $P < 0/001$ ) [Table 2].

#### Discussion

In this study, Beck's depression score decreased significantly after online CBT among the participants.

In a meta-analysis study, the effect of CBT was reviewed on depression in adults. In these studies, the effect of CBT was investigated alone and in comparison, with other treatments. According to the meta-analysis, CBT

**Table 1: Demographic characteristics of the recovered patients with COVID-19**

Characteristics	Values
Mean age (years)	44.95 $\pm$ 8.7
Sex, n (%)	
Male	9 (39.1)
Female	11 (47.8)
Marriage status, n (%)	
Single	3 (13.0)
Married	16 (69.6)
Widowed or divorced	1 (4.3)
Education status, n (%)	
Diploma	8 (34.8)
Bachelor	10 (43.5)
M's and higher	2 (8.7)
Employment status, n (%)	
Employed	13 (56.5)
Unemployed or homemaker	5 (21.7)
Retired	2 (8.7)

**Table 2: Comparison of the Beck score before and after the intervention**

Beck score	Values
Beck score before	22.70 $\pm$ 9.5
Beck score after	13.25 $\pm$ 8.4
<i>P</i>	<0.001*

\**P* value by paired sample *t*-test

is undoubtedly an effective treatment for adults with depression. Furthermore, many studies have been done on CBT in psychotherapy, so it has the highest amount of evidence.<sup>[30]</sup>

In a recent review study, the effect of CBT interventions and medication interventions was examined on depression. Both treatments have been reported to reduce depressive symptoms effectively, but the most effective treatment for depression was a combination of medication and CBT.<sup>[31]</sup>

In a clinical trial study, 39 students (aged 25–18) with a high score on the Kessler Psychological Distress scale were assigned to the groups of online cognitive behavior programs, online support group, or control. This study demonstrated that the score of depression did not significantly reduce in the groups of online cognitive behavioral programs and the online support group compared to that of the control group.<sup>[32]</sup>

In a randomized trial study, subjects were randomly assigned to one of the cases: 16 weeks of medication ( $n = 120$ ), 16 weeks of cognitive therapy ( $n = 60$ ), and 8 weeks of placebo ( $n = 60$ ). The results demonstrated that the response rate in the drug group (50%) and cognitive therapy (43%) was better than that of the placebo group (25%) in 8 weeks. In addition, the recovery rate was 46% for medication and 40% for cognitive therapy in 16 weeks. According to the results, the efficacy of cognitive therapy resembles that of medications used to treat moderate-to-severe depression; however, the expertise or experience of the therapist has a direct effect on its efficacy.<sup>[33]</sup>

In a meta-analysis study, the effect of internet-based CBT (iCBT) self-guidance was estimated in the treatment of adults with depressive symptoms compared to controls. A total of 13,384 abstracts were systematically searched in PubMed, Embase, PsycINFO, and the Cochrane Library from the beginning. The database was reviewed until January 1, 2016, and included a randomized clinical trial comparing iCBT self-guidance with depressed control subjects (routine care, waiting list, or attention control). ICBT self-guidance was much more effective than controlling the severity of depressive symptoms and therapeutic response. Adherence to treatment was linked to lower symptoms of depression and better response to treatment.<sup>[34]</sup>

Furthermore, in a randomized clinical trial on 3928 patients, the subjects were screened in 25 Swedish hospitals for eligibility. Moreover, 239 patients with recent myocardial infarction and symptoms of depression or anxiety were selected; they were randomly assigned to 14 weeks of iCBT treatment ( $n = 117$ ) and routine

treatment ( $n = 122$ ). The results demonstrated that there was a decrease in Hospital Anxiety and Depression Scale (HADS) scores in the total study score over time, but there was no difference between the study groups in follow-up. Treatment adherence was low. The result was that iCBT treatment in people with myocardial infarction did not reduce depressive or anxiety symptoms compared to that of conventional therapy.<sup>[35]</sup>

In another randomized clinical trial, 93 eligible participants selected by cluster sampling were divided into two groups as interventional group ( $n = 47$ ) and control group ( $n = 46$ ). Participants in the control group received routine treatment based on Chinese management guidelines for COVID-19, whereas participants in the interventional group received routine treatment with CBT. The Chinese version of the Depression and Stress Anxiety Scale-21 (DASS-21) was used to assess depression, anxiety, and stress in all participants at the beginning and after the intervention. The results demonstrated that a significant decrease in the scales of depression, anxiety, stress, and total DASS-21 was observed in both the interventional and control groups. However, after the intervention, participants in the interventional group did not have more symptoms of depression or anxiety compared to that of the control group. The results also expressed that CBT should focus on patients with chronic illness and those who have been hospitalized longer.<sup>[16]</sup>

According to the results obtained on the effect of online CBT on depressive symptoms in patients, the present study was consistent with studies by Cuijpers *et al.*,<sup>[30]</sup> Vasile,<sup>[31]</sup> DeRubeis *et al.*,<sup>[33]</sup> Karyotaki *et al.*,<sup>[34]</sup> and Li *et al.*,<sup>[16]</sup> On the other hand, it was inconsistent with studies by Ellis *et al.*<sup>[32]</sup> and Norlund *et al.*,<sup>[35]</sup> who pointed out that CBT has no significant effect on the treatment of depression. There are several possible reasons which describe this study's inconsistency with these studies, including that the target population and research environment in this study are different, and also the reason for this difference may be due to the differences in the sample size and the differences in the inclusion and exclusion criteria. In addition, the study should include the severity of the disease and the underlying factors, and the differences in the study assessment tools.

### Limitations and recommendation

There are some limitations to consider. First, due to the urgency brought on by the pandemic, concerns about missing the ideal intervention period, and need to quickly recruit participants, we failed to conduct a randomized controlled trial. Second, adequate evaluation was not set after each therapeutic session, as the evaluation was conducted after the last session of the therapy. Third, lack of an extended follow-up period limited the proof of the

lasting effects of the online CBT. We aim to expand the sample size in future and increase the proper follow-up period to enrich the trial. As patients suggested, more interventional sessions may be needed to entice other interested participants to join future online CBT studies. Future randomized controlled trials with assessment of treatment fidelity, need to be conducted. Until that, the results of the current study should be considered preliminary. Nonetheless, in order to promote the recovery of patients with COVID-19 and help health authorities to develop preventive measures and effective treatment of emotional-psychological problems caused by this virus, it is recommended to use the online CBT approach in clinical settings.

## Conclusion

According to the results of this study, it seems that online CBT significantly reduces the depressive symptoms of patients with improved COVID-19. This study provides meaningful preliminary evidence to support the effectiveness of the online CBT as a nondrug intervention for the mental health problems of patients with COVID-19.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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