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The effectiveness of a supportive training program on stress, anxiety, and depression of patients with COVID-19 hospitalized in Najaf hospitals

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Abstract

Introduction Hospitalization in the COVID-19 intensive care unit (ICU) induces psychological pressures on patients, including anxiety and depression, which disrupt their functioning. Patient education and support can facilitate recovery and potentially alleviate symptoms of depression and anxiety. This study aims to investigate the effectiveness of a supportive training program on stress, anxiety, and depression among COVID-19 patients hospitalized in Najaf hospitals.

Method This randomized controlled trial was conducted in 2021, involving 60 hospitalized COVID-19 patients diagnosed based on clinical symptoms and RT-PCR tests. Eligible patients were randomly assigned to either the control or intervention group using SPSS software-generated random sequence. At the beginning of the study, both groups completed demographic information forms and the Depression, Anxiety, and Stress Scale (DASS-21). The control group received standard care, while the intervention group participated in a supportive educational program in addition to routine care. On the fifth day of hospitalization, both groups completed the DASS-21 again. Data were analyzed using paired t-tests, independent t-tests, Mann–Whitney, and Wilcoxon tests.

Results The two groups were homogeneous regarding gender, place of residence, marital status, and income ($p > 0.05$). On the fifth day, a statistically significant reduction in stress, anxiety, and depression levels was observed in the intervention group compared to the control group ($p < 0.05$).

Conclusion A supportive educational program in the COVID ward can significantly reduce stress, anxiety, and depression among patients. This program is feasible for implementation by nurses without additional costs. Future research could explore the long-term effects of such interventions and assess patient satisfaction with the educational program.

Trial registration This study was registered in the Iranian Registry of Clinical Trials (no. IRCT20140625018231N1) on 05/11/2021.

Keywords COVID-19, Stress, Anxiety, Depression, Supportive Educational Program

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Introduction

The emergence and global spread of SARS-CoV-2 (COVID-19) in December 2019 has profoundly affected people's physical and mental health worldwide [1]. The rapid rise in COVID-19 cases led the World Health Organization (WHO) to declare it a pandemic on March 11, 2020. By April 19, 2021, 223 countries reported 141,057,106 confirmed cases and 3,015,043 deaths. In Iraq, the pandemic posed severe challenges, with 977,175 confirmed cases and 14,981 deaths by the same date [2].

Iraq faced a high prevalence rate of COVID-19 due to healthcare infrastructure challenges, high population density in urban areas, and limited access to vaccination during the pandemic's initial phases [3–5]. These factors highlight the urgent need for tailored interventions to address the physical and psychological health of COVID-19 patients in this region.

COVID-19, while a novel strain of coronaviruses, shares similarities with diseases such as SARS and MERS. Symptoms include fever, chills, cough, sore throat, myalgia, nausea, vomiting, and diarrhea. Severe cases may result in complications like respiratory failure, acute respiratory distress syndrome (ARDS), or death [6, 7]. Beyond the physical toll, COVID-19 significantly impacts mental health, with patients experiencing heightened fears of death, helplessness, and social stigmatization [8].

The psychological challenges of COVID-19 are exacerbated by the activation of the hypothalamus–pituitary–adrenal axis under stress, which elevates glucocorticoids, epinephrine, and norepinephrine levels, contributing to anxiety, depression, and delayed recovery [9]. This underscores the need for psychological interventions, especially in resource-limited settings like Iraq.

Existing studies have examined the effects of cognitive-behavioral therapy, mindfulness techniques, and resilience-building strategies on mental health [9–16]. However, these studies often focus on isolated interventions rather than a comprehensive educational framework. For example, Lloyd-Mel et al. (2020) explored patient communication strategies but failed to incorporate them into an integrated approach [8].

Despite these advances, a gap remains in addressing the psychological needs of COVID-19 patients through structured educational programs that combine education, stress management, and emotional support. This study seeks to bridge this gap by evaluating the effectiveness of a supportive educational program designed to reduce stress, anxiety, and depression in COVID-19 patients hospitalized at Najaf Hospital.

Method

Trial design

This study was a randomized controlled trial (RCT) with the trial code IR.MUMS.NURSE.REC.1400.028, conducted in 2021 on 60 patients admitted to the COVID-19 wards of hospitals in Najaf (Fig. 1). The study aimed to assess the impact of a supportive educational program on psychological well-being among hospitalized COVID-19 patients.

Participants

Inclusion criteria for the study were as follows: age between 18 and 65 years, a positive COVID PCR test confirming COVID-19 diagnosis, the need for hospitalization, no previous history of COVID-19 infection, not being employed as a healthcare worker, absence of hearing or visual impairments, and a minimum level of literacy. The exit criteria included a lack of willingness to continue participation at any stage of the research, the need for intubation or tracheostomy, and any conditions leading to the patient's non-cooperation during the study, such as a decline in the patient's Glasgow Coma Scale or the onset of severe respiratory or hemodynamic disorders.

Patients were selected from the COVID-19 wards of hospitals in Najaf. To identify and exclude patients with previous anxiety or depression, their medical histories were reviewed, and the DASS-21 questionnaire was used at the beginning of the study. Patients who scored high on any of the depression or anxiety subscales were excluded from the study. The study included patients aged 18–65 years with a positive COVID-19 PCR test, requiring hospitalization, with no prior history of COVID-19 infection, and not employed as healthcare workers. Exclusion criteria included unwillingness to continue participation at any stage, the need for intubation or tracheostomy, or conditions leading to non-cooperation (e.g., decline in the Glasgow Coma Scale, severe respiratory or hemodynamic disorders). To exclude patients with pre-existing anxiety or depression, medical histories were reviewed, and the DASS-21 questionnaire was administered at baseline. Patients with high scores on depression or anxiety subscales were excluded.

Intervention

After obtaining ethical approval from the Ethics Committee of Mashhad University of Medical Sciences (Ethics Code: IR.MUMS.NURSE.REC.1400.028) and an official introduction letter from the authorities of the Mashhad School of Nursing and Midwifery, the researcher initiated the study. Eligible participants were selected through daily visits to the COVID-19 wards in Najaf hospitals.

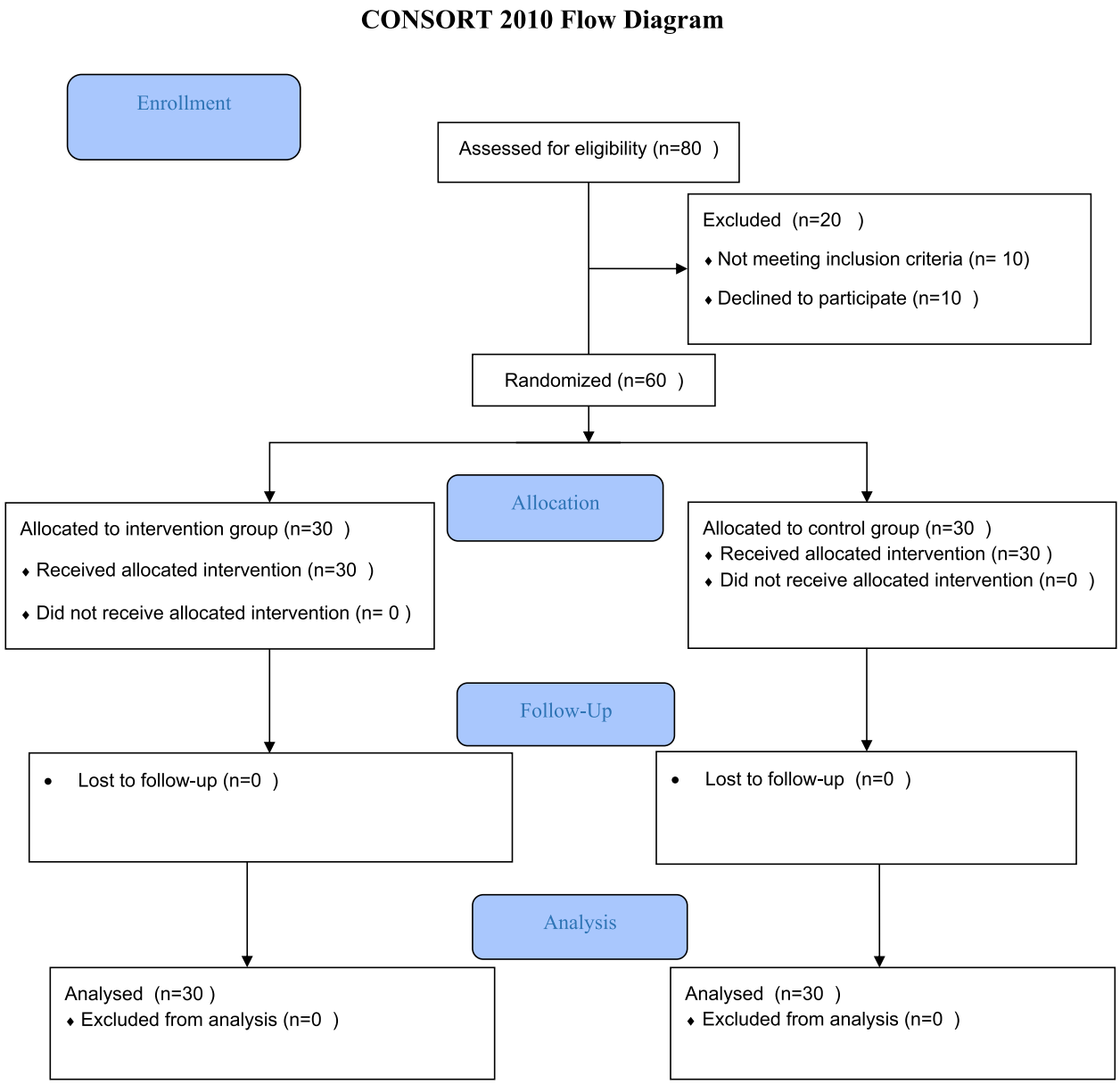

Fig. 1 CONSORT flow chart of participants

Intervention details

The intervention for the experimental group comprised a supportive educational program initiated at the beginning of hospitalization and tailored to the specific needs of COVID-19 patients. The intervention included the following components:

Number of Meetings and Duration: The intervention consisted of five meetings over the course of five days, with each meeting lasting approximately 30–45 min.

Each session of the intervention lasted approximately 60 min, conducted once a week for six weeks. Teaching methods included a combination of lectures, interactive discussions, and role-playing exercises. Educational tools such as PowerPoint presentations, printed materials, and videos were utilized to enhance understanding and engagement. Sessions were held in a quiet and comfortable room within the hospital's educational

wing, ensuring a conducive environment for learning. All sessions were facilitated by a trained instructor experienced in patient education.

Content Covered:

Day 1: Introduction to COVID-19, its course, treatment options, reasons for hospitalization, and benefits of receiving care.
Day 2: Detailed discussions on the severity levels of the disease and required therapeutic interventions.
Day 3: Information on the importance of isolation, benefits of isolation, and dietary regimens.
Day 4: Engaging patients in beneficial activities during hospitalization and methods for maintaining communication with family during isolation.
Day 5: A Q&A session addressing patient concerns, providing a platform for inquiries and support.

Additionally, comprehensive educational pamphlets addressing the educational needs of hospitalized COVID-19 patients were provided. The pamphlets included information about the disease, therapeutic interventions, reasons for isolation, dietary recommendations, and contact information for consulting the researcher.

The intervention also emphasized establishing a trusted companion for each patient upon admission. Patients were provided with a designated schedule for daily video calls with their companions and a contact number to address concerns and receive necessary consultations throughout their hospitalization. In response to inquiries, the researcher acted as a consultant, addressing questions directly when possible, consulting with the treatment team for more complex issues, and relaying necessary information to the patients.

The control group received only routine care in the department. At the end of the fifth day of hospitalization, participants in both groups completed the DASS-21 scale again.

In accordance with research ethics, the treatment of the control group after the study was conducted adhered to the principles of beneficence, non-maleficence, and respect for persons. Participants in the control group received only the standard care provided in the hospital during the study period. This ensured that they were not deprived of necessary medical attention while participating in the research.

Following the completion of the study, participants in the control group were provided with the option to receive the same supportive educational program that the intervention group had benefited from. This offer was made to ensure that they could also gain access to valuable information regarding their condition, treatment, and coping strategies. Participants were fully informed about this option and were encouraged to engage in discussions with the research team about their needs and concerns.

Outcomes

In this study, the instruments utilized included a demographic information form and the Depression, Anxiety, and Stress Scale (DASS).

The demographic information form was developed based on previous studies, expert consultation, and contextual relevance, without employing psychometric tools, as it aimed to capture basic socio-demographic variables such as gender, marital status, income level, and place of residence.

The DASS scale, originally developed by Lovibond in 1995, is a widely accepted measure of depression, anxiety, and psychological stress. This scale comprises 21 items, scored on a Likert scale ranging from 0 (does not apply to me at all) to 3 (applies to me very much). The formal and content validity of the DASS scale was previously established in a study conducted by Ghafari et al. Furthermore, it received validation from ten nursing faculty members from Tarbiat Modares University and the University of Tehran [17, 18].

To confirm the reliability of the DASS, a test–retest method yielded a coefficient of 0.91, indicating high stability over time. Additionally, the reliability of the tool was further supported by Moradi Panah's study, which reported Cronbach's alpha values of 0.94 for depression, 0.92 for anxiety, and 0.82 for stress.

The Arabic version of the DASS-21 questionnaire was employed in this study. This version has been validated for use among Arabic-speaking populations, ensuring cultural and linguistic appropriateness for the participants residing in Iraq and Najaf.

Frequency and timing of variable measurements

Measurements of the demographic and clinical variables were conducted at the beginning of the study to establish baseline characteristics. The DASS scale was administered again at the end of the fifth day of hospitalization in both the intervention and control groups to evaluate changes in depression, anxiety, and stress levels.

Data collection methods

Data collection was conducted using both paper and digital formats. The demographic information form and DASS scale were initially filled out on paper during interviews with the patients. Subsequently, data entry and analysis were performed using a digital database to ensure accuracy and efficiency.

Data collectors

The data collection process was carried out by trained research assistants under the supervision of the primary researcher. All data collectors were instructed on ethical considerations and the proper administration of the DASS to ensure the authenticity and reliability of the collected information.

Sample size and randomization

To determine the sample size, given the lack of results from similar studies, a pilot study was conducted on 10 individuals in each group. The sample size was calculated using the formula for comparing means with a 95% confidence level (Z1-α/2 = 1.96) and 80% test power (Z1-β = 0.84) for all study outcomes. The highest value calculated pertained to stress, with an estimated sample size of 25 individuals per group. To ensure robustness and allow for subgroup comparisons, accounting for a 20% dropout rate, 30 individuals were enrolled in each group, resulting in 60 participants remaining in the study. The formula used to determine the sample size is as follows:

$$N = (Z1\text{-}\alpha/2 + Z1\text{-}\beta)2\ (S12 + S22)/(X1\text{-}X2)2$$

Z1-α/2 = 1.96 (for a 95% confidence interval)
Z1-β = 0.84 (for 80% power)
X1 = 9.3 (mean stress score in the intervention group)
X2 = 6.2 (mean stress score in the control group)
S1 = 2.7 (standard deviation of stress score in the intervention group)
S2 = 1.3 (standard deviation of stress score in the control group)
N = 25 (sample size per group)

For group assignment, a randomized controlled trial (RCT) design was employed. Randomization was conducted using a computer-generated random sequence, and allocation concealment was maintained through a sealed envelope method. Sequentially numbered envelopes containing random group allocation codes (Group A for the intervention and Group B for the control) were prepared in advance. Each time a patient met the inclusion criteria, the corresponding envelope was opened, and the participant was assigned to either the intervention or control group based on the code within the envelope.

While the interventionist was aware of the group allocations due to the nature of the supportive educational program, steps were taken to ensure that this did not introduce bias. For instance, the data analysis was conducted by an independent analyst blinded to the group assignments. Additionally, all participants were treated with equal respect and attention to minimize differences in interaction.

Statistical methods

The data collected from both phases of the study were coded and entered into SPSS-21 software for analysis. To assess the normality of the data, both visual and statistical methods were employed. Visual methods included histograms and Q-Q plots, which provided graphical representations of the data distribution. Statistically, the Shapiro–Wilk test was conducted to evaluate whether the data followed a normal distribution. A p-value of less than 0.05 from the Shapiro–Wilk test indicated a departure from normality.

Based on the results of the normality tests, appropriate statistical analyses were conducted. For normally distributed data, paired t-tests and independent t-tests were utilized. In contrast, for data that did not meet the normality assumption, non-parametric tests such as Mann–Whitney and Wilcoxon signed-rank tests were applied. A p-value of less than 0.05 was considered statistically significant for all tests conducted.

Result

Of the 80 participants initially assessed for eligibility, 20 were excluded (10 did not meet inclusion criteria, and 10 declined to participate). The final sample included 60 participants, randomized into intervention ($n = 30$)

Table 1 Demographic characteristics of the participants

Variable	Group		*P*
	Intervention	Control	
Age (Mean ± SD)	49.1 ± 13.2	41.6 ± 12.8	***$P = 0.030$
Sex, n (%)			
Female	16 (53.3)	21 (70.0)	*$P = 0.184$
Male	14 (46.7)	9 (30.0)	
Marital status, n (%)			
Single	6 (20.7)	8 (26.7)	**$P = 0.714$
Married	18 (62.1)	18 (60.0)	
deceased wife	5 (17.2)	3 (10.0)	
Divorced	0 (0.0)	1 (3.3)	
Place of home, n (%)			
city	25 (83.3)	23 (76.7)	*$P = 0.519$
village	5 (16.7)	7 (23.3)	
Family income, n (%)			
Weak or average	23 (76.7)	21 (70.0)	*$P = 0.559$
good or great	7 (23.3)	9 (30.0)	

* Chi-square

** Exact chi-square

*** independent t

Table 2 Mean and standard deviation of the stress score of the studied patients during the stages by group

Stress Score	Group		*P*
	Intervention	Control	
1st day of hospitalization (Mean ± SD)	19.2 ± 6.2	19.6 ± 6.6	*$P = 0.603$
The 5th day of hospitalization (Mean ± SD)	6.8 ± 4.6	16.0 ± 7.8	*$P < 0.001$
Comparison of the 5th with the 1st day of hospitalization (Mean ± SD)	−12.2 ± 6.2	−2.6 ± 4.2	*$P < 0.001$
The result of the intragroup test	**$P < 0.001$	**$P = 0.004$	

* U Man Whitney

** Wilcoxon

Table 3 Mean and standard deviation of the anxiety score of the studied patients during the stages by group

Anxiety Score	Group		*P*
	Intervention	Control	
1st day of hospitalization (Mean ± SD)	19.6 ± 4.6	19.4 ± 6.6	*$P = 0.892$
The 5th day of hospitalization (Mean ± SD)	4.6 ± 3.2	16.2 ± 8.0	**$P < 0.001$
Comparison of the 5th with the 1st day of hospitalization (Mean ± SD)	−15.0 ± 5.6	−3.2 ± 6.0	**$P < 0.001$
The result of the intragroup test	*$P < 0.001$	***$P = 0.012$	

* Independent T

** U Man Whitney

*** Wilcoxon

and control ($n = 30$) groups. There was no attrition; all participants completed the study (Table 1).

On the first day of hospitalization, stress scores for the intervention group (mean ± SD: 19.2 ± 6.2) were similar to those of the control group (19.6 ± 6.6, $p = 0.603$). By the fifth day, the intervention group's scores significantly decreased (6.8 ± 4.6, $p < 0.001$), while the control group showed a modest reduction (16.0 ± 7.8, $p = 0.004$). Within-group differences confirmed the intervention's effect in reducing stress levels more effectively (Table 2) (Fig. 1).

Initial anxiety levels were comparable between groups (19.6 ± 4.6 in the intervention group vs. 19.4 ± 6.6 in the control group, $p = 0.892$). On the fifth day, the intervention group exhibited a marked reduction in anxiety (4.6 ± 3.2, $p < 0.001$), whereas the control group saw less improvement (16.2 ± 8.0, $p < 0.001$). Between-group comparisons further emphasized the intervention's effectiveness (Table 3) (Fig. 2).

Depression scores followed a similar trend, with no significant initial differences (17.0 ± 5.4 vs. 16.2 ± 7.8, $p = 0.588$). By the fifth day, the intervention group's depression scores significantly declined (3.8 ± 3.4, $p < 0.001$), while the control group showed smaller reductions (14.0 ± 7.6, $p = 0.054$). The intervention led to more pronounced improvements in depression (Table 4) (Fig. 3).

Practical implications of these results demonstrate the effectiveness of supportive educational programs in mitigating stress, anxiety, and depression during hospitalization. These findings highlight the importance of incorporating psychosocial interventions into clinical practice to improve patient outcomes (Fig. 4).

Discussion

The present study was a randomized controlled trial designed to evaluate the impact of a supportive educational program on depression, stress, anxiety, and satisfaction levels in COVID-19 patients hospitalized in COVID wards. The findings demonstrated that implementing a structured educational program significantly reduced patients' psychological distress while enhancing their overall satisfaction.

Our results are consistent with prior research highlighting the effectiveness of educational and psychosocial interventions in alleviating mental health issues among COVID-19 patients. For example, Kang et al. (2020) reported that cognitive-behavioral interventions, such as guided breathing exercises and psychosocial support, significantly alleviated anxiety and depression in COVID-19 patients [19]. Similarly, Li et al. (2020) found that daily cognitive-behavioral interventions incorporating relaxation techniques, problem-solving strategies, and social support measures led to substantial reductions in anxiety and depression levels [20].

Hospitalized COVID-19 patients often experience heightened stress due to fears about their health, isolation, and lack of family support. These stressors can activate the hypothalamic–pituitary–adrenal axis, exacerbating anxiety and depression [8, 9, 21]. The current study suggests that providing structured educational content and consistent emotional support can mitigate these psychological responses, helping to stabilize patients' mental well-being.

Beyond COVID-19, tailored educational interventions have been effective in various clinical populations [22]. Aghakhani et al. (2017) found that self-care educational support packages reduced anxiety, depression, and stress in myocardial infarction patients [23]. Similarly, Ebrahimi et al. (2021) demonstrated that structured educational

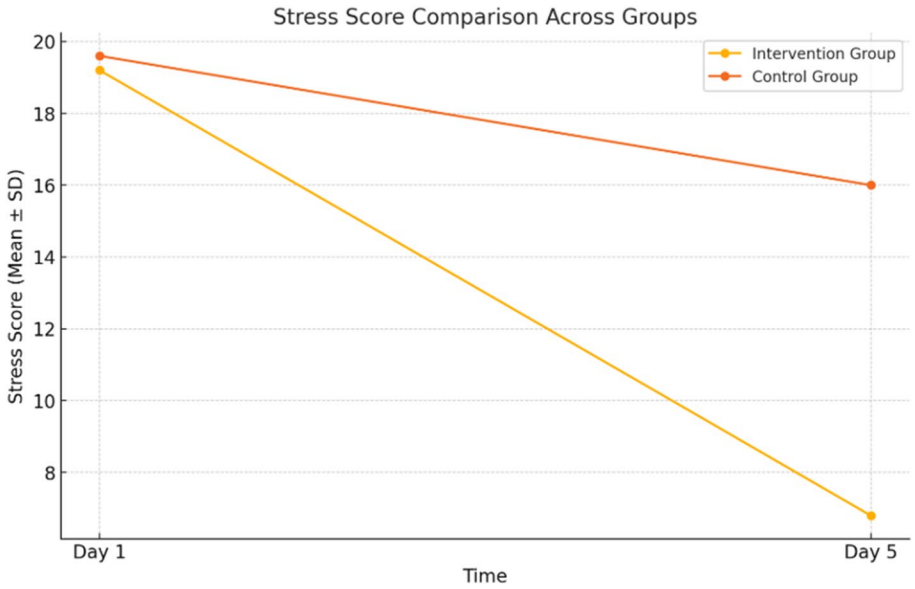

Fig. 2 Stress score comparison across groups

Table 4 Mean and standard deviation of the depression score of the studied patients during the stages by group

Depression Score	Group		*P*
	Intervention	Control	
1st day of hospitalization (Mean ± SD)	17.0 ± 5.4	16.2 ± 7.8	*$P = 0.558$
The 5th day of hospitalization (Mean ± SD)	3.8 ± 3.4	14.0 ± 7.6	**$P < 0.001$
Comparison of the 5th with the 1st day of hospitalization (Mean ± SD)	−13.2 ± 5.4	−2.2 ± 6.0	*$P < 0.001$
The result of the intragroup test	***$P < 0.001$	****$P < 0.001$	

* Independent T

** U Man Whitney

*** Wilcoxon

**** paired t-test

programs for hemiplegic stroke patients reduced anxiety, depression, and stress among caregivers [24]. Moreover, Mardani et al. (2011) highlighted the role of psychological education in alleviating depression in cancer patients, further reinforcing the significance of education-based mental health interventions [18]. Additionally, Abasi et al. (2021) confirmed the effectiveness of mindfulness-based educational interventions in reducing stress and anxiety in individuals at risk of COVID-19 [25].

Several recent studies further support the significance of psychological interventions in improving mental health outcomes among various populations. Dalili and Bayazi (2019) demonstrated that mindfulness-based cognitive therapy effectively improved illness perception and reduced psychological symptoms in rheumatoid arthritis patients [26]. Alahyari et al. (2021) found that cognitive-behavioral group interventions significantly alleviated depression and anxiety in patients with type II diabetes [27]. Additionally, Shahrabad et al. (2018) reported that Lazarus multimodal therapy effectively reduced depression and anxiety while improving blood glucose control in women with type 2 diabetes [28]. These findings align with our results, further emphasizing the importance of integrating psychological and educational interventions into patient care.

This study contributes to the existing literature by emphasizing the importance of integrating structured educational programs into routine patient care, particularly for individuals experiencing high psychological distress due to hospitalization and isolation. Unlike previous studies that primarily focused on general psychological interventions, our research tailored the educational content to the specific concerns of COVID-19 patients, including disease progression, isolation challenges, and coping strategies. By filling this gap, the study highlights the need for patient-centered educational interventions that extend beyond medical treatment to address mental health concerns.

Despite its strengths, this study has several limitations. First, the lack of long-term follow-up data restricts our understanding of the sustained impact of the educational program. Future studies should consider longitudinal

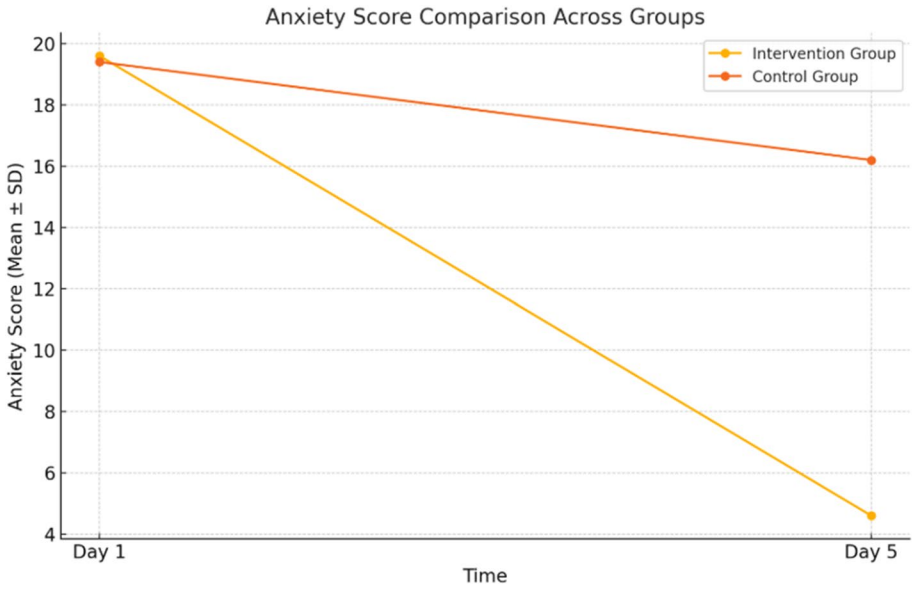

Fig. 3 Anxiety score comparison across groups

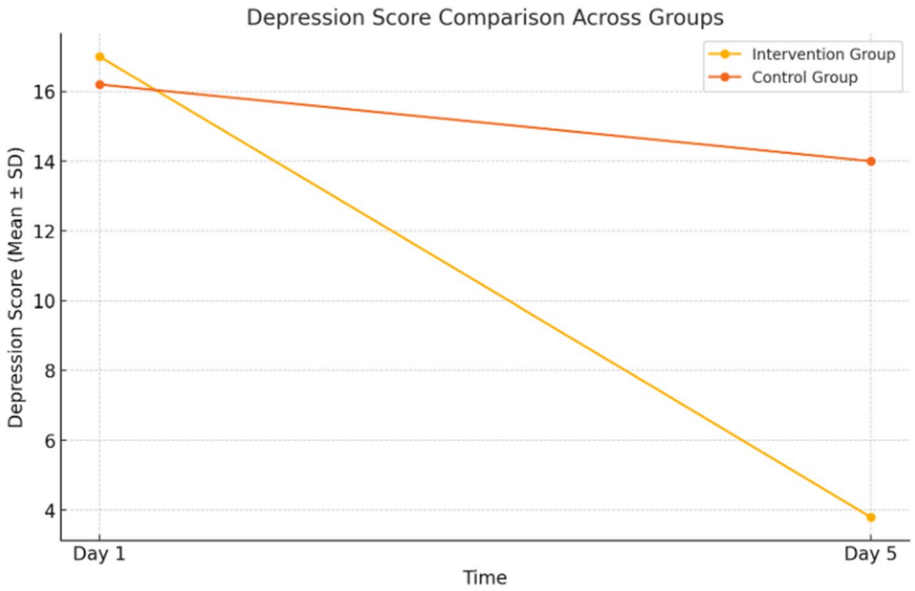

Fig. 4 Depression score comparison across groups

designs to assess the durability of psychological improvements. Second, the accuracy of participants' responses may have been influenced by their mental state at the time of questionnaire completion. To mitigate this limitation, efforts were made to standardize assessment conditions. Third, the study was conducted in a single city, limiting generalizability to broader populations. Future research should involve diverse demographic and socioeconomic groups to enhance external validity.

Future research should explore the integration of supportive educational programs with other psychological interventions, such as cognitive-behavioral therapy or mindfulness-based stress reduction techniques, to assess potential synergistic effects. Additionally, leveraging digital platforms such as mobile applications, online sessions, and virtual reality tools could enhance accessibility and effectiveness, particularly for patients in remote areas or quarantine conditions. Further studies should

also incorporate quality-of-life assessments to evaluate broader psychosocial improvements resulting from educational interventions.

Implications for practice

The findings underscore the critical role of structured educational programs in reducing psychological distress among hospitalized COVID-19 patients. Healthcare providers should consider incorporating similar interventions into standard care protocols for high-stress medical conditions. Implementing supportive educational programs can enhance patient outcomes, reduce psychological burdens, and improve overall healthcare experiences for both patients and medical staff.

Conclusion

The findings of this study demonstrate that a structured supportive educational program significantly reduces stress, anxiety, and depression while enhancing patient satisfaction among hospitalized COVID-19 patients. This intervention, which combined personalized education, emotional support, and continuous engagement, addressed patients' concerns and improved their psychological well-being.

Beyond its immediate clinical implications, this study highlights the potential for integrating structured educational programs into routine healthcare settings, particularly for patients facing psychological distress due to hospitalization and isolation. These findings contribute to the broader field of patient-centered care by emphasizing the role of tailored educational interventions in improving mental health outcomes.

Future research should explore the scalability of such programs across different healthcare contexts, their long-term psychological benefits, and their applicability to other high-stress medical conditions. Additionally, integrating digital health technologies, such as mobile-based educational tools and virtual counseling, could further enhance the accessibility and effectiveness of these interventions.

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Authors' contributions
All authors have read and approved the manuscript. Study design: DA, FH; data collection and analysis: SRM, AAA, DA; manuscript preparation: KM.

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Data availability
The datasets generated in the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the Ethics Committee of Mashhad University of Medical Sciences (IR.MUMS.NURSE.REC.1400.028) and adhered to the Declaration of Helsinki. Informed consent was obtained from all participants, who were provided with a clear explanation of the study's purpose and importance. Participants who met the inclusion criteria signed a written informed consent form and were informed that they could withdraw from the study at any time without any impact on their treatment plan. All methods were conducted in accordance with the relevant guidelines and regulations. Additionally, the study was registered in the Iranian Registry of Clinical Trials (no. IRCT20140625018231N1) on 05/11/2021.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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