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ORIGINAL ARTICLE

Effectiveness of Internet-Based Mindfulness-Based Stress Reduction Compared with Online Counseling Guidelines of the Ministry of Health on Reducing Negative Emotions during the SARS-COV-2 Pandemic : A Quasi-Experimental Study

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ABSTRACT

Objectives: In late 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused coronavirus disease 2019 (COVID-19). The SARS-CoV-2 pandemic is causing psychological impacts such as stress, anxiety, and depression. In light of this situation, improvement in internet-based mental health services is necessary. Therefore, this study aimed to compare the effectiveness of Internet-based Mindfulness-based Stress Reduction (IMBSR) with the Online Counseling Guidelines of the Ministry of Health (OCGMH) in reducing depression, anxiety, and stress during the SARS-CoV-2 pandemic.

Methods: A quasi-experimental study with a two-group randomized controlled pretest-posttest questionnaire was designed. Based on inclusion and exclusion criteria, 84 participants were enrolled in the study who had contacted Ferdowsi University of Mashhad's Psychology and Counseling Clinic through online networks to complain about anxiety and distress caused by the coronavirus. Data analysis was performed using an independent sample t-test. Both internet-based interventions (i.e., IMBSR and OCGMH) were executed by clinical psychologists.

Results: The mean scores for stress, anxiety, and depression were significantly improved after both internet interventions (i.e., IMBSR and OCGMH). Further analysis showed that stress and anxiety significantly decreased in the IMBSR group compared to the OCGMH group ($P<0.05$). However, participants in the OCGMH group had a lower score on the depression index than that of the IMBSR group ($P<0.05$).

Conclusion: To summarize, the IMBSR intervention improved stress and anxiety during the quarantine of SARS-CoV-2. Together these results provide important insights into internet-based interventions during pandemic situations. As a suggestion, advances in internet-based mental health services are necessary during the quarantine of diseases.

KEYWORDS: *Anxiety, Depression, Mindfulness, SARS-COV-2, Stress, Internet, Internet-based intervention, Remote consultation, COVID-19*

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INTRODUCTION

Respiratory viruses are an emerging risk for global public health security. In December 2019, the presence of a novel coronavirus known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was reported in Wuhan, China. As of January 06, 2022, coronavirus disease 2019 (COVID-19) has sickened more than 298 million people and killed more than 5.4 million around the world [1].

It is critical to have an effective preventive strategy for COVID-19. The main effective ways to prevent the spread of this contagious disease are quarantine, mass vaccination, and social isolation [2]. On the other hand, this situation can be stressful and increase fear and anxiety about the disease in societies. Providing psychological services as an important strategy to reduce fear, stress, and anxiety is needed. One of the effective and applicable psychological therapies is Internet-based Mindfulness-based Stress Reduction (IMBSR). This approach consists of 10 sessions that combine stress reduction methods with mindfulness meditation. In this therapy, daily exercises and techniques related to care, mindfulness, body scanning, observation of the senses, concentration on breathing, relaxation, yoga, and meditation exercises are used to increase the power of observation. Participants can learn a type of meditation in which they can direct their minds to focus on the present time and develop a non-judgmental awareness focused on the present. The important point in this approach is that participants should include meditation and mindfulness exercises in their daily lifestyle [3-6]. Internet-based Mindfulness-based Stress Reduction is compared with Online Counseling Guidelines of the Ministry of Health.

Online Counseling Guidelines of the Ministry of Health (OCGMH) involves a standardized 5-session intervention that combines education and behavioral techniques to reduce anxiety, stress, and depression [7].

According to the literature, IMBSR is effective in reducing the physical and psychological symptoms of a wide range of problems, including depression [8], chronic pain [9, 10], fibromyalgia [11], stress and anxiety [12]. This type of treatment has successfully treated more than ten thousand patients [3]. IMBSR intervention was able to alleviate symptoms of depression, anxiety, stress, sleep disorders, and increase psychological functioning [9, 13-16].

According to the efficacy of IMBSR intervention and the progression of Internet-Based Mental Health Services during SARS-CoV-2, this study aimed to compare IMBSR with Online Counseling Guidelines of the Ministry of Health on symptoms of depression, anxiety, and stress following the novel coronavirus outbreak.

MATERIAL AND METHODS

Study design

This was a quasi-experimental study and a two-group single-blind trial. Initially, 230 participants approached, among whom 102 participants met the inclusion criteria and were allocated to the IMBSR and the Online Counseling Guidelines of the Ministry of Health (OCGMH) groups. Measurement of the outcomes was performed at two-time points, including before and after the study intervention. In the end, the data of 84 participants were analyzed due to a drop in subjects.

Participants

Participants finally included 84 clients who contacted the Ferdowsi University of Mashhad's Psychology and Counseling Clinic through online networks to complain about anxiety and distress caused by the coronavirus.

Sample Size

The sample size was determined using the G*power 3 program, which provides improved effect size calculators [17]. This resulted in a minimum number of subjects for studying the effects of the intervention. The required sample size was 40 per group: Significance level ($\alpha = .05$), large effect size ($d = .80$), and power (80%). The participants' enrollment and randomization were performed, and 80 participants were needed for this study.

Inclusion Criteria

The inclusion criteria were participants who suffered from anxiety and distress caused by the coronavirus (The Score of 14 or >14 included as a cut-off based on the Depression, Anxiety, and Stress Scale (DASS-21)), age of 18–60 years, a high school diploma, or higher degrees. Then, the participants who met the inclusion criteria signed the online informed consent form of the study and took the study pretest.

Exclusion Criteria

The exclusion criteria were suffering from active malignant conditions such as cancer, having a history of convulsion or epilepsy during the last 6 months before the study, absence of severe anxiety, stress,

and depression symptoms, incomplete questionnaire, incompletion of interventions, the existence of other mental disorders, being a pregnant or breastfeeding woman, having a history of drug abuse, having received psychological therapies during a month before the study, having the history of using yoga and meditation.

Data collection and procedures

This research project was approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran, with the approval code of IR.MUMS.MEDICAL.REC.1399.326 [18]. All participants signed the informed consent form of the study. To identify eligible participants, participants' medical history and present symptoms were assessed at the first online visit. The participants were informed of the purpose of the study, how long the study would take, that they were free to decide whether or not to participate, and that they could withdraw at any time. It was also explained that the questionnaire used in this study would not disclose the name of the respondent, but would use serial numbers and pseudonyms instead. Participants had the opportunity to sign up for the study by completing a questionnaire, which coexisted as the first measurement point (T1). In this study, the effects of a 10-week IMBSR and a 5-week OCGMH on depression, anxiety, and stress were evaluated by means of a questionnaire-based test. The Depression Anxiety Stress Scales-21 (DASS-21) questionnaire was applied. After the first assessment point at T1, participants were randomly allocated to either the IMBSR (n: 51) or the OCGMH (n: 51) groups. Random allocation was done by an individual who was external to the study and by using a computer-generated randomization program and four-person randomization blocks. These randomization techniques were used to ensure that the main researchers (i.e., the authors) were blind to random allocation. Given the design of the study, the psychologist who implemented the IMBSR intervention was aware of the groups. However, the study data were collected by a research assistant who was blind to allocation and intervention. During a fixed period of 10 weeks, participants of the IMBSR group received Internet-based Mindfulness-based stress reduction. The IMBSR sessions themselves were constructed in a process dynamic way that became more exam-specific as the examination period approached closer. Depending on the temporal distance to exams, sessions concentrated on different aspects. After completion of the intervention period, all participants were invited again to participate in a second online assessment (T2) by completing the same questionnaire as used in T1. To reflect critical variables as closely as possible, T2 took place during examination period at end of course. Due to drop in subjects, at end data of 84 participants (each group n: 42) were analyzed. Figure 1 shows flow diagram of study.

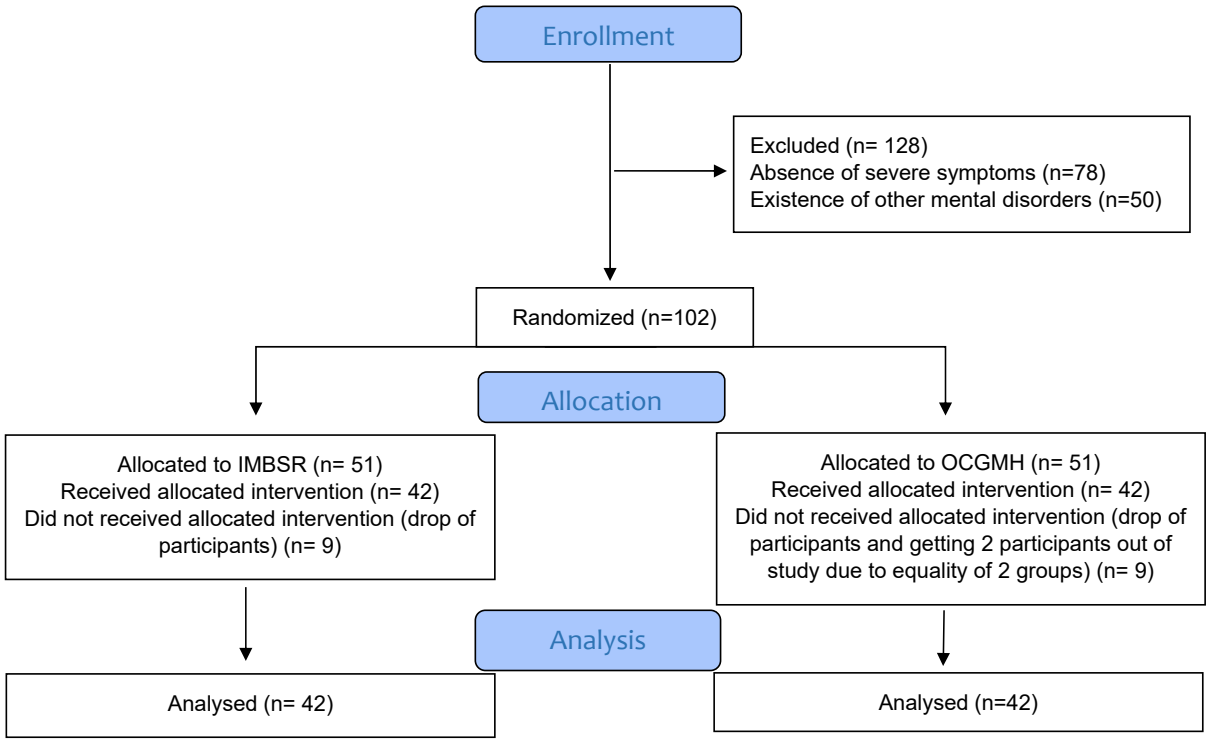

Figure 1. Flow diagram of the study. Abbreviation: IMBSR: Internet-Based Mindfulness-Based Stress Reduction. OCGMH: online counseling guidelines of the Ministry of Health

Instrumentation

The Depression Anxiety Stress Scales-21 (DASS-21) represents the brief 21-item version of the DASS. DASS-21 is a self-report measure of one-week state negative affect, developed with the specific aim of achieving maximum differentiation between the affective syndromes of depression, anxiety, and tension/stress. Respondents indicated the extent to which they experienced each of the symptoms depicted in the items during the previous week on a 4-point scale between 0 (did not apply to me at all) and 3 (applied to me very much, or most of the time). The 21-item version was developed by selecting the highest loading items from each scale of the original 42-item version of the DASS while also aiming to retain coverage of the full symptom content of each of the three affective states [19]. The factor structure of DASS-21 is stable and its scales possess good convergent and discriminant validity and high internal consistency in both clinical and non-clinical samples and different ethnic groups of adults [20]. Moreover, the Persian version of DASS-21 has satisfactory psychometric properties and can be used amongst Iranian adult population [21-22]. In this study, reliability coefficient of Cronbach's alpha was computed as 0.76.

The Intervention

IMBSR is a group-based educational program that consists of ten 2.5-hour weekly online sessions. The development of IMBSR is based on a combination of established mindfulness elements of the IMBSR method [23]. In this study, each IMBSR session consisted of formal meditation and an educational component that was provided online via Skype and Whatsapp. Meditation techniques included mindful body scan, sitting meditation, walking meditation, and yoga. The participants were encouraged to use mindfulness exercises in their activities of daily living (such as while eating) and also to do meditation exercises for 15–45 minutes per day between IMBSR sessions [8]. The intervention was implemented in ten 2.5-hour sessions by a licensed psychologist who was experienced in doing meditation exercises via the internet. An electrical-booklet containing information about weekly sessions, breathing exercises and body scans, mindfulness exercises, and yoga images was provided to the participants. Moreover, an MP3 file that contained verbal instructions about breathing exercises and body scans was sent to each of them. The participants of the OCGMH group received online counseling guidelines from the Ministry of Health. This treatment involves a standardized 5-session intervention that combines education and behavioral techniques to reduce anxiety, stress, and depression [7]. The content of the IMBSR sessions is shown in Table 1 and the content of the OCGMH sessions is shown in Table 2.

Statistical analysis

Data were analyzed using SPSS-20 software (SPSS Inc., Chicago, Illinois, USA). An independent t-test was used to compare depression, anxiety, and stress scores between the two groups of IMBSR and OCGMH at the post-test level. A Paired Sample t-Test was also used to analyze differences between pre- and post-intervention. Data are presented as mean ± SD. A P-value less than 0.05 was considered as the significant level.

RESULTS

The demographic variables of the participants are presented in Figure 2. The average age was 30.69 ±7.57 in the IMBSR group and 30.38 ±7.63 in the OCGMH group. To show the effect of the intervention, an independent t-test was performed between pre-test scores in two groups on three dependent variables. As shown in Figure 3, the results showed that there was no difference between the pre-test scores in depression *($p = 0.688$)* and stress *($p = 0.505$)* items, but there was a significant difference in the anxiety scores between the two groups *($P < 0.05$)*. Further statistical tests revealed that both internet-based interventions (i.e., IMBSR and OCGMH) were effective in reducing depression, anxiety, and stress compared to the pre-test *($P< 0.05$)*. Interestingly, the average scores of stress and anxiety in the IMBSR group significantly decreased compared to the OCGMH group *($P<0.05$)*. However, participants in the OCGMH group had a lower score of the depression index than that of the IMBSR group ($P<0.05$).

DISCUSSION

The present study was conducted to investigate the effectiveness of two internet interventions (i.e., IMBSR in comparison with OCGMH) on psychological symptoms such as depression, anxiety, and stress for people who were affected by the SARS-COV-2 pandemic. The results of data analysis indicated that internet-based interventions could be effective in reducing the negative emotions caused by quarantine during the SARS-COV-2 pandemic. Moreover, a significant reduction in the scores of stresses and anxiety was observed in the IMBSR group compared to the OCGMH group. However, participants in the OCGMH group obtained lower scores for the depression index than the IMBSR group. The results of this study are

Table 1. Sessions of Internet-Based mindfulness-based stress reduction [3,6]

Session	Session Contents of Each Session
Session 1	Mindful self-targeting focused on goal-setting strategies and basic mindfulness exercises on perception and self-observation. In the first step, participants learned the basics of defining and mindfully reaching their goals.
Session 2	Application in daily life, participants were taught to remind themselves of their goals and daily mindfulness practice in terms of real-life training by self-cueing and self-reminding strategies.
Session 3	Attention to an individual's assumptions dealt with self-reflexive processes. The self-evaluation of constructive beliefs and assumptions was enhanced by attention and awareness improving mindfulness exercises. Furthermore, mindfulness exercises to improve the relaxation skills of participants were repeated.
Session 4	Mindful self-efficacy, the participants learned to take an attitude of nonjudgmental comprehension of the momentum of thoughts and understand that thoughts come and go. By visualization, participants improved their self-efficacy concerning their goals. Via a daily logbook, participants were able to observe their daily progress in a mindful way. By setting their weekly learning plan and self-reminders, students learned to structure their examination preparation.
Session 5	Mindful behavior adaption, built on the self-observation experiences of former sessions. By being aware of their current progress, participants learned to adapt and structure their learning behavior to reach their self-set goals. Intrinsic motivation was enhanced by adequate use of (natural) self-rewarding strategies. To deepen the awareness of reward experiences, former mindfulness exercises were repeated.
Session 6	Mindful examination preparation enabled participants to dissociate themselves from their thoughts. Self-instructions helped participants to focus and structure crisis preparation. In this process, mindfulness facilitated the application of focusing strategies. Again, mindfulness was used to reduce the stress caused by stressors.
Session 7	Mindful emergency strategies dealt with the deepening of dissociation from stressful thoughts and mindful relaxing strategies. With the help of the learned self-leadership and mindfulness skills, participants learned to develop their emergency strategies for pressure situations, for example, to refocus through self-talk and mindful breathing to calm down. To enhance participants' self-efficacy successful examination, the behavior was visualized.
Session 8	In Calming down thoughts, the focus was on the use of constructive thought patterns, as this session was close to the stressful examination period. Students identified stressful thoughts concerning their pandemic. The mindfulness exercises of dissociation from thoughts enhanced the effects
Session 9 &10	In Sessions 9 and 10, Transfer to daily life 1 and 2, the focus was on the repetition of self-leadership and mindfulness strategies and skills learned earlier. Participants learned to transfer the skills into daily life and examination situations.

Table 2. Sessions of OCGMH [7]

Session	Session Contents of Each Session
Session 1	Communication and evaluation (introduction, active listening, non-judgmental approach, summarizing, evaluating the severity of symptoms such as depression, anxiety, and distress and the level of dysfunction caused by symptoms, assessing the existence of the current psychiatric disorder and deciding about referring a client or not)
Session 2 & 3	Psychological interventions involve distraction techniques (planning activities, social contributions, comparisons, challenging thoughts to change negative emotions, pushing away distress through mental imagery, the conscious concentration of the mind on thought and experiencing strong sensations) and improvement of being present in the moment (positive guided imagery, giving meaning to a situation, praying, relaxation, and so on)
Session 4 & 5	Psychological interventions involve staying on the ground skill, stress management, examining the likelihood of anxiety, examining the likelihood of worry, checking the solvability of the concern, attention diversion, and worry time, talking to others, and internal positive coping self-talk.

consistent with studies by Fischer R, Bortolini T, Karl JA, Zilberberg M, Robinson K, Rabelo A, et al. [24], Kang C, Sun S, Yang Z, Fan X, Yuan J, Xu L, et al. [15] & Klooster K. [25]. Overall, these results indicate that internet-based interventions are a great way to stay in contact with people and revive psychological services.

During the SARS-COV-2 pandemic, due to quarantine conditions, fear about the novel coronavirus has increased. Fear and anxiety about SARS-COV-2 can be overwhelming and cause strong emotions in people [26]. IMBSR can regulate stress and anxiety by fostering a non-judgmental mindful awareness by focusing on the present. In other words, people are instructed to observe situations and thoughts without judgment and reaction. IMBSR does not intend to challenge or change the content of thoughts, emotions, and body senses but aims to accept and communicate with emotions and cognitions without reacting to them. IMBSR can be effective in reducing stress and anxiety in emergencies caused by the outbreak of SARS-COV-2 via reducing self-centered attention, preventing

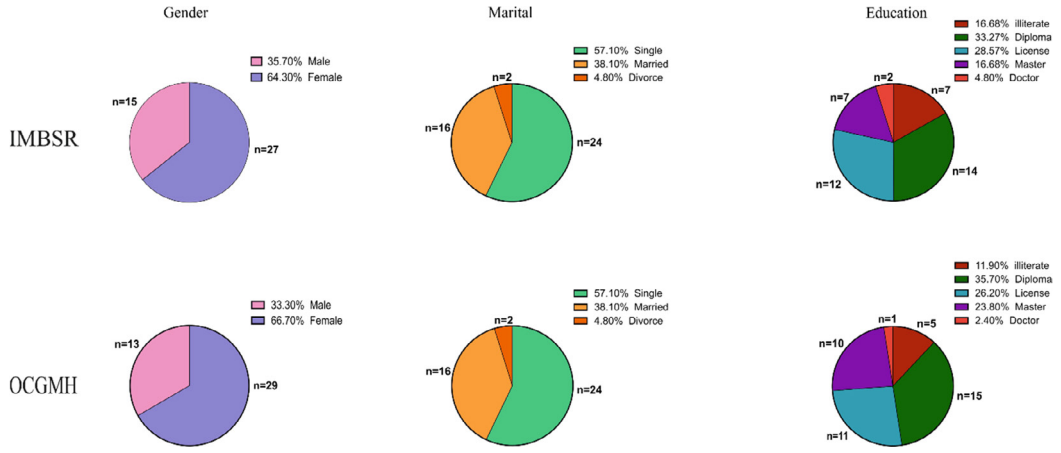

Figure 2. Demoghraphic charactristics of all subjects. Gender, marital ststus, and education levels were included in IMBSR and OCGMH groups.

anxiety and rumination, and gaining non-judgmental mindful awareness of negative thoughts without behavioral responses [3,5,27]. Through mindfulness exercises, IMBSR can help a person reduce automatic and habitual responses to stressful experiences and change the way they respond to stress over time by developing an inner vision and accepting unchangeable events of life like the current difficult situation caused by coronavirus [9,27].

On the other hand, OCGMH uses techniques such as examining the possibility of anxious thoughts, checking for the solvability of anxiety, distracting attention, worry time, talking to others, positive coping self-talk to reduce anxiety and stress [7]. Planning activities, social contributions, and talking to others in this type of online counseling can be effective in reducing depression. Because people are at home and businesses are experiencing a recession and physical activity outside the home is reduced, the likelihood of depression increases dramatically. People can reduce their depression by calling and talking to a counselor about their feelings. When people feel that they are heard and understood by another human being they feel much better [28]. In this type of counseling participants were suggested to plan some activities for their daily life. Designing and planning for some activities daily can be very helpful in declining negative emotions. Thus subjects were helped plan for activities like reading books cooking exercising and so on (7)(7)(7). This technique is a kind of behavioral activation which has evidence-based effectiveness in reducing depression [29]. Data from this study indicated that IMBSR was more efficient than OCGMH in reducing stress and anxiety but the depression index was more effectively reduced in OCGMH than IMBSR intervention.

These data must be interpreted with caution because there were some limitations including (i) there was no follow-up and only one psychological state could be examined (ii) self-report questionnaires like DASS-21 which were used in this study may not indicate the real mental and emotional mood that a person is experiencing or some respondents may not answer precisely, giving a superficial and inaccurate answer (iii) the sample group was selected through voluntary sampling. However, large randomized controlled trials could provide more definitive evidence.

CONCLUSION

This study has identified that internet-based therapies, such as IMBSR and OCGMH, can be effective in reducing the negative emotions caused by quarantine during the SARS-COV-2 pandemic. Additionally, the study found that IMBSR was more effective in reducing stress and anxiety compared to OCGMH. Further research is needed to establish the therapeutic efficiency of IMBSR on stress and anxiety.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This research project was approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran, with the approval code of IR.MUMS.MEDICAL.REC.1399.326 [18]. All participants signed the informed consent form of the study

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CONSENT FOR PUBLICATION

Not applicable.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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AUTHOR CONTRIBUTIONS

S.I.S performed the study design and contributed to the study concept. H.F performed statistical analysis and interpretation of data. B.S.A and A.T.B contributed to writing the manuscript, while J.M performed critical revision of the manuscript for important intellectual content. S.S.N. conceived the study, wrote the manuscript, and supervised the work. All authors provided critical feedback and helped shape the research and manuscript.

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