Effect of Jacobsen's Relaxation Technique on the Anxiety and Job Stress of Nurses Caring COVID-19 Patients

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ABSTRACT

Aims During the COVID-19 epidemic, the stress and anxiety of nurses were high due to the rapid transmission of the disease. Studies show the effectiveness of the Jacobsen relaxation technique in stress and anxiety control. This study aimed to determine the effect of Jacobsen's relaxation technique on the anxiety and job stress of nurses caring COVID-19 patients.

Materials & Methods This clinical trial was carried out on 70 nurses caring for COVID-19 patients in 2021-2022. The subjects were assigned to control and intervention groups by random block sampling. After designing the Jacobsen relaxation application, it was installed on the mobile phones of the subjects in the intervention group. The subjects of the intervention group were asked to perform the Jacobsen relaxation technique 30 minutes every day for one month, whereas the control group did not receive any intervention. The anxiety scale of Spielberger's state and Esipow occupational stress questionnaires were filled out by the subjects of the two groups before, immediately, and one month after the intervention. Data were analyzed using repeated analysis of variance, Chi-square, and independent T tests through SPSS 19 software.

Findings No significant difference was observed in situational and characteristic anxiety and job stress between two groups at different times (p>0.05). There was no significant difference between the average anxiety and occupational stress between the groups at different times (p>0.05).

Conclusion The use of the Jacobsen relaxation technique using a mobile application cannot improve the anxiety and occupational stress of nurses.

Keywords Jacobsen technique; Nurse; Job stress; Anxiety; Covid-19

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Introduction

On January 30, 2020, the World Health Organization declared the COVID-19 pandemic a public health emergency of international concern. According to global statistics, a death rate of 3.4% has been recorded for COVID-19 [1]. Despite the efforts of researchers, the pandemic will be ended by prevention and control of the disease and general vaccination against it [2]. Fear and anxiety caused by a possible infection have created a high and destructive psychological burden, which can lead to mental and emotional abnormalities, weakening of the immune system, and reducing the body's ability to fight diseases [3]. Nurses are critical in the treatment team, they make up more than 75% of the treatment team, and are the first group facing the COVID-19 pandemic [1]. Job stress is one of the main problems of nurses, which make a conflict between their professional performance and personal life [4]. According to the definitions, job stress is the harmful physical and emotional responses of people because of the incompatibility between the job needs, abilities, resources, or needs of employees [5]. The health of the nurses is at risk due to the nature of their work, wearing protective clothing, use of N95 masks, and mental conflict about being infected and infecting others, which can lead to psychological disorders such as anxiety and stress [6]. The possibility of making a mistake at work, the fear of contagion, the fear of disease transmission, the anxiety of the death of oneself, the patient, and the family due to COVID-19, and the high workload are anxiety-inducing factors in nurses of COVID-19 patients [4]. Anxiety causes sympathetic stimulation and increased pulse rate, decreased sleep, decreased self-esteem, and absenteeism from work [7]. Kawano et al. showed that nurses are exposed to the most stressful factors compared to other jobs and their physical and mental health affects the quality of work and patient satisfaction [8]. Studies have shown that during the COVID-19 pandemic, nurses are absent from work more than other professional groups due to burnout, COVID-19 disease, or stress-related disability [9-10]. Considering the mortality caused by COVID-19 and the high anxiety and stress of patients, the anxiety and stress of nurses caring for COVID-19 patients should be reduced to the care of patients effectively [6]. The pharmaceutical and non-pharmacological methods are effective to reduce anxiety and stress in nurses. Due to the side effects of medicinal methods such as drowsiness, confusion, cognitive impairment, and forgetfulness, it is recommended to use non-medicinal methods. Considering the spread of the COVID-19 virus and the direct contact of nurses with the patients and the impossibility of holding stress management training programs, Jacobsen's progressive muscle relaxation technique is a non-pharmacological method due to the possibility of performing the technique individually. The progressive muscle relaxation technique was first proposed by Jacobsen in 1938 [11]. Jacobsen relaxation is a technique in which a person achieves a feeling of relaxation through active contraction and then relaxation of a particular muscle group [10]. Studies have shown that the Jacobsen relaxation technique increases the quality of life [12] and reduces anxiety [13], and stress and anxiety of addicts [14]. Meanwhile, Calder Calisi et al. concluded that the use of relaxation techniques did not affect the anxiety, stress, and depression of nurses [15]. Chang et al. showed that although relaxation technique training reduced the anxiety and stress of pregnant women in the intervention group, there was no significant difference between the two intervention and control groups [16]. Fiol-DeRoque et al. (2021) showed that the use of relaxation applications on mobile phones during the outbreak of COVID-19 was able to reduce the anxiety of the treatment team only in the first two weeks, whereas the effect was not sustained [17]. According to the conflicting results of studies in the field of using the Jacobsen technique to reduce anxiety and stress, also considering the fourth wave of the COVID-19 pandemic and the high stress of nurses from contagion and transmission of this disease, the main question of this study was, whether using the Jacobsen technique application can reduce the job stress and anxiety of nurses caring for patients with COVID-19? Therefore, this study aimed to determine the effect of using Jacobsen's relaxation technique application on the anxiety and occupational stress of nurses caring for COVID-19 patients.

Materials and Methods

Study design & participants

This clinical trial (IRCT20111210008348N51) was carried out on 70 nurses working at Shahid Beheshti hospital of Kashan city, who cared for COVID-19 patients and meet the specific criteria of the study, from October to December 2020. The intervention included the use of the Jacobsen technique application and the results included job stress and anxiety of nurses caring for COVID-19 patients. The sample size was calculated to be 32 in each group based on Ghafari et al. [18] and concerning the anxiety scores of 6.6±5.6 and 2.7±2.3 in the two control and intervention groups, 95% confidence level, and 95% test power through the following formula. Considering a 10% statistical decline, the sample size was determined to be 35 in each group.

$$N= \frac{(z_{1-\frac{\alpha}{2}}+z_{1-\beta})^2(s_1{}^2+s_2{}^2)}{d^2}$$

The subjects were selected by the available sampling method and they were assigned into two intervention and control groups (35 subjects in each group). The inclusion criteria included having a Bachelor of Science or higher education level in nursing, job experience of more than one year, caring for COVID-

19 patients, and having a smartphone with an Android operating system. Exclusion criteria included severe anxiety diagnosed by a psychiatrist, non-use of complementary medicine techniques such as yoga, acupressure, and massage, and non-use of sedatives. Training application of Jacobsen progressive muscle relaxation was designed by the researchers using studying texts and articles [19, 20] through cooperation with computer engineers. The application was designed in the Android environment for mobile phones and tablets. Then, the application was provided to experts (2 physical medicine specialists, and 2 doctors of nursing) and their opinions were asked about the quality and quantity of its content. After this stage, the application was provided to two software design engineers who were skilled in the field of application development and their comments about its features (background color, fonts, and images) were applied. The content of the application included the identification of muscles and muscle groups and training by the Jacobsen relaxation technique using photos and animations in 5 steps. The researchers taught the intervention group how to work with the application in a session and installed it on their mobile phones. At first, the intervention group was asked to set a daily reminder on the application to perform the technique two hours before entering the workplace. The reminder was an audio alarm and the nurse was required to turn off the reminder and perform the technique. The nurse ticked the performance of the technique daily, in the self-reporting checklist. Jacobsen's technique in the application included the following features:

1) The nurse sits on a comfortable chair or lays on a couch with comfortable clothes and removes their accessories.

2) The nurses would contract and expand muscle groups along with effective and deep breathing through the guidance of the advisor.

3) The subjects should have done this exercise until felting and expressing the difference between muscle contraction and expansion. In this case, the subjects had learned the desired technique and were able to do it alone using the application. In this technique, large muscle groups were contracted and expanded; because the contraction and relaxation of these muscles and the understanding of the difference between these two feelings were tangible for the subjects at the beginning of the work. As the subjects contracted and expanded each of their muscles, they were able to easily and spontaneously relax and release their entire body and remove anxiety, stress, and any unpleasant mental, psychological and physical feelings [21, 22]. This technique, based on Jacobsen's study in 1938 [11], was performed by nurses every day for 30 minutes during a month. The self-reporting method was used to perform muscle relaxation to control the performance of the technique. Also, the researcher made phone calls with the subjects of the intervention group once a week. The control group received no training. The research tools included demographic variables questionnaire, the Jacobsen relaxation program checklist, the Spielberger State-Trait Anxiety Inventory, and Osipow's Stress Inventory. The subjects of the two groups filled out the questionnaires of Spielberger State-Trait Anxiety Inventory and Osipow's Stress Inventory, immediately after the end of the intervention and one month later [18].

To comply with ethics in the research, after the intervention, the researcher announced to the control group that if they wish, they can install the application on their mobile phones and practice the technique.

Measurements

The research tools included demographic variables questionnaire (age, gender, education level, marital status, job experience, shift work, overtime per month, employment status), the Jacobsen relaxation program checklist, the Spielberger State-Trait Anxiety Inventory, and Osipow's Stress Inventory. The Spielberger State-Trait Anxiety Inventory consisted of two scales of situational and trait anxiety, which measured anxiety by state and trait features. Each of the scales had 20 items scored by a 4-point Likert scale. The total scores of situational and trait anxiety were in the range of 20-80, where the scores of 20, 40-59, and 60-80 indicate no anxiety, mild anxiety, moderate anxiety, and severe anxiety, respectively. The Cronbach's alpha coefficient of the Spiegelberger questionnaire was reported as 0.92 [23]. Bagheri *et al.* confirmed the validity and reliability of the questionnaire and reported Cronbach's alpha coefficient of 0.92 [24]. In this study, the reliability was confirmed by Cronbach's alpha coefficient of 0.89. The standard Osipow's Stress Inventory was used for the first time by Osipow *et al.* in 1987 [22]. The Osipow's Stress Inventory was scored using a 5-point Likert scale. The questionnaire is arranged into six job stress dimensions and each dimension included 10 items. Its scoring is different for males and females, so that a score of 60-107 for females and 60-133 for males is less than normal stress, a score of 108-203 for females and 134-216 for males is normal stress, a score of 204-251 for female and 217-258 for male is moderate stress and the score of 252-300 for female and 259-300 for male indicate severe stress. The validity and reliability of this questionnaire have been confirmed in various studies and have been at an optimal level [24, 25]. The reliability of the scale was calculated as 0.91 in this stud

Data Analysis

Data were analyzed using SPSS 19 software (SPSS Inc; USA) and the normality of quantitative variables was assessed using the Kolmogorov-Smirnov test. Descriptive statistic (number, percentage, mean, and standard deviation) was used to data classify and describe. Independent T, Chi-square, and paired T

tests were used to compare quantitative variables, categorized variables, and normal quantitative variables in each group (before and after the intervention), respectively. Repeated measures ANOVA test was used to compare the average anxiety and job stress between and within the groups before and immediately and one month after the intervention.

Findings

The age mean of the intervention and control groups were 34.29±5.27 and 33.71±4.28 years, respectively (p=0.62). The job experience mean of the intervention and control groups were 10.23±5.57 and 11.37±5.75 years, respectively (p=0.32). The overtime per month mean of the intervention and control groups were 49.46±26.56 and 54.91±21.30 hours, respectively (p=0.34). There were no significant differences between the two groups in terms of demographic variables (Table 1).

Table 1) Demographic characteristics of the subjects in the intervention and control groups

Parameter		Intervention n=35	Control n=35	p-value
Gender	Female	(52.4) 33	(47.6) 30	p=0.23 Fisher exact
	Male	(28.6) 2	(71.4) 5	
Education level	Bachelor of science	(47.4) 27	(52.6) 30	p=0.35
	Master of science	(61.6) 8	(38.4) 5	Chi-square
Marital status	Single	(47.3) 9	(52.7) 10	p=0.996
	Married	(51) 26	(49) 25	Chi-square
Work shift	Morning	(75) 6	(25) 2	p=??
	Evening	(0) 0	(100) 4	
	Night	(66.7) 6	(33.3) 3	
Work contract	In circulation	(46.9) 23	(53.1) 26	p=0.23
	Official	(55.9) 19	(44.1) 15	Chi-square
	Temporary	(31.3) 5	(68.8) 11	
	Contractual	(55) 11	(45) 9	

The normal distribution of the data was confirmed using the Kolmogorov-Smirnov test. The results of ANOVA repeated measurements showed no significant difference in the time effect on the average score of situational anxiety in the intervention group; there is no significant difference between the situational anxiety score at three-time points. Analysis of variance with repeated measures was used to investigate the interaction effect of time and intervention on the situational anxiety score. The condition of compound symmetry was established (p>0.05 was calculated in Makhli's test), therefore, the interaction effect of time and intervention was not significant according to the Sphericity Assumed statistic. Also, the independent t-test showed no significant difference between the two groups before (p=0.31), immediately after (p=0.51), and two months after the intervention (p=0.89; Table 2).

Table 2) Comparison of the average situational and trait anxiety, immediately, and one month after the intervention in the study groups (RM ANOVA)

Parameter		Control (n=35)	Intervention (n=35)	Time/Group* Sphericity	Mauchly's test	Group effect	Between Group**
Situational anxiety	Before intervention (T1)	55.37±6.26	57.37±9.72	$\chi^2=1.75$	F=0.67	F=0.34	p=0.31
	Immediately after intervention (T2)	54.31±8.44	55.57±7.65	p=0.41	p=0.51	p=0.51	p=0.51
	Two months later (T3)	51.02±8.26	50.71±6.69				p=0.89
Trait anxiety	Before intervention (T1)	52.94±6.65	52.02±5.53	$\chi^2=6.47$	F=0.79	F=0.018	p=0.53
	Immediately after intervention (T2)	46.45±6.42	46.68±6.79	p=0.029	p=0.44	p=0.89	p=0.88
	Two months later (T3)	44.34±5.71	45.48±6.04				p=0.53

*ANOVA repeat measurement; **Independent T-test

The ANOVA repeated measures showed no significant effect of time on the mean score of characteristic anxiety in the intervention group; in The results of the ANOVA showed the significant effect of time on the average occupational stress score in the test group; so there was no significant difference between the job stress scores in 3-time points. The repeated measures ANOVA was used to investigate the interaction effect of time and

intervention on occupational stress. The condition of compound symmetry was established (p>0.05 in Makhli's test). Therefore, the interaction effect of time and intervention was not significant, according to the Sphericity Assumed statistic (p=0.9; F=0.1). Also, the independent t-test showed a significant difference between the two groups before (p=0.46), immediately after (p=0.27), and two months after the intervention (p=0.47; Table 3).

Table 3) Comparison of the average job stress before, after and one month after the intervention (RM ANOVA)

Group	Control (n=35)	Intervention (n=35)	Time/Group* Greenhouse-Geisser	Mauchly's test	Group effect	Between Groups**
Before intervention (T1)	168.27±15.56	165.57±15.29	$\chi^2=0.47$	F=0.1	F=1.17	p=0.46
Immediately after intervention (T2)	165.20±12.95	161.65±13.94	p=0.78	p=0.9	p=0.28	p=0.27
Two months later (T3)	153.60±10.69	151.62±12.10				p=0.47

*ANOVA repeat measurement; **Independent T-test

Discussion

This study showed no significant effect of the Jacobsen relaxation technique on the anxiety and occupational stress of nurses caring for COVID-19

patients. However, inconsistent with our study, Liu *et al.* found that the Jacobsen relaxation technique reduced the anxiety of patients with COVID-19 once a day for 30 minutes for 5 days [26]. Xiao *et al.* also

showed that doing 30 minutes of the Jacobsen relaxation technique before going to bed and after waking up for one week reduces anxiety disorders and stress in patients with COVID-19 [27]. The results of other studies indicated the effectiveness of this technique to reduce anxiety and stress in multiple sclerosis [18] and cancer patients [28]. According to studies, the Jacobsen technique has created a balance between the posterior and anterior hypothalamus and prevents the adverse effects of tension and anxiety by reducing the activity of the sympathetic system [11]. Therefore, it was expected to decrease anxiety and stress in the present study, but there was no improvement. Although the intervention time was short in the mentioned studies, the training and intervention were performed on the patients in the presence of the researchers, while in the present study, the Jacobson intervention method was performed on nursing using an application. Therefore, it can be said that probably due to the workload of nurses during the COVID-19 pandemic, the conditions for performing the relaxation exercises were not prepared for them, or they did not use the intervention correctly. Inconsistent with our study, O'Donnel et al. found that using a meditation application reduced the anxiety and stress of COVID-19 patients and increased their feeling of recovery [29]. Although in this study, different sedation was conducted using an application and the participants were people who had different characteristics from the subjects of our study during the outbreak of the COVID disease. In addition, O'Donnel et al. measured anxiety with different tools. Also, inconsistent with our study, Ozgundondu et al. found that performing the Jacobsen technique with music in the intensive care unit for 20 minutes every day for 8 weeks can reduce the stress of nurses [30]. The study by Ozgundondu et al. was conducted before the outbreak of COVID-19 and was accompanied by music, also there was no follow-up period, and the duration of the intervention was longer. Also, the intervening factors of stress for nurses such as the death of patients, wearing special clothes for personal protection against COVID-19, using masks, and lack of safety equipment during the spread of COVID-19 caused the different results of the above study with our study [10].

Fathi et al. also showed that the use of relaxation exercises can reduce occupational stress in nurses [31]. Nijland et al. stated that performing relaxation techniques in the care departments every day for 10 minutes reduces the stress and anxiety of nurses caring for COVID-19 patients [32]. In our study, the technique of sedation was used by an application installed on the nurses' phones and they used the application in their home, whereas in the research of Nijland et al., the first nurse of each shift performed sedation techniques in the special care department; also, there is a possibility that nurses did not perform the sedation technique properly due to their busyness considering the performing intervention by an application using not face-to-face mode. Consistent with our study, the research of Fiol-DeRoque et al. showed that the use of relaxation mobile applications on the treatment team reduced the anxiety of the treatment team during the outbreak of COVID-19, only in the first two weeks, and no significant decrease was observed in the intervention group compared to the control group [17]. Chuang et al. found no significant effect of relaxation technique training to reduce women's anxiety and stress in the intervention group [16]. Calder Calisi et al. in 2017, found no significant effect of the use of relaxation techniques on the anxiety, stress, and depression of nurses [15]. Matourypour et al. showed the significant effect of the Jacobsen technique on nurses' occupational stress [33]. Although the results of these studies are consistent with the current study, the sample type, type, and duration of the sedation technique are different from our study. It seems that the ineffectiveness of the sedation technique in this study is due to the following reasons:

This study was carried out during the outbreak of the fourth wave of Corona pandemic, and general vaccination had not been carried out. Therefore, the nurses had a lot of anxiety and stress due to the disease contagion and its transmission to their families, and therefore, performing the Jacobsen relaxation technique did not reduce their anxiety and stress. Also, during COVID-19, nurses faced the death of patients and even hospital staff more than before, and probably this problem could increase their anxiety and stress and cause psychological disorders in them. In addition, the high-risk nature of the conditions of COVID-19, the unpredictability of the pandemic situation, uncertainty about the control time of this disease [29], and incorrect information [34] about the disease could increase the anxiety and stress of nurses. It also seems that one month of relaxation intervention was not enough to reduce the anxiety and stress of nurses and there is a need to its continue to find out its effectiveness. One of the strong points of this study is the design of the Jacobsen relaxation application in the Android environment and its installation on mobile phones.

The limitation of the study was the impossibility of monitoring the Jacobsen technique performed by the subjects and the impossibility of blinding the study. Therefore, it is suggested to study this topic in the future and use this technique for a longer period. It is also suggested to the comparison of the effect of the Jacobsen technique application and face-to-face intervention concerning vaccination and reducing the spread of Coronavirus.

Conclusion

The use of the Jacobsen relaxation technique doesn't improve the anxiety and occupational stress of nurses which can be due to the high stress and

anxiety of nurses during the outbreak of COVID-19, the contagiousness of the disease and the death of patients, worrying about infecting the nurses and their families with COVID-19. There is a possibility to fail the performing the intervention technique due to the busy work.

Ethical Permissions: Permission to conduct the present study was obtained from the Research Vice-Chancellor of Kashan University of Medical Sciences with an ethics code of IR.KAUMS.NUHEPM.REC.1399.088. Written informed consent was obtained from the participants to participate in the research. The objectives, method and implementation duration, possible benefits, and losses were explained to all participants and they were assured that their information will remain confidential and they have the right to withdraw from the study. To comply with ethics in the research, after the intervention, the researcher announced to the control group that if they wish, they can install the application on their mobile phones and practice the technique.
Conflicts of Interests: There was no conflict of interest.
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