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Research article

Effects of progressive muscle relaxation combined with music on stress, fatigue, and coping styles among intensive care nurses

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ABSTRACT

Aim: To examine the effects of progressive muscle relaxation combined with music on stress, fatigue and coping styles amongst intensive care unit (ICU) nurses.
Design: A randomised controlled trial of 56 nurses aged 18 years and older, with at least three months experience. The intervention group (n = 28) received a 20 minute session comprising progressive muscle relaxation combined with music for a total of eight weeks in the form of group sessions, while the control group (n = 28) received only a single-time face-to-face attention-matched education (20 minutes). The data collection tools were administered at baseline, at week four, eight and twelve.
Setting: Internal Medicine, Anaesthesia, and Coronary Intensive care Unit of a training and research hospital.
Main outcome measures: Primary outcome: Stress level. Secondary outcome: Fatigue severity and coping styles.
Results: Stress scores in the intervention group decreased significantly at week 8 and week 12 ($p < 0.05$). Similarly, the fatigue scores were observed to be significantly lower in the intervention group at week 8 and week 12 in comparison to those in the control group ($p < 0.05$). The scores of coping styles, obtained for the acceptance sub-dimension were significantly higher in the intervention group compared to the control group at week 4, 8, and 12 ($p < 0.05$). The use of instrumental support, venting and the emotional support scores were observed to be significantly higher in the intervention group compared to the control group at week 12 ($p < 0.05$).
Conclusion: The results indicated that progressive muscle relaxation combined with music appears to be effective in decreasing stress and fatigue, and in improving the coping styles amongst intensive care nurses. Future studies should be conducted on a larger scale to make conclusions with higher probability.

Implications for clinical practice

- This study highlights the beneficial effects of progressive muscle relaxation combined with music therapy on stress, fatigue, and coping styles amongst intensive care nurses.
- The progressive muscle relaxation combined with music therapy indicated positive effects on perceived stress and fatigue scores and coping styles.
- Results generated from this study shed light on how intensive care nurses are provided support with mind-body based interventions including progressive muscle relaxation and music therapy.
- Future research integrating additional home exercises should be conducted on a larger scale, and for a longer period.

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Introduction

Intensive care units (ICUs) are an essential part of hospital-based healthcare in order to provide rapid resuscitative and supportive care to critically ill patients (Kıraner et al., 2016; Yılmaz and Vermişli, 2016). ICUs are also stressful atmospheres because of the complexity and the dynamic nature of their environment. The different ICU stressors include working relationship with nurses and the other healthcare team members, communication and conversations with the patients, the high levels of knowledge and skills required to work in this ward, use of sophisticated technical equipment in ICUs, high workload, the necessity of responding swiftly and promptly to situations that demand urgent care and heavy responsibility regarding the care of the patients (Cengiz, 2017; Dede, 2013; Günüşen, 2017; Nursen et al., 2016; Şengül et al., 2015). Nurses, who are the indispensable members of ICU team, hold important duties and responsibilities such as providing 24 hour care, high concentration, close monitoring of the patients, early recognition of complications and maintenance of strong communication with the other healthcare providers. A Swedish study conducted previously indicated that greater than 80% of ICU nurses reported higher levels of stress compared to the other professional groups (Gelsema et al., 2005).

In addition to higher stress levels, the other most common problems experienced by ICU nurses are physical and mental fatigue (Akyol and Kankaya, 2017; Kesgin and Kublay, 2011). Fatigue is a subjective symptom, which is defined as burnout or exhaustion and prevents nurses from continuing the practices in their lives and decreases their efficiency (Altuntaş et al., 2014; Jenkins and Warren, 2012; Troxel et al., 2010). The levels of fatigue among 120 nurses were evaluated and it was reported that 68% of the nurses felt tired and exhausted (Altuntaş et al., 2014). Moreover, because of exposure to chronic stress and fatigue, nurses may experience headache, sleep disorder, mental problems such as anxiety and depression, low performance at work and even burn-out syndrome (Oktay, 2005). As a result of high stress and chronic fatigue, the coping abilities of ICU nurses decrease over time (Andolhe et al., 2014). Considering the outcomes of previous studies available in the literature, mind-body practices such as breathing exercises, yoga, meditation, progressive muscle relaxation (PMR) and music therapy have been utilised in recent years to help reduce stress and fatigue in the individuals and improve their coping styles (Steinberg et al., 2017; Troxel et al., 2010).

PMR is one of the mind-body practices that involves voluntary stretching and relaxation of all the muscle groups in the body, from head to foot (Genç and Oğuz, 2018b). PMR allows reduction of the effects of chronic stress on the body and assists in attracting the individuals' attention on their skeletal muscles (Li et al., 2015; Şahin and Dayapoğlu, 2015). Similar to PMR, music therapy is another mind–body practice, which uses rhythm, melody, harmony and other elements of music to cause improvements in the individuals' neuroendocrine system, to bring significant changes in the structure of their feelings and thoughts (Liu et al., 2016; Robb et al., 2018). Previous studies have reported that music therapy causes a decrease in the pulse rate, respiratory rate, systolic/diastolic blood pressure and body temperature, provides relaxation, directs attention to different thoughts, reduces stress levels and improves the quality of life (QOL) by providing sensorial and mental well-being (Meriç and Kaya, 2018; Warth et al., 2015). So far, the use of PMR and music therapy has remained limited to reducing acute or chronic pain, improving QOL in chronic diseases, managing chemotherapy-related side effects such as pain, nausea, vomiting, and fatigue and changing the attitudes and behaviours of the individuals (Genç and Oğuz, 2018a; İbrahimoğlu, 2015; Liao et al., 2018; Pahlavanzadeh et al., 2016; Şahin and Dayapoğlu, 2015; Zhou et al., 2015). Additionally, a few reports have indicated that PMR and music therapy exert promising effects of stress relief amongst ICU nurses (Pahlavanzadeh et al., 2016; Ploukou and Panagopoulou, 2018; Steele, 2018). Just one study is available in the literature that has highlighted the effect of performing music therapy in reducing the severity of perceived stress in oncology nurses (Steele, 2018). On the other hand, previous studies applying only progressive muscle relaxation, or music therapy, or combining both of them, generally conducted with small number of participants, as single centered, non-randomised, and had variations in assessment times and follow-up procedures (Choi, 2010; Liao et al., 2018; Ploukou and Panagopoulou, 2018; Zhou et al., 2015). No clinical study has so far investigated the effects of PMR in combination with music therapy on stress, fatigue and coping styles amongst nurses working in ICUs. In consideration of the long-term exposure to stress, chronic fatigue, and the lack of coping styles among ICU nurses, studies that assess the effects of PMR and music therapy become essential. In this regard, the present randomised controlled trial aimed at examining the effects of PMR in combination with music therapy on stress, fatigue, and coping styles amongst ICU nurses. The present study hypothesised that PMR combined with music as a supportive therapy could reduce (1) stress, (2) fatigue levels and (3) also improve coping styles amongst nurses working in ICUs.

Materials and methods

Study design and setting

The present study was designed as a prospective, attention-matched education, controlled, randomised trial, and was conducted in University of Health Sciences, Ankara Gulhane Training and Research Hospital. The study was conducted with the nurses working in Internal Medicine, Anaesthesia, and Coronary ICUs. The nurses who were grouped in the intervention group were provided with a booklet containing the definition, purpose, benefits, and application techniques of PMR and the music therapy. The session of PMR combined with music was conducted by the principal investigator (PI), who had work experience in relaxation and music therapy, through group sessions, which composed of 10–15 participants; each session was 20 minutes long and was conducted once each week for a total of eight weeks. The participants in the intervention group were asked to not perform additional PMR and music therapy sessions independently at home until the completion of follow-up assessment. The nurses in the control group received a single-time face-to-face attention-matched educational session, for a total of 20 minutes, on the first day of the study and no additional intervention was conducted for this group during the whole study period. Like the intervention group, the control group session (attention-matched education) which composed of 10–15 participants was performed with a booklet containing the causes, negative effects of stress and fatigue on the body, and techniques for coping with stress in a silent room located in the hospital. The participants in the intervention group continued to receive group sessions comprising PMR combined with music, once a week, for a total of eight weeks. The PMR combined with music sessions were finalized at week 8. The intervention was applied neither to the intervention nor the control group post the completion of the weekly sessions (week 8) until the follow-up assessment (week 12). The follow-up assessment was performed only once at week 12 (four weeks post the last session of PMR combined with music). The 2017 CONSORT Statement for Randomised Trials of Non-Pharmacological Treatments was used as a guide while reporting the present study.

Sample size

G* Power 3.1 software was used to calculate the sample size for the study. The power of the study was calculated on the basis of our data which included comparisons between the study groups in terms of mean differences at the baseline and week 8 in the Fatigue Severity Scale (FSS) scores. The corresponding scores obtained for the intervention group and control group were 30.86 ± 10.41 and 42.82 ± 9.66, respectively. Considering a two-sided α of 5%, with a medium effect size (0.60), the power of the study was determined to be 98.9.

Randomisation, allocation and blinding

The potential participants (n = 75) were listed and assessed in terms of the eligibility criteria established by the PI. Subsequently, the PI explained the study protocol to the participants. The participants eligible for the present study were recruited from 1 July 2018 to 15 January 2019. A total of 12 nurses were excluded from the study as they either did not meet the inclusion criteria (n = 4) or declined to participate in the study (n = 8). Subsequent to obtaining informed consent from the eligible participants, these 63 nurses were assigned randomly into two groups (Group A: 31; Group B: 32) through lottery method (A: Control; B: Intervention) by the second author of the present report who was not involved in the intervention procedures, and the PI informed the nurses about the randomisation results. As a result of the assignment to a different hospital (n = 1) and annual leave (n = 2), a total of three participants in the intervention group could not begin the sessions. In the control group, a total of four participants could not receive the attention-matched education either due to assignment to a different hospital (n = 2) or due to change of unit (n = 2). The study was finally completed with a total of 56 ICU nurses, 28 in the intervention group and 28 in the control group (Fig. 1). The PI collected all data of the study. All the sessions comprising PMR combined with music were also conducted by the PI who was not blinded to the study groups due to the nature of PMR. Hence, the current study was conducted as non-blinded. The data obtained in the study were analysed by an independent statistician.

Eligibility criteria and study sample

The eligible nurses included those who (a) were ≥18 years old, (b) had an experience of at least three months in ICUs, and (c) had no documented history of chronic obstructive pulmonary disease, heart failure and asthma. The exclusion criteria were as follows:

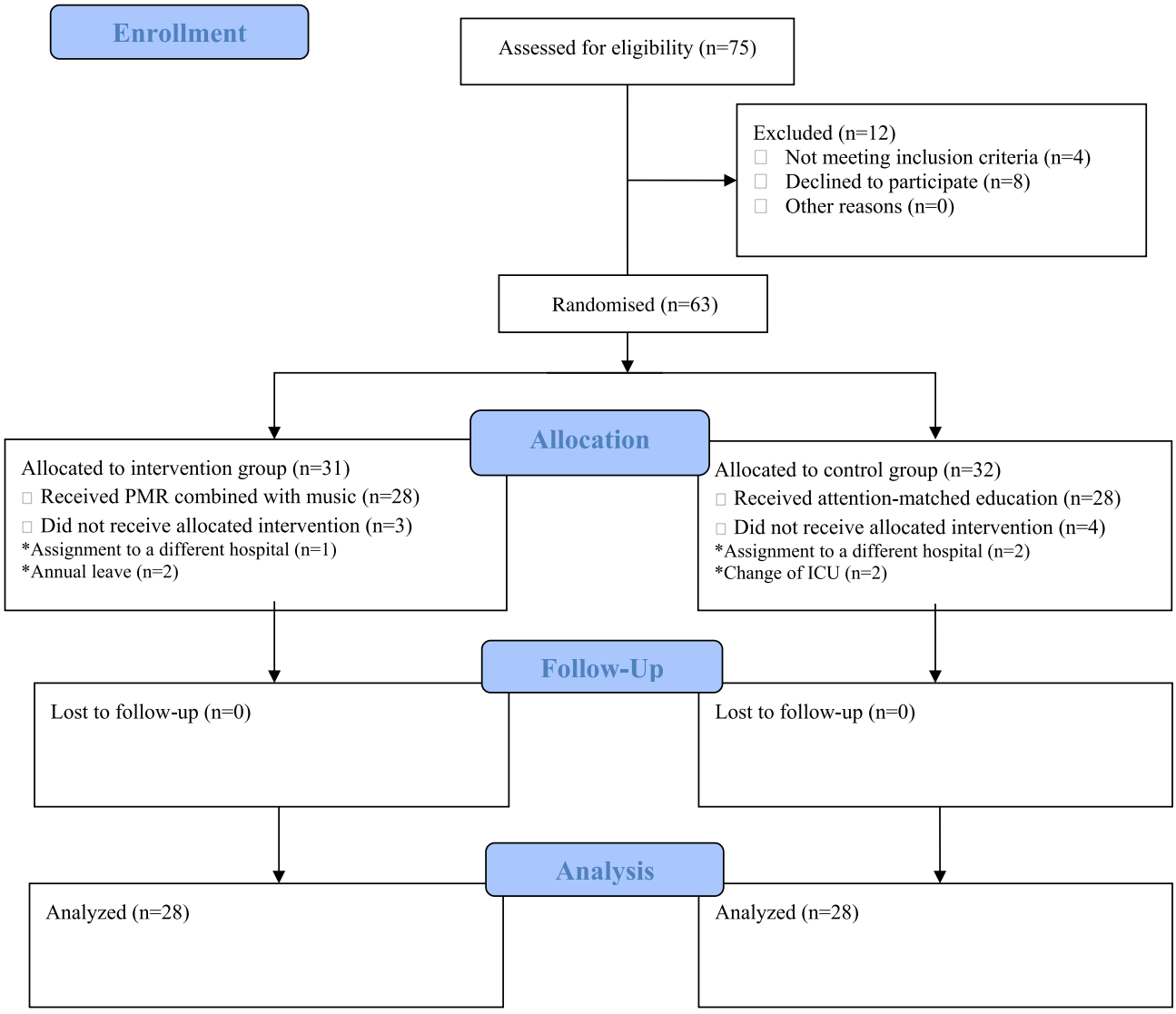

Fig. 1. Flow diagram of the study sample.

(a) history of severe psychiatric disorder, (b) ICU experience of less than three months, and (c) not currently using any complementary therapy modalities such as acupuncture, massage therapy, relaxation techniques, and yoga that can be influential on perceived stress and fatigue or coping styles.

Progressive muscle relaxation combined with music: procedure

The nurses were required to reach the amphitheater of the Ankara Gulhane Training and Research Hospital, which dimly lit, in order to receive the group sessions of PMR combined with music. Training on PMR combined with music was conducted in face-to-face sessions. The participants were first taught the description, using fields and effects on the body of the PMR plus music therapy. Subsequently, step-by-step instructions on PMR were provided by the PI. After the demonstration by PI, all the PMR steps were practiced by the participants under the supervision of PI within the duration of 20 minutes, following which, PMR booklets prepared by the researchers were delivered to the nurses in the training session itself. The PI prepared the amphitheater prior to each group session, and the preparations included placement of a laptop on a small table in the middle of amphitheater and insertion of a flash memory card (USB) for relaxing music developed by Daniel Kobialka. The aforementioned music piece was selected because it contains elements such as rhythm, melody, and harmony, has a fluid melody and a tempo that does not increase the resting heart rate (Liao et al., 2018; Zhou et al., 2015).

The intervention group continued with the 20-min PMR accompanied by music group sessions once a week, each week, for a total of eight weeks. The nurses in the CG were invited to a silent room, where they received a single-time attention-matched education on the effects of stress on the body. The attention-matched education was conducted face to face and lasted for 20 min, following which training booklets designed by researchers were distributed amongst the participants.

The nurses in the intervention group selected their places in the amphitheater based on where they felt comfortable sitting on the chairs. Deep breathing technique was demonstrated by the PI to all the nurses when the latter had settled in comfortable positions. After the demonstration, the nurses were asked to take a deep breath, focus on the music, and wear the black-colored cotton eye patch provided to them in order to achieve a dimly lit environment, just prior to the commencement of the session. After completing the PMR session, the music was turned off. The PMR intervention comprised 20 min sessions, which involved tensing and relaxing the body along with deep breathing. The participants performed PMR for each body part in a particular order, beginning with the face muscles and head, followed by neck, shoulders, chest, abdomen, legs, and feet. All the muscle tensing and relaxing procedures were performed in accompaniment with deep breathing. The participants were instructed to tense a specified group of muscles for 5 s while breathing in, and then relax the same muscles for 10 s while breathing out. While performing this exercise, the participants visualized a wave of relaxation flowing through their body by using the deep-breathing technique.

The steps for the PMR session are listed below:

1. Wear comfortable clothes, sit on a chair in a comfortable position, and use the black-coloured cotton eye patch provided to you until the completion of the intervention.
2. Bring your attention specifically to your body. If you begin to notice that your mind is wandering, bring your attention back to the muscle you are currently working on.
3. Take a deep breath through your abdomen, hold for 3 seconds, and exhale slowly. Again, as you breathe, notice your stomach rising and your lungs being filled with air.
4. As you exhale, imagine all the tension in your body being released and flowing out of your body. Again, inhale and exhale. Feel that your body has relaxed.
5. As you go through each step, continue breathing in the manner instructed earlier.
6. Now, please tighten your forehead muscles by raising your eyebrows as high as you are able to. Hold for 5 s and then lose the tension, and wait for the next 10 seconds.
7. Next, tighten your eye muscles. Hold for 5 seconds and release. Wait for 10 seconds.
8. Now smile widely, feel the tension in your mouth and cheeks. Hold for 5 seconds and release; appreciate the softness in your face. Wait for 10 seconds.
9. Gently pull your head back as if you were looking at the ceiling. Hold the position for 5 seconds and release; feel the tension melting away. Wait for 10 seconds.
10. Now, feel the weight of your relaxed head and neck. Breathe in and breathe out. Let go of all the stress in your body. Breathe in and breathe out.
11. Now, tightly, but without forcing, clench your hands. Hold this position for 5 seconds and release. Wait for 10 seconds.
12. Now, flex your forearms to tighten the biceps muscles. Feel the tension in your muscles. Hold for 5 seconds and release; enjoy the relaxing effect. Breathe in and breathe out.
13. Now spread your arms and position your elbows in front of you to tighten the triceps muscles. Hold for 5 seconds and release. Wait for 10 seconds.
14. Now lift your shoulders up as if they could touch your ears. Hold for 5 seconds and release quickly; feel the weight of your shoulders. Wait for 10 seconds.
15. Tense your upper back by pulling your shoulders back. Hold for 5 seconds and release. Wait for 10 seconds.
16. Tighten your chest by taking a deep breath. Hold for 5 seconds and exhale deeply.
17. Now tighten your stomach muscles by pulling into your belly. Hold for 5 seconds and release. Wait for 10 seconds.
18. Gently lean forward to tighten your low back. Feel your upper body letting go of the tension and stress; hold for 5 seconds and relax. Wait for 10 seconds.
19. Tighten your buttocks. Hold for 5 seconds and release. Imagine that your hips have become light. Wait for 10 seconds.
20. Touch your knees with each other, and then press your patellae in a manner as if you are holding a penny or a thin paper between them. Hold the position for 5 seconds and release. Wait for 10 seconds.
21. Now flex your feet, pull your toes toward you, and feel the tension in the muscles at the back of your lower leg. Hold for 5 seconds and release; feel that the weight of your legs is sinking. Wait for 10 seconds.
22. Bend your toes, and feel the tension in the muscles at the front of your lower leg. Hold for 5 seconds and release. Wait for 10 seconds.
23. Now imagine a wave of relaxation slowly spreading through your body, beginning at your head and reaching your feet. Feel the light weight of your relaxed body. Breathe in and breathe out. In and out.

Outcome measurements and study instruments

The primary outcome of this study was the perceived stress level. The secondary outcomes were fatigue severity and change in coping styles findings. Personal Information Form was used to collect the sociodemographic and working characteristics of the nurses included in the present study. Perceived Stress Scale (PSS) for stress levels, Fatigue Severity Scale (FSS) for fatigue scores, and Brief COPE for coping style were also utilized for data collection.

Personal information form

This form contained 12 questions inquiring about age, gender, educational level, marital status, number of children, income status, comorbid conditions, living alone or living with a family or friend, name of ICU, total experience in ICUs, working hours per week, and level of satisfaction with ICU (Eren and Öztunç, 2016).

Perceived stress scale (PSS)

The scale was developed by Cohen et al. (1983) and represents a global measure of stress that assesses the extent to which the respondents perceive life to be unpredictable, uncontrollable, and overloaded. The PSS contains general rather than event-specific items and is sensitive to background extraneous stressors as well as to existing stressful circumstances. The PSS originally developed contained 14 items. However, subsequent scrutiny produced a modified 10-item version (PSS–10) that possessed superior psychometric properties. Consequently, Cohen (1988) recommended that researchers should use PSS–10 rather than the original version of PSS. The PSS scale is a 5-point Likert type (1 = never, 2 = almost never, 3 = sometimes, 4 = fairly often, 5 = very often) scale. The validity and reliability tests for the Turkish version of this scale were conducted by Erci (2006); the item-total score correlation was determined to be in the range of 0.32–0.66, and the Cronbach's alpha coefficient obtained was 0.70. PSS scores were obtained by reversing the responses (e.g. 0 = 4, 1 = 3, 2 = 2, 3 = 1, and 4 = 0) to the four positively stated items (items 4, 5, 7, and 8), followed by summing across all the scale items. Higher scores obtained in the PSS indicate a high level of perceived stress (Erci, 2006). In the present study, the PSS Cronbach's alpha coefficient was calculated to be 0.74.

Fatigue severity scale (FSS)

The scale was originally developed by Krupp et al. (1989) and assesses the individuals' fatigue severity. This scale contains nine items and allows the selection of scores from 1 (strongly disagree) to 7 (strongly agree) to indicate the agreement level to each item. The Turkish validity and reliability of this scale were studied by Armutlu et al. (2007), who obtained a Cronbach's alpha coefficient of 0.94 and an item-total correlation coefficient was in the range of 0.64–0.67. The total score is the mean of scores of the nine items, and a higher score obtained on this scale indicates a higher degree of fatigue. A score of four or higher implies fatigue. In the present study, the FSS Cronbach's alpha coefficient was calculated to be 0.81.

Brief COPE

Brief COPE is a 28-item multi-dimensional measure of the strategies used for coping in response to stressors. Carver (1997) originally developed a 53-item scale, which was later translated into a 28-item short form known as Brief COPE. Brief COPE contains 14 sub-dimensions and is scored as a four-point Likert scale, ranging from "I have not been doing this at all" (score 1) to "I have been doing this a lot" (score 4). The fourteen sub-dimensions are self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humor, acceptance, religion and self-blame. The sub-dimensions in Brief COPE are classified into three categories: problem-focused coping strategies, emotion-focused coping strategies and ineffective coping strategies (Bacanlı et al., 2013). While the sub-dimensions of active coping, planning, self-distraction, and use of instrumental support constitute problem-focused coping strategies, use of emotional support, positive reframing, acceptance, humor, and religion sub-dimensions constitute emotion-focused coping strategies. Venting, denial, behavioral disengagement, self-blame and substance use sub-dimensions are placed in the category of ineffective coping strategies (Bacanlı et al., 2013). The reliability and validity of the Turkish version of Brief COPE were established by Bacanlı et al. (2013), who obtained a Cronbach's alpha value of 0.79 for the Turkish version. The higher score obtained in Brief COPE represents better coping strategies used by the participants.

Data collection

The baseline data were collected using the personal information form, PSS, FSS and Brief COPE in the first interview conducted with the nurses. PSS, FSS, and Brief COPE interviews were repeated at week 4, week 8 and week 12. All the data collection tools were applied through face-to-face interviews by the PI.

Statistical analysis

The data obtained in the present study were analysed using IBM SPSS Statistics 23.0 (IBM Corp., Armonk, New York). The variables of the study were evaluated for conformity to a normal distribution using the Shapiro-Wilk test. Mean (±standard deviation) was used for expressing the data exhibiting normal distribution, while median and 25th and 75th quartile values were used for the data that were not normally distributed. The baseline variables including age, marital status, educational level, income level, etc., were compared using the chi-squared test. Comparisons between the study groups in terms of PSS, FSS, and Brief COPE scores were performed by using one-way ANOVA and Mann-Whitney *U* test. The statistical significance threshold for the two-tailed test and the analyses was set at $p < 0.05$.

Ethical considerations

The study was approved by the clinical trials ethics committee of the University of Health Sciences, Ankara Gulhane Training and Research Hospital (decision number: 18/167–05.06.18), and was performed in accordance with the Declaration of Helsinki. After obtaining permission from the related ICU units, PI approached the eligible nurses at ICUs. All the eligible participants were requested to submit a written informed consent for participation in the study. The participants were informed that they could withdraw from the study at any point of time without stating a reason and that there was no cost for participating in the study. All data were collected and recorded in a manner that protected the anonymity of the participants.

Results

Participants' adherence to PMR combined with music sessions

In the weekly sessions, no participants dropped out of the study, and all of them attended the weekly sessions in line with the study protocol. Moreover, no participant dropouts were observed due to unexpected adverse effects of PMR combined with music,

indicating that this intervention was safe to practice and well-tolerated amongst ICU nurses.

Participants' demographic and working characteristics

Sociodemographic and working characteristics of the nurses are presented in Table 1. The mean age of the nurses was 24.61 ± 2.61 years in the intervention group and 27.75 ± 4.75 years in the control group. All the participants (100.0%) in the present study were female. Majority of the participants (78.6%) in the intervention group and 53.6% of those in the control group were single. A great majority of participants (92.8%) in the intervention group and all the participants (100.0%) in the control group had graduated from university. A big majority of participants in the study groups had moderate income levels. A huge proportion of participants (92.9% in the intervention group and 89.3% in the control group) reported having no comorbid condition. In both of the groups, more than half of the participants were living with their families.

In regard to working characteristics, 71.4% of the participants in the intervention group and 75.0% in the control group were working in the internal medicine ICU. More than half of the participants (57.1%) in the intervention group and 64.3% in the control group were working in ICU for more than two years. While 53.6% of the participants in the intervention group were working for 40–48 hour per week, 53.6% of the participants were working for more than 48 h per week in the control group. Greater than 60.0% of the participants in both the groups reported being satisfied with working in ICUs. The study groups were homogeneous in terms of age, gender, marital status, educational level, income status, living with either their family or friends, comorbid conditions, experience in ICU, working hours per week and satisfaction levels with ICUs ($p > 0.05$).

Effects of PMR combined with music therapy on PSS scores of participants

The median total PSS scores of the participants in the intervention group were as follows: 31.0 at the baseline, 29.0 at week 4, 27.0 at week 8 and 30.0 at week 12 of the study. The corresponding scores obtained for the control group were 29.0, 30.5, 29.0, and 31.0, respectively. In regard to the comparison of the total PSS scores between the study groups, statistical testing revealed no significant difference for the baseline and week 4 assessments, while a significant reduction was observed in favor of the intervention group ($p < 0.05$) at weeks 8 and 12 of the study (Table 2).

Table 1
Socio-demographics characteristics of the participants (N = 56).

Characteristics	Intervention Group (n = 28)		Control Group (n = 28)		Test statistic*	p-value
Age (X ± SD)	24.61 ± 2.61		27.75 ± 4.75		3.063	0.060
	n	%	n	%		
Gender						
Female	28	100.0	28	100.0	**	**
Male	0	0	0	0		
Educational level						
High school	2	7.2	0	0.0	**	**
University	26	92.8	28	100.0		
Marital status						
Single	22	78.6	15	53.6	3.903	0.051
Married	6	21.4	13	46.4		
Having Children						
No	26	92.9	23	82.1	1.469	**
Yes	2	7.1	5	17.9		
Income status						
Low	3	10.7	3	10.7	0.422	**
Moderate	19	67.9	24	85.7		
High	6	31.4	1	3.6		
Comorbid diseases						
Not present	26	92.9	25	89.3	0.220	1.000
Present	2	7.1	3	10.7		
Living with together						
Family	15	53.6	17	60.7	1.125	0.557
Alone	10	35.7	10	35.7		
Friend	3	10.7	1	3.6		
ICU						
Internal medicine	20	71.4	21	75.0	1.691	0.422
Coronary	6	21.4	3	10.7		
Anesthesia	2	7.1	4	14.3		
Total experience in ICU						
6–23 months	16	57.1	10	35.7	1.788	0.285
>2 year	12	42.9	18	64.3		
Working hours per week						
40–48 h	15	53.6	13	46.4	1.143	0.285
>49 h	13	46.4	15	53.6		
Satisfaction with ICU						
Yes	18	64.3	19	67.9	0.080	0.778
No	10	35.7	9	32.1		

X = Mean, SD: Standard deviation, *Chi-square test $p < 0,05$, **No Chi-square analysis could be conducted due to the values being less than 5.

Table 2
Comparison of PSS scores between the groups (N = 56).

PSS	Intervention Group (n = 28) Median (25th–75th)	Control Group (n = 28) Median (25th–75th)	Test statistic*	p-value
Baseline	31.00 (25.50–36.00)	29.00 (26.25–33.75)	364.0	0.646
Week 4	29.00 (5.00–34.50)	30.50 (28.00–32.00)	356.0	0.554
Week 8	27.00 (25.00–29.75)	29.00 (27.00–31.75)	260.0	**0.030**
Week 12	30.00 (28.00–32.00)	31.00 (29.25–32.75)	197.0	**0.001**

PSS: Perceived Stress Scale, *Mann-Whitney *U* test.

Effects of PMR combined with music therapy on FSS scores of participants

The mean total FSS scores of the participants in the intervention group were as follows: 42.4 at the baseline, 41.1 at week 4, 30.8 at week 8 and 22.6 at week 12 of the study. The corresponding scores for the control group were 45.3, 43.6, 42.8, and 41.7, respectably. In regard to the comparison of the total FSS scores between the study groups, statistical testing revealed no significant difference for the baseline and week 4 assessments, while a significant reduction was observed in favour of the intervention group ($p < 0.05$) at weeks 8 and 12 of the study (Table 3).

Effects of PMR combined with music therapy on Brief COPE scores of participants

In regard to Brief COPE scores, at the end of the monitoring period, the scores of the acceptance sub-dimension obtained for the intervention group were significantly higher than those obtained for the control group at week 4, week 8 and week 12 ($p < 0.05$). The intervention group also yielded significantly higher scores for coping styles in terms of the use of instrumental support, use of emotional support, and venting sub-dimensions, in comparison to those observed for the CG in the 12th week of the study ($p < 0.05$). Besides, the scores for the self-distraction sub-dimension were observed to be significantly higher ($p < 0.05$) in the intervention group compared to the CG at week 4 (Table 4).

Discussion

The present study was designed as a prospective, randomised, controlled trial that examined the effects of well-established 8-week interventions of PMR combined with music on stress, fatigue, and coping styles among ICU nurses. Although reports exploring the effects of PMR or different mind–body practices on the nurses working in different units are available in the literature, it is possible to state based on our knowledge that no study has been conducted to date investigating the effects of PMR combined with music on ICU nurses.

High stress is a major problem amongst nurses working in ICUs. The literature review revealed that to date, limited studies have used various non-pharmacological approaches such as yoga, music therapy, and relaxation to reduce the perceived levels of stress amongst ICU nurses (Mehrabi et al., 2012; Pahlavanzadeh et al., 2016). This study combined PMR and music therapy and became the pioneer study to investigate the effects of these interventions on the stress levels amongst nurses working in ICUs. At the end of the monitoring period, data analysis revealed that the perceived stress scores had significantly reduced in the intervention group, and the beneficial effects of PMR combined with music continued until the follow-up assessment at week 12 of the study. This finding supported the first hypothesis established by us, and also coincided with the previous studies focusing on the effects of PMR on nurses. Steele (2018) studied the effect of one session of PMR combined with music on stress levels amongst oncology nurses in a recent randomised controlled study and reported a significant decrease in the perceived stress scores immediately after the intervention. Ploukou and Panagopoulou (2018) also reported similar findings from their randomised controlled study conducted in the oncology ward, according to which, music therapy that lasted for one month, with 60-min per week sessions, significantly reduced the anxiety, depression and somatic scores, and improved the well-being of the participants. Lai and Li (2011) reported consistent findings in their randomised controlled crossover trial, revealing that soothing music decreased the self-perceived stress levels amongst the first-line nurses. When the outcomes of all these studies are taken together, PMR combined with music therapy appears to exert both short-term and long-term effects of reducing perceived stress. Additionally, Steinberg et al. (2017) revealed that a mindfulness-based intervention that included yoga, meditation, and mindfulness developed for surgical ICU personnel decreased the stress levels of participants in their feasibility study. Significant decrease in the stress scores of ICU nurses observed in the present study could be attributed to the relaxation effects of PMR and music interventions which included energy restoration in the body and reduction of autonomic stimulation (Benson, 1975).

In addition to stress, another problem evident amongst ICU nurses is commonly experienced fatigue. Fatigue impairs the QOL of the nurses and also causes stress. It is noteworthy that only a few trials have been conducted in the nursing population to investigate the effects of non-pharmacological interventions on fatigue severity (Anderson et al., 2017; Duarte and Pinto-Gouveia, 2016; Hür, 2018). Moreover, to the best of our knowledge, no study so far has investigated the effects of PMR combined with music on fatigue severity amongst nurses working in ICUs. It was difficult

Table 3
Comparison of FSS scores between the study groups (N = 56).

FSS	Intervention Group (n = 28) (X±SD)	Control Group (n = 28) (X±SD)	Test statistic*	p-value
Baseline	42.43 ± 11.83	45.36 ± 12.20	0.831	0.366
Week 4	41.18 ± 11.07	43.68 ± 10.40	0.758	0.388
Week 8	30.86 ± 10.41	42.82 ± 9.66	19.843	**<0.001**
Week 12	22.64 ± 6.64	41.79 ± 8.19	101.954	**<0.001**

FSS: Fatigue Severity Scale, X = Mean, SD: Standard deviation, *One-way ANOVA.

Table 4
Comparison of Brief COPE scores between the study groups (N = 56).

Brief COPE Sub-dimensions	Measurement time	Intervention Group (n = 28) Median (25th–75th)	Control Group (n = 28) Median (25th–75th)	Test statistic*	p
Use of instrumental support	Baseline	6.0 (5.0–7.0)	6.0 (5.0–6.0)	372.00	0.733
	Week 4	6.0 (4.0–6.7)	6.0 (5.0–6.0)	350.50	0.485
	Week 8	5.5 (4.0–7.0)	6.0 (5.0–6.0)	390.50	0.980
	Week 12	6.5 (6.0–7.0)	6.0 (4.0–6.0)	214.00	**0.003**
Humour	Baseline	5.0 (3.0–5.7)	4.0 (3.0–5.0)	368.00	0.689
	Week 4	4.0 (3.0–5.0)	4.0 (3.0–5.0)	379.50	0.834
	Week 8	4.0 (3.0–4.7)	4.0 (3.0–5.0)	344.50	0.425
	Week 12	4.0 (4.0–5.0)	4.0 (3.0–5.0)	351.00	0.488
Active coping	Baseline	6.5 (5.2–8.0)	6.0 (6.0–7.0)	344.50	0.420
	Week 4	6.0 (6.0–7.0)	6.0 (5.2–6.0)	296.00	0.096
	Week 8	6.0 (6.0–7.0)	6.0 (5.2–6.7)	323.50	0.237
	Week 12	6.0 (5.2–7.0)	6.0 (6.0–6.0)	342.50	0.372
Substance use	Baseline	2.0 (2.0–2.0)	2.0 (2.0–2.0)	362.00	0.461
	Week 4	2.0 (2.0–2.0)	2.0 (2.0–2.0)	384.50	0.864
	Week 8	2.0 (2.0–2.0)	2.0 (2.0–2.7)	371.00	0.631
	Week 12	2.0 (2.0–2.0)	2.0 (2.0–2.7)	348.50	0.477
Acceptance	Baseline	6.0 (5.0–7.0)	6.0 (5.0–6.7)	317.50	0.208
	Week 4	6.0 (5.0–7.0)	5.0 (4.0–6.0)	250.50	**0.017**
	Week 8	6.0 (5.0–7.0)	5.0 (4.0–6.0)	268.50	**0.038**
	Week 12	6.0 (5.0–6.0)	5.0 (4.0–5.0)	200.00	**0.001**
Venting	Baseline	6.0 (5.0–6.0)	5.5 (5.0–6.0)	390.00	0.973
	Week 4	6.0 (5.0–6.0)	5.0 (4.2–6.0)	319.00	0.216
	Week 8	6.0 (5.0–6.0)	5.0 (5.0–6.0)	323.00	0.235
	Week 12	6.5 (5.2–7.0)	5.0 (5.0–6.0)	199.50	**0.001**
Religion	Baseline	6.0 (4.5–7.0)	5.5 (4.0–7.0)	317.00	0.209
	Week 4	6.0 (4.2–6.7)	5.5 (4.0–6.7)	347.00	0.446
	Week 8	6.0 (6.0–6.7)	6.0 (4.2–6.0)	300.00	0.108
	Week 12	6.0 (5.0–7.0)	6.0 (5.0–7.0)	360.00	0.753
Denial	Baseline	4.0 (2.0–4.0)	3.5 (2.0–4.7)	377.00	0.798
	Week 4	3.0 (2.2–4.0)	3.5 (3.0–4.0)	368.00	0.682
	Week 8	3.5 (3.0–5.0)	3.5 (2.2–4.0)	331.00	0.302
	Week 12	3.0 (3.0–4.0)	3.0 (3.0–4.0)	389.50	0.964
Behavioural disengagement	Baseline	3.0 (2.0–4.0)	2.5 (2.0–4.0)	367.50	0.670
	Week 4	2.0 (2.0–3.0)	2.0 (2.0–3.0)	370.50	0.697
	Week 8	2.0 (2.0–3.0)	3.0 (2.0–3.0)	346.00	0.413
	Week 12	2.0 (2.0–3.7)	2.0 (2.0–3.0)	351.50	0.460
Self-distraction	Baseline	6.0 (5.0–7.0)	6.0 (5.0–7.0)	385.00	0.906
	Week 4	6.0 (6.0–7.0)	6.0 (5.2–6.0)	272.50	**0.036**
	Week 8	6.0 (6.0–7.0)	6.0 (5.2–7.0)	321.50	0.224
	Week 12	6.0 (6.0–7.0)	7.0 (6.0–7.0)	340.00	0.361
Self-blame	Baseline	5.0 (5.0–6.7)	5.0 (4.0–6.0)	320.50	0.222
	Week 4	5.0 (4.0–6.0)	5.0 (4.0–5.0)	340.00	0.370
	Week 8	4.0 (4.0–6.0)	4.5 (4.0–5.0)	374.00	0.758
	Week 12	4.0 (4.0–5.0)	5.0 (4.0–5.0)	349.50	0.467
Positive reframing	Baseline	6.0 (5.0–7.0)	6.0 (6.0–7.0)	387.00	0.932
	Week 4	6.0 (5.2–7.0)	6.0 (5.0–6.7)	352.50	0.497
	Week 8	6.0 (6.0–7.0)	6.0 (6.0–7.0)	332.00	0.295
	Week 12	7.0 (6.0–8.0)	6.0 (6.0–7.0)	303.50	0.126
Use of emotional support	Baseline	5.5 (4.2–6.0)	5.5 (4.2–6.0)	379.50	0.834
	Week 4	5.0 (4.0–6.0)	6.0 (5.0–6.0)	329.00	0.288
	Week 8	6.0 (5.0–7.0)	5.0 (4.0–6.0)	294.50	0.101
	Week 12	6.0 (6.0–7.0)	5.0 (5.0–6.0)	233.50	**0.012**
Planning	Baseline	7.0 (6.0–7.0)	6.0 (6.0–7.7)	342.00	0.396
	Week 4	6.0 (6.0–7.0)	6.0 (5.2–6.0)	328.00	0.262
	Week 8	6.0 (6.0–7.0)	6.0 (5.0–7.0)	311.00	0.160
	Week 12	6.0 (6.0–7.0)	6.0 (5.2–7.0)	351.00	0.484

* Mann-Whitney *U* test.

to make a direct comparison between the study findings. The analysis conducted following the PMR combined with music sessions revealed that fatigue severity scores were significantly reduced at week 8 and this beneficial effect continued until the follow-up assessment at week 12 of the study, supporting our second hypothesis. In line with the findings of the present study, Hür (2018) examined the effects of stress management training on fatigue levels amongst ICU nurses and reported similar findings in terms of considerable reductions in the fatigue scores. Another previous report stated that a 6-week awareness meditation program conducted for oncology nurses resulted in relief from fatigue (Duarte and Pinto-Gouveia, 2016). Taken together, all these findings indicate that non-pharmacological interventions such as PMR, music, and meditation may exert similar beneficial effects on fatigue scores in nurses. It is suggested that PMR combined with music approach adopted in the present study could play an

important role in decreasing the feeling of fatigue by providing a pleasurable stimulus, thereby creating arousal which increases nurses' engagement during PMR. It is also suggested that music may enhance PMR, as the movements of the relaxation technique could be entrained with music, which may have ultimately decreased fatigue in the participants (Choi, 2010).

In support of our third hypothesis, PMR combined with music significantly improved the coping styles in the intervention group in comparison to those in the CG. On the basis of the outcomes of the present study, one of the problem-focused coping strategies, the use of instrumental support significantly improved in the intervention group at week 12, as observed in the follow-up assessment. In regard to the emotion-focused coping strategies, acceptance was significantly used by the participants in the intervention group at weeks 4, 8 and 12. Additionally, the self-distraction sub-dimension obtained a significantly higher score in the intervention group at week 4. Similar to the findings of the present study, Mehrabi et al. (2012) reported that yoga improved problem-focused coping strategies in ICU nurses. It may, therefore, be concluded that PMR combined with music or yoga exert positive effects on improving the coping styles in ICU nurses. These parallel findings in relation to coping style strategies could be partially attributed to the nature of PMR and music interventions both of which belong to the category of non-pharmacological, relaxation approaches, and have similar therapeutic components. In the literature, problem-focused coping strategies have been frequently used to alter or modify the fundamental cause of stress. In this context, nurses in the PMR combined with music intervention group obtained greater coping scores compared to the nurses in the CG, implying that they were able to cope better with their daily lives or with ICU related stressors by following the weekly practice of the PMR combined with music sessions conducted in the present study. Emotion-focused coping strategies have also been demonstrated to take control over the individuals' emotions (Contrada and Baum, 2011). In this context, with improvements in the emotion-focused coping strategies in the PMR combined with music group in the present study, ICU nurses may gain certain abilities in terms of self-reflection, self-expression, and processing of their own emotions in order to achieve reappraisal of the unchangeable stressors (Baldacchino and Draper, 2001; Stanton et al., 2000).

Limitations

The findings of the present study must be interpreted in the context of certain limitations. The PI collected the data for both the control and intervention groups and administered all the interventions. This could be a potential inherent bias. The study protocol occurred over 8 weeks with only a single time follow-up, so the long-term effects are unknown. Therefore, a study identifying the long-term effects would be better able to describe the full impact of the interventions. Finally, the present study was conducted in a single center, and the sample was confined to female nurses only, which makes findings difficult to generalise to all nurses working in ICUs.

Conclusion

Taking all the findings of the present study together, it may be stated that PMR combined with music is an effective approach to manage stress and fatigue, and is supportive of greater use of problem-focused and emotion-focused coping strategies among ICU nurses. The PMR combined with music approach appears to be well-tolerated, acceptable, and practical amongst ICU nurses who are exposed to heavy stressors in their daily lives. The present study evidenced benefits of PMR combined with music, and it is recommended that nurses integrate PMR and music interventions into clinical setting after participating in the related specific training programs. Future studies should examine the results using longitudinal designs in nurses working in multiple settings. This study suggests that PMR, and music therapy can provide a low-cost, feasible, and attractive way to alleviate some of the stressors of nurses working in high intensity settings. The authors suggest that future research should explore PMR combined with music therapy for other problems such as burn out syndrome, sleep disturbance, and depression to provide more comprehensive support for ICU nurses.

In conclusion, the present randomised control trial provided sufficient evidence that PMR combined with music exerts beneficial effects of decreasing perceived stress and fatigue severity as well as improving the coping styles amongst ICU nurses. According to the results of the present study, it is possible to safely integrate PMR combined with music into clinical practice, for the management of stress and fatigue and to support the coping strategies of ICU nurses.

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Ethical approval

The study was approved by the clinical trials ethics committee of the University of Health Sciences, Ankara Gulhane Training and Research Hospital (decision number: 18/167–05.06.18), and was performed in accordance with the Declaration of Helsinki.

Authors' note

This study was master dissertation of B.O. and Z.G.M. was the advisor.

Declaration of Competing Interest

The authors declare they have no conflict of interest.

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Appendix A. Supplementary data

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