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Effects of Music Assisted Progressive Relaxation Exercises on Postoperative Sleep Quality and Pain Intensity: A Quasi-experimental Controlled Study

Müzik Terapisi ile Birlikte Yapılan Progresif Gevşeme Egzersizinin Postoperatif Uyku Kalitesi ve Ağrı Şiddeti Üzerine etkisi: Yarı Deneysel Bir Araştırma

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Abstract

Objective: Generally, deterioration of sleep quality has a negative impact on pain, while pain due to illness may also adversely impair sleep quality. This study was conducted to evaluate the effect of music-assisted progressive relaxation exercises (MaPRE) on postoperative sleep quality and pain intensity of patients hospitalized in the surgical clinics of a university hospital.

Materials and Methods: This was a nonrandomized, single-blind, quasi-experimental controlled study with pre- and post-test. A total of 62 patients took part in the study, including 31 surgical patients in the intervention group, and 31 surgical patients in the control group. The intervention group regularly performed MaPRE for 30 min per day during the week after surgery. Data were collected by "visual analogue scale" for evaluation pain intensity, and "visual analog sleep scale" for determination sleep quality.

Results: Performing MaPRE provided a significant increase in the sleep quality of patients and a significant decrease in the level of pain intensity of patients in the intervention group. There was no significant difference found between sleep quality of patients who performed MaPRE and those who did not. There was a significant difference between the level of pain intensity of patients who performed MaPRE and those who did not. However, patients who underwent MaPRE had higher levels of pain intensity than those who did not.

Conclusion: MaPRE increased postoperative sleep quality of patients and reduced the severity of postoperative pain in patients. In conclusion, MaPRE increases the sleep quality of patients in surgical clinics and helps reduce the patients' level of pain intensity.

Keywords: Sleep quality, pain intensity, music therapy, progressive relaxation exercises, postoperative care

Öz

Amaç: Genel olarak uyku kalitesinin bozulması ağrıyı olumsuz etkilerken, hastalığa bağlı ağrı da uyku kalitesini olumsuz etkileyebilir. Bu çalışma, bir üniversite hastanesinin cerrahi kliniklerinde yatan hastalarda, müzik destekli progresif gevşeme egzersizlerinin (MaPRE) ameliyat sonrası uyku kalitesi ve ağrı yoğunluğuna etkisini değerlendirmek amacıyla yapılmıştır.

Gereç ve Yöntem: Bu, ön ve son test ile randomize olmayan, tek kör, yarı deneysel kontrollü bir çalışmadır. Çalışmaya müdahale grubunda 31 cerrahi hasta ve kontrol grubunda 31 cerrahi hasta olmak üzere toplam 62 hasta dahil edilmiştir. Müdahale grubu ameliyattan sonraki hafta boyunca düzenli olarak günde 30 dakika MaPRE yapmıştır. Çalışmanın verileri ağrı şiddetini değerlendirmek için "görsel kıyaslama ağrı ölçeği" ve uyku kalitesini belirlemek için "görsel kıyaslama uyku ölçeği" yardımıyla toplanmıştır.

Bulgular: MaPRE yapılması müdahale grubundaki hastaların uyku kalitesinde anlamlı bir artış ve ağrı şiddeti düzeyinde anlamlı bir azalma sağlamıştır. MaPRE uygulayan ve uygulamayan hastaların uyku kaliteleri arasında anlamlı bir fark bulunamamıştır. MaPRE uygulayan ve uygulamayan hastaların ağrı şiddeti düzeyleri arasında anlamlı fark bulunmuştur. Ancak, MaPRE uygulayan hastalarda, uygulamayanlara göre daha yüksek düzeyde ağrı şiddeti bulunmuştur.

Sonuç: MaPRE hastaların ameliyat sonrası uyku kalitesini artırmış ve hastalarda ameliyat sonrası ağrı şiddetini azaltmıştır. Sonuç olarak, MaPRE cerrahi kliniklerde yatan hastaların uyku kalitelerini artırmakta ve ağrı şiddetlerini azaltmaya yardımcı olmaktadır.

Anahtar Kelimeler: Uyku kalitesi, ağrı şiddeti, müzik terapi, progresif gevşeme egzersizi, ameliyat sonrası bakım

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Introduction

Sleep quality of patients hospitalized due to an acute illness is generally impaired due to disturbances such as fragmentation of sleep, disruption of circadian rhythm, altered sleep architecture with decreases in slow wave and rapid eye movement sleep (1). In the postoperative period, it is observed that sleep quality of the patients is affected by pain, complications, early mobilization, chronic diseases, noise pollution in the hospital environment, nursing care and treatment hours, treatment equipment on the patient, and light (2). Various interventions such as aromatherapy massage (3), Tibetan yoga, Thai Chi exercises (4), forest therapy (5), sleep hygiene education and reflexology (6), Melissa officinalis supplementation (7), and training based on Roy Adaptation Model (8) were implemented to improve the sleep quality of hospitalized patients. Patients hospitalized in surgical clinics are often discharged without time for these training and interventions, as early discharge is recommended (9).

In general, deterioration of sleep quality has negative impacts on pain, while pain due to illness may also adversely impair sleep quality (1). Especially nocturnal pain, directly makes falling asleep difficult and provides easy arousal during sleep (2). It has been shown that disturbed sleep the night before surgery (lower sleep efficiency) in patients was associated with increased postoperative pain severity, and pain interference with daily activities over the week after surgery (10). Interventions aimed at improving sleep quality appear to reduce pain symptoms and to improve sleep even in the setting of considerable pain and discomfort (11). In addition to medical applications such as sedative hypnotic agents (11), interventions such as aroma therapy and music therapy (12), educational pain management booklet (13), mirror therapy (14), and massage (15) are widely used to reduce the pain of patients after surgery.

MaPRE can improve sleep quality by relaxing muscles in the body, lowering blood pressure, and stimulating circulation. These exercises provide physical and mental relaxation by stimulating the parasympathetic nervous system. Progressive relaxation exercises can be applied without any material. The major advantage of progressive relaxation exercises is that they can be independently administered by the patient and are easy to administer and do not harm the patient. Therefore, they are easily accessible and cost effective interventions that improve sleep quality during the hospitalization period starting from the intensive care phase after surgery (16). Although there are studies showing that progressive relaxation exercises combined with music therapy in surgical patients provide a degrease in depression, anxiety and length of hospital stay (17), an increase in quality of life (16), and a rehabilitation with improving upper limb function (18); clinical evidence to support their routine use in increasing sleep quality and a reduce in pain level is insufficient (1,19). This study was conducted to evaluate the effect of music-assisted progressive relaxation exercises (MaPRE) on postoperative sleep quality and pain intensity of patients hospitalized in the surgical clinics of a university hospital.

Research hypothesis

H_1. MaPRE will increase the postoperative sleep quality of patients in intervention group.
H_2. Patients who perform MaPRE will have a better postoperative sleep quality than those who do not.
H_3. MaPRE will reduce the severity of the postoperative pain of patients in intervention group.
H_4. Patients who perform MaPRE will have less postoperative pain than those who do not.

Materials and Methods

Design

This non-randomized, single-blind, quasi-experimental controlled study with pre- and post-test was conducted between March 01-July 31, 2019 with the hospitalized patients in the Surgical Clinics of Eskişehir Osmangazi Unversity Health Practice and Research Hospital. The surgical clinics in which this study was performed consist of general surgery, urology, plastic, orthopaedics, cardiovascular, eye, brain, thoracic and ear nose and throat surgery and cardiology departments. The study was registered at ClinicalTrials.gov Protocol Registration Data Element Definitions for Interventional and Observational Studies database under identifier NCT04827940.

Participants

For the selection of the participants, a cross-sectional study was conducted on 139 patients who were hospitalized in the Surgical Clinics of Eskişehir Osmangazi Unversity Health Practice and Research Hospital, in which preoperative sleep quality and pain intensity were evaluated. Findings regarding the cross-sectional study were reported in another article (20). Then, a convenience sample was recruited from 139 patients for the quasi-experimental controlled study. The a priori power analysis of the study was achieved by G*Power, version 3.1 statistical software (21). The required sample size was found to be 56 participants, including 28 patients in each group, at 0.05 type I error level, 0.90 force and 0.80 effect size obtained using the data from the reference study (22). We then factored in an estimated 10% attrition rate, due to probability of being early discharged or non-compliance. Participants had been recruited the until we achieved a target of 31 patients in each group.

Patients who met the following criteria were recruited in this study: 1) Being 18 years or older; 2) Agreeing to participate in the research; 3) Being hospitalized within the time interval of the study in surgical clinics for at least one week in postoperative period; 4) Not regularly practicing relaxation exercises before. Patients were not recruited if they: 1) Were under 18 years of age; 2) Refused to participate in research; 3) Discharged before one week in postoperative period within the time interval of the study; 4) hospitalized for more than a week due to the possibility of having a serious illness that prevents them from doing relaxation exercises; 5) Had a communication problem. Nursing students informed the researcher about the patients who accepted to participate in the study. A person from the research team then contacted the participants to review the inclusion

criteria and invite them to study. All participants (n=139) who volunteered to participate in the study and met the inclusion criteria were given training on progressive relaxation exercises one day before surgery in order to all participant benefit from the benefits of intervention. At this point, the researchers had no influence or knowledge on which patient would be included in intervention group and which patient would be in control group. Patients who were discharged before one week in the postoperative period (n=70) and who did progressive relaxation exercises intermittently in the postoperative period (n=7) were excluded from the study. Consequently, while 31 patients who were hospitalized for at least one week in postoperative period and who regularly performed MaPRE within 1 week after the surgery were constituted the intervention group, 31 patients who were hospitalized for at least one week after the surgery but did not perform MaPRE after the surgery constituted the control group. In the post hoc power analysis performed at the end of the study, it was determined that the power of the study was 0.92. The participant flow is presented in Figure 1.

Measures

The data of the study were collected by face-to-face interview method with the using of ''visual analogue scale'' for evaluation pain intensity, and ''visual analog sleep scale (VASS)'' for determination sleep quality.

Visual analogue scale for pain (VASP): The VASP is a continuous scale comprised of a horizontal or vertical line, 10 centimeters (100 mm) in length. For pain intensity, the scale is anchored by "no pain" (score of 0) and "pain as bad as it could be" or "worst imaginable pain" (score of 10). The patients were asked to mark the part expressing their pain intensity on the 10 cm horizontal line. This chart was prepared as a blank line for self-assessment and the prepared chart was measured with the help of a ruler to obtain a numerical index of the level of pain intensity. A higher score indicates greater pain intensity (23).

VASS: The original VASS was developed by Verran and Snyder-Halpern in 1988 to assess the quality of sleep of patients, consisted of 15 items and three sub-dimensions as disturbance, effectiveness, and supplementation (daytime sleep). Turkish version of the scale consists of 10 items and unlike original one, it evaluates sleep quality as a whole without it's sub-dimensions. Each item in the scale is evaluated by a visual analog technique, consisted of a scalechart ranging from 0 (left side) to 100 (right side), and the minimum score that can be obtained from the scale is 0 and the maximum score is 1000. An increase in the score obtained from the scale indicates that the sleep quality decreases. Cronbach's Alpha value was 0.94 in the original study (24) and it was found as 0.87 for both pre and post-test in the present study.

Procedures

The data of study were collected during application of the ''surgical nursing'' course. Students who completed the 4-hour training program about sleep, progressive relaxation exercises and questionnaire administration became the pollsters of the study. Each student taught MaPRE to the patient under the supervision of the researcher. The students fulfilled the task of filling the scales (VASP, VASS) applied to the patients.

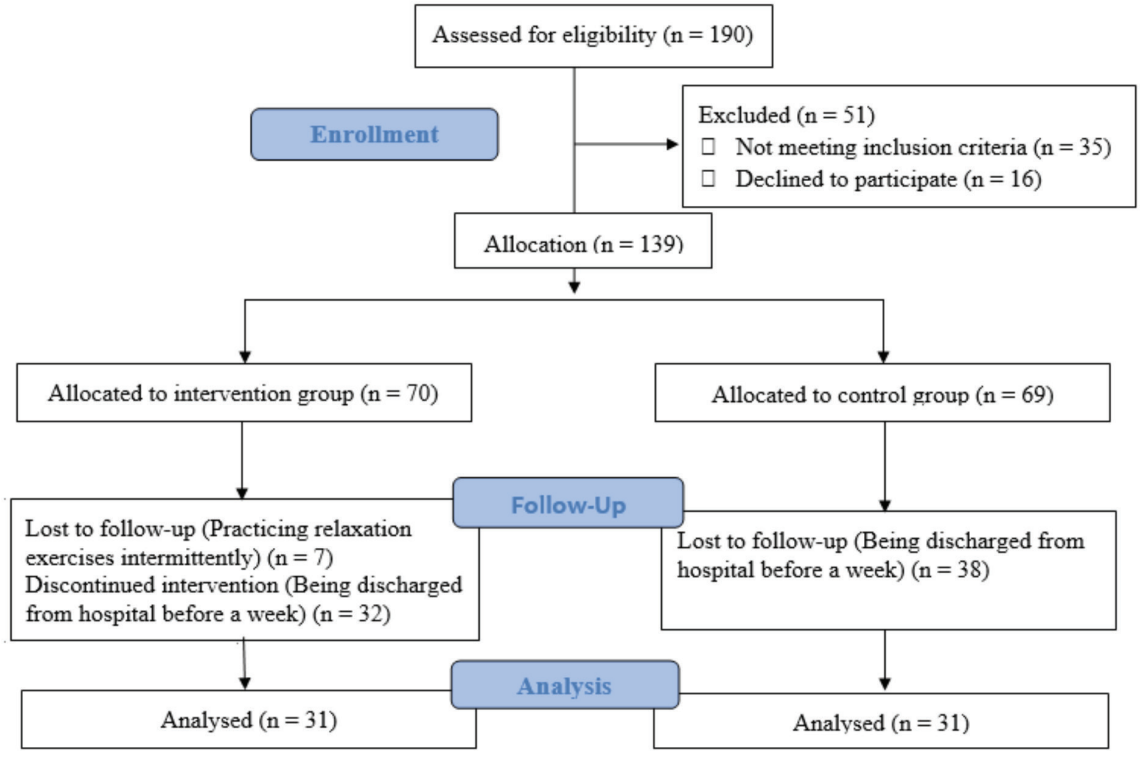

Figure 1. Participant flow

Students also played a reminder role in patients' compatibility with MaPRE. In the study, relaxation music for sleep prepared by the Turkish Psychological Association and Progressive Relaxation Exercises developed by Jacobson (25) were used. Progressive relaxation exercises are an easy-to-learn, easy-to-apply, invasive, and potentially risk-free intervention in the clinical setting. Its aim is to help the individual feel the difference between tension and looseness by reviewing the user's whole body as soon as possible, so control the muscles and get into a relaxed state as soon as possible by reducing the user's tension.

The progressive relaxation technique includes the conscious contraction and relaxation of the muscles in the body together with deep breathing exercises while sitting or lying down comfortably, accompanied by music (25). A pre-test was applied to all patients who accepted participate in study, and then, MaPRE was taught to each patient at the bedside with the help of the ''relaxation exercises brochure'', and it was observed whether patients applied the exercises correctly. Relaxation exercises brochure demonstrates how performed relaxation exercises were performed by supporting them with illustrations. The relaxation music for sleep, prepared by the Turkish Psychologists Association, was installed on the mobile phones of patients. To reduce potential bias related to non-randomization, the researcher(s) ensured that the relaxation exercise training was given to all participants who wanted to participate in the study. All patients were asked to perform MaPRE before sleeping for an average of 30 minutes, for a week after the surgery and every day. Patient's statement and observation of the nurse in the clinic were used for the controlling. Considering the insufficient number of patients hospitalized for more than a week after the surgery and the possibility of serious illness diagnoses that would prevent patients who were hospitalized for more than a week from performing MaPRE, the post-tests were applied one week after the surgery, and sleep quality and pain intensity were evaluated.

Ethical Considerations

This study was approved by Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee (26.02.2019/11) and institutional approval was obtained from Eskişehir Osmangazi University Hospital (21.09.2018/97008). In addition, patients were informed about the study and verbal and written informed consents were obtained from participants.

Statistical Analysis

Independent sample t-test in the presence of two independent variables and One-Way ANOVA in the presence of three or more independent variables were used in comparison of the pre-test and post-test scores of intervention and control groups. Paired sample t-test was used in comparison of the difference between pre-test post-test scores of intervention and control groups. The statistical significance level was taken as $p<0.05$.

Results

Characteristics of study participants

A total of 62 patients took part in the study, including 31 patients who regularly applied MaPRE every day for a week after surgery in intervention group, and 31 patients who never perform MaPRE for one week after surgery in control group. The mean age of intervention group and control group were respectively, 51.74±17.89 (minimum: 18.00, maximum: 74.00), and 54.35±18.62 (minimum: 19.00, maximum: 86.00) years. There were 11 females and 20 males in intervention group, and 13 females and 18 males in control group. There was no significant difference between the two groups in terms of demographic variables that could affect the results, and these demographic characteristics were homogeneous.

Intervention and control group comparisons of background characteristics and some related variables

Performing MaPRE provided a significant increase in sleep quality of those who were male, those who were overweight, those who shared their room with 2 or more patients, all patients with or without his/her companion, those with any chronic disease, and those with chronic prescription medication use (Table 1; for each $p<0.05$). In the control group, sleep quality of those staying in a single room increased in post tests according to pre-tests (Table 1; $p<0.05$).

Performing MaPRE provided a significant increase in sleep quality of those who have never a short daytime napping, those who have frequently a short daytime napping, those with sleep problems before hospitalization, those who do not perform exercise regularly, those with or without tea consumption in the evening, those who do not consume coffee in the evenings, and those who do not use tobacco and alcohol (Table 2; for each $p<0.05$). In the control group, sleep quality of those who have sleep problems during hospitalization increased in post tests according to pre-tests (Table 2; $p<0.05$).

Performing MaPRE provided a significant decrease in the level of pain intensity of both women and men, those who were both normal weight and overweight, those staying in both single and double or more people rooms, those who had a companion, those with and without any diagnosed chronic disease, and those with and without chronic prescription medication use (Table 3; for each $p<0.05$).

Performing MaPRE provided a significant decrease in the level of pain intensity of those who never or freguently had a short daytime napping, those both who did not have a sleep problem before hospitalization and who had a sleep problem before hospitalization, those who had sleep problems during their hospitalization, those who both performed exercise regularly and those who did not, those who did not consume coffee in the evenings, those who both used tobacco and alcohol and those who did not use (Table 4; for each $p<0.05$).

The comparison of sleep quality (VASS) and pain intensity (VASP) of intervention and control groups was presented in Table 5. There was a significant difference between intervention and control groups' pre-procedure sleep quality ($p=0.026$).

Performing MaPRE provided a significant increase in sleep quality of patients in intervention group (H_1 accepted; p=0.004). There was no significant difference found between sleep quality of patients who performed MaPRE and those who did not (H_2 rejection; p>0.05). Performing MaPRE provided a significant decrease in the level of pain intensity of patients in intervention group (H_3 accepted; p<0.001). There was a significant difference between the pre-procedure level of pain intensity in intervention and control groups (p<0.000). There was a significant difference between the level of pain intensity of patients who performed MaPRE and those who did not (p=0.032). However, patients who performed MaPRE had higher level of pain intensity than those who did not (H_4 rejection; p>0.05).

Discussion

It is known that the sleep disturbance in surgical patients causes delay in postoperative recovery, prolonged hospital stay and higher costs. Therefore, it is very important to increase sleep quality of surgical patients (26). It has been stated in many studies that music and progressive relaxation exercises increase the sleep quality of patients (16,19,22). In present study, performing MaPRE provided a significant increase in sleep quality of patients in intervention group (H_1 accepted). In a study conducted with burn patients, it was found that progressive relaxation exercises increased sleep quality (27). In some studies, it was reported that patients with good sleep quality were discharged earlier from hospital, had less postoperative pain intensity and reported fewer complications (22). Postoperative complications and length of stay in the hospital were not evaluated, as it was not the primary goal in present study. However, it can be said that patients' level of pain intensity in intervention group was lower than control group, and the results were similar to the literature.

Table 1. The distribution of the mean of patients in intervention and control groups in pre and post tests of the VASS scores by their some related independent variables

	Visual analog sleep scale (VASS)							
Variables	n	Intervention group		Test statistics	n	Control group		Test statistics
		Pre-test	Post-test			Pre-test	Post-test	
		Mean ± SD	Mean ± SD	t/F ; p		Mean ± SD	Mean ± SD	t/F ; p
Gender								
Female	11	580.09±143.45	456.63±221.00	2.232; 0.050	13	532.53±205.77	490.30±188.53	1.445; 0.174
Male	20	561.85±221.17	462.40±185.89	2.230; **0.038**	18	395.61±187.45	397.66±181.89	-0.080; 0.937
Test statistics (t; p)		0.246; 0.808	-0.077; 0.939			1.927; 0.064	1.378; 0.179	
Body mass index								
Normal	11	613.00±150.10	563.36±199.52	1.262;.235	9	489.88±221.57	414.66±173.72	2.163; 0.062
Overweight	14	552.78±194.03	428.07±190.84	2.684; **0.019**	13	417.61±224.99	424.07±216.53	-0.184; 0.857
Obese	6	522.66±277.49	346.83±114.06	1.413; 0.217	9	467.33±164.46	476.33±169.22	-0.478; 0.645
Test statistics (F; p)		0.482; 0.623	3.118; 0.060			0.350; 0.708	0.279; 0.759	
Number of inpatients in the patient room								
1	10	646.20±154.89	538.30±207.12	1.801; 0.105	11	465.27±139.25	420.09±144.50	2.780; **0.019**
2 and above	21	531.23±203.97	423.23±182.95	2.517; **0.020**	20	446.30±235.14	445.55±210.30	0.026; 0.979
Test statistics (t; p)		1.574; 0.126	0.533; 0.127			0.244; 0.809	-0.357; 0.724	
Presence of companion								
No	4	417.25±164.06	299.00±144.02	5.245; **0.013**	7	387.57±215.01	403.71±234.62	-0.376; 0.720
Yes	27	590.70±191.35	484.25±192.49	2.701; **0.012**	24	472.12±201.17	446.08±176.16	1.198; 0.243
Test statistics (t; p)		-1.716; 0.097	-1.839; 0.076			-0.964; 0.343	-0.520; 0.607	
Presence of any diagnosed chronic disease								
No	14	630.28±199.25	506.92±195.99	1.812; 0.093	20	423.20±218.22	391.95±186.74	1.489; 0.153
Yes	17	517.29±180.87	422.00±192.11	3.164; **0.006**	11	507.27±170.87	517.54±167.09	-0.263; 0.798
Test statistics (t; p)		1.654; 0.109	1.214; 0.235			-1.102; 0.279	-1.857; 0.074	
Chronic prescription medication use								
No	13	626.76±190.56	505.46±235.89	1.768; 0.102	18	436.33±182.41	415.16±188.52	0.977; 0.342
Yes	18	526.11±191.79	427.77±159.40	2.874; **0.011**	13	476.15±236.17	466.07±189.29	0.279; 0.785
Test statistics (t; p)		1.446; 0.159	1.030; 0.316			-0.530; 0.600	-0.741; 0.465	
Total	31	568.32±194.73	460.35±195.38		31	453.03±203.87	436.51±187.41	

SD: Standard deviation

In a meta-analysis study in the literature, it was emphasized that music requires more than three weeks of follow-up to be effective on sleep quality (28). In present study, it was not possible patient's listening to music for more than three weeks due to the high circulation in surgical clinics. However, it was thought that its effect could be increased by being performed MaPRE. In present study, no significant difference was found between the post-test sleep quality scores of patients who performed MaPRE and those who did not (H_2 rejection). The present study results are in line with the results of the study conducted by Moradi-Mohammadi et al. (29) with patients who underwent coronary artery bypass graft surgery. Since most studies in the literature were conducted with patients who were hospitalized for a long time or stayed in a nursing home (17,30), the duration of the intervention may have been a factor in obtaining different results from the present study.

Table 2. The distribution of the mean of patients in intervention and control groups in pre and post tests of the VASS scores by their some habits

	Visual analog sleep scale (VASS)							
Variables	**n**	**Intervention group**		**Test statistics**	**n**	**Control group**		**Test statistics**
		Pre-test	**Post-test**			**Pre-test**	**Post-test**	
		Mean ± SD	**Mean ± SD**	**(t ; p)**		**Mean ± SD**	**Mean ± SD**	**(t ; p)**
A short daytime napping								
Never	7	613.28±230.56	453.00±267.87	3.178; **0.019**	8	388.33±174.70	417.77±150.07	-0.727; 0.488
Sometimes	16	483.81±145.33	467.93±158.20	0.574; 0.574	16	471.47±225.65	443.64±213.81	1.119; 0.280
Often	8	698.00±184.72	451.62±219.53	2.612; **0.035**	4	506.80±180.43	446.00±185.51	1.557; 0.194
Test statistics (F; p)		4.209; **0.025**	0.023; 0.977			0.682; 0.514	0.060; 0.942	
Presence of sleep problems before hospitalization								
No	22	525.95±193.42	458.36±197.48	2.081; 0.050	22	419.86±170.50	419.00±170.31	0.040; 0.969
Yes	9	671.88±164.28	465.22±201.84	2.516; **0.036**	9	534.11±262.93	479.33±229.49	1.395; 0.201
Test statistics (t; p)		-1.985; 0.057	-0.087; 0.931			-1.441; 0.160	-0.809; 0.425	
Presence of sleep problem during hospitalization								
No	10	364.80±111.90	309.00±123.74	1.460; 0.178	16	360.37±182.86	383.62±186.11	-0.825; 0.422
Yes	21	665.23±143.77	532.42±182.92	2.830; **0.010**	15	551.86±181.56	492.93±177.61	2.636; **0.020**
Test statistics (t; p)		-5.805; **0.000**	-3.486; **0.002**			-2.927; **0.007**	-1.671; 0.106	
Performing exercise regularly								
No	21	572.28±212.93	448.52±197.73	2.751; **0.012**	21	436.76±215.46	436.71±204.78	0.003; 0.998
Yes	10	560.00±159.77	485.20±198.38	1.478; 0.174	10	487.20±182.96	436.10±154.58	1.113; 0.295
Test statistics (t; p)		0.162; 0.873	-0.482; 0.633			-0.637; 0.529	0.008; 0.993	
Tea consumption in the evening								
No	11	510.00±177.29	437.81±218.27	3.464; **0.006**	9	497.55±209.74	497.11±196.52	1.512; 0.169
Yes	20	600.40±200.69	472.75±186.40	3.039; **0.007**	22	434.81±203.53	411.72±182.34	-0.309; 0.761
Test statistics (t; p)		-1.248; 0.222	-0.470; 0.642			0.772; 0.446	1.158; 0.256	
Coffee consumption in the evening								
No	24	551.62±212.10	433.54±183.88	2.997; **0.006**	17	433.00±214.05	422.82±190.25	0.473; 0.642
Yes	7	625.57±110.51	552.28±220.26	0.993; 0.359	14	477.35±195.88	453.14±189.64	0.696; 0.499
Test statistics (t; p)		-0.881; 0.386	-1.440; 0.161			-0.596; 0.556	-0.442; 0.662	
Tobacco use								
No	19	537.89±182.95	435.15±186.60	3.338; **0.004**	17	470.58±204.67	460.11±197.99	0.465; 0.648
Yes	12	616.50±210.99	500.25±210.48	1.521; 0.157	14	431.71±208.50	407.85±176.62	0.705; 0.493
Test statistics (t; p)		-1.098; 0.281	-0.901; 0.375			0.522; 0.606	0.767; 0.449	
Alcohol use								
No	26	567.80±198.31	437.26±192.94	3.431; **0.002**	27	419.85±191.29	419.96±189.51	-0.006; 0.995
Yes	5	571.00±196.40	580.40±179.36	-0.155; 0.884	4	677.00±147.46	548.25±144.42	1.896; 0.154
Test statistics (t; p)		-0.033; 0.974	-1.534; 0.136			-2.563; **0.016**	-1.292; 0.207	
Total	31	568.32±194.73	460.35±195.38		31	453.03±203.87	436.51±187.41	

SD: Standard deviation

Pain is the most common cause of complaints in surgical clinics. In addition, it is emphasized that pain and sleep disorders mutually affect each other. In the literature, previous studies showed that music and relaxation exercises reduced the level of pain intensity of patients (19,31). In present study, performing MaPRE provided a significant decrease in the level of pain intensity of patients in intervention group (H_3 accepted). Similarly, Gallagher et al. (31) was reported that postoperative music and relaxation exercises reduced pain severity of patients. However, in present study patients who performed MaPRE had higher level of post-test pain intensity than those who did not (H_4 rejection). This may be due to the willingness of those with high level of pain intensity to seek ways to manage their pain and their more willingness to perform MaPRE compared to the control group.

Study Limitations

Several limitations of this study should be noted. MaPRE was performed for a maximum of one week duration in postoperative period due to the rapid circulation of patients hospitalized in surgical clinics. This limitation was tried to be overcome by performing two proven interventions, such as music and relaxation exercises, together. Another limitation of present study was that there was no randomization so that all patients could benefit from the advantage of intervention.

Conclusion

As far as we know, the present study is the first study on the sleep quality and pain intensity of patients hospitalized in all surgical clinics of MaPRE. MaPRE increase the sleep quality of patients in surgical clinics and help reduce the patients' level of pain intensity. MaPRE are not a routine method for

Table 3. The distribution of the mean of patients in intervention and control groups in pre and post tests of the VAS scores by their some related independent variables

		Visual analog scale (VAS)						
Variables	**n**	**Intervention group**		**Test statistics**	**n**	**Control group**		**Test statistics**
		Pre-test	**Post-test**			**Pre-test**	**Post-test**	
		Mean ± SD	**Mean ± SD**	**(t ; p)**		**Mean ± SD**	**Mean ± SD**	**(t ; p)**
Gender								
Female	11	4.95±1.82	3.27±2.24	3.019; **0.013**	13	3.00±3.10	4.00±5.14	-0.690; 0.504
Male	20	6.72±2.74	5.15±2.71	3.139; **0.005**	18	2.33±2.42	1.72±1.87	2.265; **0.037**
Test statistics (t; p)		-1.9215; 0.065	-1.950; 0.061			0.671; 0.507	1.734; 0.093	
Body mass index								
Normal	11	2.53±0.76	3.06±0.92	2.473; **0.033**	9	2.66±3.53	3.77±6.11	-0.515; 0.620
Overweight	14	2.34±0.62	2.79±0.74	3.873; **0.002**	13	2.84±2.44	2.15±2.15	2.112; 0.056
Obese	6	3.22±1.31	1.63±0.66	1.085; 0.328	9	2.22±2.38	2.33±2.39	-1.000; 0.347
Test statistics (F; p)		0.773; 0.471	0.468; 0.631			0.136; 0.874	0.542; 0.588	
Number of inpatients in the patient room								
1	10	7.20±2.65	5.00±3.05	2.851; **0.019**	11	2.72±2.61	2.09±2.11	2.055; 0.067
2 and above	21	5.57±2.41	4.23±2.52	3.239; **0.004**	20	2.55±2.81	3.00±4.38	-0.468; 0.645
Test statistics (t; p)		1.700; 0.100	0.734; 0.469			0.172; 0.865	-0.643; 0.525	
Presence of companion								
Yok	4	4.00±2.16	2.50±2.51	1.732; 0.182	7	2.71±2.49	2.57±1.98	0.420; 0.689
Var	27	6.40±2.51	4.77±2.62	3.929; **0.001**	24	2.58±2.81	2.70±4.13	-0.154; 0.879
Test statistics (t; p)		-1.814; 0.080	-1.628; 0.114			0.111; 0.912	-0.084; 0.934	
Presence of any diagnosed chronic disease								
No	14	6.57±2.53	4.42±2.56	3.122; **0.008**	20	2.05±2.64	2.35±4.36	-0.309; 0.761
Yes	17	5.70±2.61	4.52±2.85	3.191; **0.006**	11	3.63±2.61	3.27±2.19	1.305; 0.221
Test statistics (t; p)		0.931; 0.360	0.560; 0.919			-1.603; 0.120	-0.653; 0.519	
Chronic prescription medication use								
No	13	6.23±2.86	3.92±2.87	3.207; **0.008**	18	2.50±2.14	1.88±1.84	2.500; 0**.023**
Yes	18	6.00±2.41	4.88±2.54	3.142; **0.006**	13	2.76±3.41	3.76±5.26	-0.685; 0.506
Test statistics (t; p)		0.243; 0.810	-0.989; 0.331			-0.269; 0.790	-1.409; 0.170	
Total	31	6.09±2.57	4.48±2.68		31	2.61±2.70	2.67±3.72	

SD: Standard deviation

hospitalized patients in surgical clinics; however, it is thought to contribute to postoperative recovery. Providing a recovery environment for patients in surgical clinics is among the responsibilities of nurses. The effects of factors that increase the level of pain intensity and disrupt sleep quality should be tried to be reduced, and patients with sleep problems should be determined in a timely manner. MaPRE are non-invasive, affordable, effective and easy-to-apply intervention that can be applied throughout the hospitalization. Therefore, the healthcare team should include such interventions in the treatment and care plan.

Information: The study was registered at ClinicalTrials.gov database under identifier NCT04827940, https://clinicaltrials.gov/ct2/show/NCT04827940

Table 4. The distribution of the mean of patients in intervention and control groups in pre and post tests of the VAS scores by their some habits

		Visual analog scale (VAS)						
Variables	**n**	**Intervention group**		**Test statistics**	**n**	**Control group**		**Test statistics**
		Pre-test	**Post-test**			**Pre-test**	**Post-test**	
		Mean ± SD	**Mean ± SD**	**(t ; p)**		**Mean ± SD**	**Mean ± SD**	**(t ; p)**
A short daytime napping								
Never	7	5.71±3.03	3.42±2.93	4.042; **0.007**	8	2.00±2.82	1.44±2.12	1.474; 0.179
Sometimes	16	5.46±2.47	4.50±2.28	2.097; 0.053	16	2.82±2.85	3.35±4.58	-0.467; 0.647
Often	8	7.68±1.83	5.37±3.20	2.412; **0.047**	4	3.00±2.23	2.60±2.40	1.633; 0.178
Test statistics (F; p)		2.263; 0.123	0.983; 0.387			0.319; 0.730	0.760; 0.477	
Presence of sleep problems before hospitalization								
No	22	6.09±2.70	4.54±2.89	3.552; **0.002**	22	2.27±2.33	2.81±4.14	-0.642; 0.528
Yes	9	6.11±2.35	4.33±2.23	2.326; **0.048**	9	3.44±3.46	2.33±2.59	2.169; 0.062
Test statistics (t; p)		-0.020; 0.985	0.197; 0.845			-1.099; 0.281	0.324; 0.748	
Presence of sleep problem during hospitalization								
No	10	4.00±1.63	2.60±2.06	2.264; 0.050	16	1.87±2.18	1.93±2.20	-1.000; 0.333
Yes	21	7.09±2.33	5.38±2.49	3.609; **0.002**	15	3.40±3.04	3.46±4.82	-0.050; 0.961
Test statistics (t; p)		-3.757; 0.001	-3.050; 0.005			-1.610; 0.118	-1.148; 0.261	
Performing exercise regularly								
No	21	6.35±2.42	4.80±2.65	3.272; **0.004**	21	2.61±2.53	2.23±2.27	1.896; 0.072
Yes	10	5.55±2.91	3.80±2.74	2.782; **0.021**	10	2.60±3.16	3.60±5.77	-0.514; 0.619
Test statistics (t; p)		0.813; 0.423	0.979; 0.336			0.018; 0.986	-0.949; 0.350	
Tea consumption in the evening								
No	11	5.27±2.37	3.63±3.04	2.541; 0.029	9	2.66±3.08	2.22±2.43	0.018; 0.986
Yes	20	6.55±2.62	4.95±2.41	2.506; 0.021	22	2.59±2.61	2.86±4.17	0.908; 0.374
Test statistics (t; p)		-1.341; 0.190	-1.321; 0.197			0.070; 0.945	-0.429; 0.671	
Coffee consumption in the evening								
No	24	6.22±2.62	4.37±2.82	4.158; **0.000**	17	2.94±2.53	3.76±4.47	-0.756; 0.460
Yes	7	5.64±2.49	4.85±2.26	1.364; 0.221	14	2.21±2.93	1.35±1.98	2.280; **0.040**
Test statistics (t; p)		0.525; 0.604	-0.413; 0.683			0.739; 0.466	1.862; 0.073	
Tobacco use								
No	19	5.63±2.64	4.21±2.85	3.073; **0.007**	17	2.64±2.57	3.41±4.62	-0.695; 0.497
Yes	12	6.83±2.36	4.91±2.42	2.972; **0.013**	14	2.57±2.95	1.78±2.04	2.242; **0.043**
Test statistics (t; p)		-1.281; 0.210	-0.708; 0.484			0.076; 0.940	1.219; 0.233	
Alcohol use								
No	26	5.92±2.49	4.23±2.71	3.843; **0.001**	27	2.40±2.43	2.70±3.90	-0.420; 0.678
Yes	5	7.00±3.08	5.80±2.28	3.207; **0.033**	4	4.00±4.32	2.50±2.64	1.732; 0.182
Test statistics (t; p)		-0.854; 0.400	-1.207; 0.237			-1.103; 0.279	0.100; 0.921	
Total	31	6.09±2.57	4.48±2.68		31	2.61±2.70	2.67±3.72	

SD: Standard deviation

Table 5. Comparison of sleep quality (VASS) and pain intensity (VAS) of intervention and control groups					
Study groups	**n**	**Pre-test**	**Post-test**	**Test statistics (t ; p)**	**Hypothesis acceptance/ rejection**
		$\overline{X}$ ± SD	$\overline{X}$ ± SD		
Visual analog sleep scale (VASS)					
Intervention group	31	568.32±194.73	460.35±195.38	3.144; **0.004**	**H_1 accepted**
Control group	31	453.03±203.87	436.51±187.41	0.854; 0.400	
Test statistics (t; p) Hypothesis acceptance/rejection		2.277; **0.026**	0.490; 0.626 **H_2 rejected**		
Visual analog scale (VAS)					
Intervention group	31	6.09±2.57	4.48±2.68	4.316; 0.000	**H_3 accepted**
Control group	31	2.61±2.70	2.67±3.72	-0.102; 0.919	
Test statistics (t; p) Hypothesis acceptance/rejection		5.199; **0.000**	2.190; **0.032** **H_4 rejected**		
t: Paired sample t-test, $\overline{X}$: Mean, SD: Standard deviation					

Ethics

Ethics Committee Approval: This study was approved by Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee (26.02.2019/11) and institutional approval was obtained from Eskişehir Osmangazi University Hospital (21.09.2018/97008).
Informed Consent: Patients were informed about the study and verbal and written informed consents were obtained from participants.
Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: P.D., Ö.Ö., Y.Ş., N.K., Design: P.D., Ö.Ö., Y.Ş., N.K., Data Collection or Processing: Y.Ş., Analysis or Interpretation: P.D., Drafting the article: P.D., Y.Ş., Revising: P.D., Ö.Ö., Y.Ş., N.K., Final Approval: P.D., Ö.Ö., Y.Ş., N.K.
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