Original Article

The Effect of Relaxation Techniques and Back Massage on Pain and Anxiety in Turkish Total Hip or Knee Arthroplasty Patients

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Abstract:

The purpose of this study was to examine the effects of relaxation techniques and back massage on postoperative pain, anxiety, and vital signs on postoperative days 1-3 in patients who had undergone total hip or knee arthroplasty (THA, TKA). Sixty patients having a THA or TKA were randomly assigned to either a experimental group or a control group. The McGill Pain Questionnaire Short Form (MPQ-SF) and State Anxiety Inventory (SAI) were used to measure pain and anxiety, respectively. Vital signs, including blood pressure (systolic and diastolic), pulse, and respiratory rate, were also obtained. Statistically significant differences in pain intensity ($F = 14.50$; $p = .000$), anxiety level ($F = 19.13$; $p = .000$), and vital signs ($F = 169.61$, 9.14, 14.23, 65.64; $p = .000$) measured over time were found between the experimental and the control group. Results of this research provide evidence to support the use of relaxation techniques and back massage at bed rest times of patients to decrease pain and anxiety. The interventions helped them to forget about their pain for a while and improved their anxiety state. After an evaluation of the conclusions, use of these interventions should be implemented by nurses into routine plans of care for patients.

In the postoperative period, one of the most significant patient reports is postoperative pain—acute pain that begins with the surgical trauma, decreases over time, and ends with healing of the tissue. Postoperative pain is caused by ischemia and the release of neuropeptides at the site of trauma and throughout the nervous system (Black, Hawks, & Kene, 2001; Eti-Aslan, 2006; Wentz, 2009). Ischemic pain is of particular concern in postoperative orthopedic patients (Gregory, 2005), because orthopedic surgery, especially total hip and knee arthroplasty, is often cited as among the most painful of surgeries. The severe pain seen so frequently after

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orthopedic surgery is largely a result of the nature of the surgical procedure, which often involves significant muscle and skeletal tissue repair or reconstruction (Pasero & McCaffery, 2007).

Hill and Davis (2000) indicated that 60% of patients who underwent total hip arthroplasty (THA) and total knee arthroplasty (TKA) experienced severe pain after surgery, and this situation was caused by osseous and muscle trauma arising from the operation as well as hyperemia formed after tourniquet application. In addition, problems such as infection (actual/current) and distention diagnosed in the postoperative period and an individual's values/experience of pain may increase the intensity of pain (Eti-Aslan, 2006; Gregory, 2005; Wentz, 2009). Similarly, in the results of a study performed by Huang, Cunningham, Laurito, and Chen (2001), 25%-50% of orthopedic patients reported severe pain after operation, but this rate was reduced to just over 25% with ambulation processes. In Turkey, Eti-Aslan (2006) determined that acute pain is prevalent in patients at a rate of 30%-97% during the postoperative period. Studies by Akyol, Karayurt and Salmond (2009), Esen Büyükyılmaz and Aştı (2010), and Yavuz (2000) showed that the highest pain scores occurred for reconstruction and arthroplasty surgery (hip or knee), in which the words "throbbing, ripping, stabbing, exhausting, burning, and sharp" were used as descriptors of pain by Turkish orthopedic patients.

Disease, hospitalization, and operation are among the most frequently encountered situations that cause anxiety (Black, Hawks, & Kene, 2001). In addition, the pain experienced by patients after surgery, especially after hip and knee arthroplasty, and the adaptation period to prostheses cause anxiety (Şendir, 2000). Closs, Briggs, and Everitt (1997) established that a great majority of orthopedic patients experienced extremely severe pain on the second postoperative day and that a significant relationship was detected between anxiety and pain. For this reason, postoperative anxiety should be evaluated in addition to the diagnosis of preoperative anxiety, so that nursing interventions can be planned to reduce it (Gregory, 2005; Mac Lellan, 2006; Pellino et al., 2005).

Nonpharmacologic nursing applications in the postoperative period (relaxation techniques, back massage, cold/hot compresses, etc.) help the individual both to attain his/her expectations and to reduce his/her fear, anxiety, and pain (Gregory, 2005; Mann & Carr, 2006). These applications are easy to explain and teach to patients, they can be applied economically with a minimal amount of equipment, and their effects can be observed (Christiaens, 2003; Good, 1995). In a study carried out on a large sample group (n = 709), Titler et al. (2003) determined that position changes, cold compresses, massages, hot compresses, and relaxation techniques were mostly preferred by patients. Another study by Heye, Foster, Bartlett, and Adkins (2002) reported that relaxation techniques and massage reduced anxiety by preventing pain transmission from reaching the spinal cord and by relaxing muscles. Stress balls, massage, relaxation techniques (rhythmic respiration, muscle relaxation techniques, and listening to music), and cold compresses were reported as the most preferred methods for decreasing pain and anxiety on the first and third postoperative days for patients who underwent total hip and knee arthroplasty (Pellino et al., 2005).

Pain causes stress, which in turn causes the cardiovascular system to respond by activating the sympathetic nervous system, resulting in increased pulse, blood pressure, and oxygen demand (Pasero, Paice, & McCaffery, 1999). Measuring pulse, blood pressure, and oxygen saturation may provide evidence that relaxation techniques and back massage are decreasing sympathetic nervous system stimulation from the stress of pain, thereby decreasing pulse, blood pressure, and oxygen demand (Mann & Carr, 2006). Allred, Byers, and Sole (2010) suggested that further research is needed regarding the use of music and/or rest periods as an adjuvant to traditional pain management. Research to investigate the use of music and/or rest periods for longer periods of time, at varying times of the day, and at different points in care might also provide evidence to support the use of music to improve pain.

The aim of the present study was to examine the effects of relaxation techniques (including rhythmic respiration, muscle relaxation techniques, and listening to music) and back massage on postoperative pain, anxiety, and vital signs (such as blood pressure, pulse, respiratory rate) on postoperative days 1-3 in patients who had undergone total hip or knee arthroplasty. The specific purpose of the study was to test the following hypothesis: Pain intensity, anxiety level, and vital signs are lower in patients treated with relaxation techniques and back massage two times a day during the first 3 days after total hip or knee arthroplasty than in arthroplasty patients not subjected to these treatments. Accordingly, the research questions were:

1. What is the effect of relaxation techniques and back massages applied on the first, second, and third postoperative days to patients who underwent total hip or knee arthroplasty on pain intensity?
2. What is the effect of relaxation techniques and back massages applied on the first, second, and third postoperative days to patients who underwent total hip or knee arthroplasty on anxiety level?

3. What is the effect of relaxation techniques and back massages applied on the first, second, and third postoperative days to patients who underwent total hip or knee arthroplasty on vital signs (such as blood pressure, pulse, and respiratory rate)?

METHODS

Study Design

An experimental design was used to examine the effects of relaxation techniques and back massage on postoperative pain intensity, anxiety level, and vital signs on postoperative days 1-3. Permission to undertake this study was received from the hospital Ethics Committee. Before the study, each of the participants were informed of the purpose of the research and assured of his or her right to refuse to participate or to withdraw from the study at any stage. Also, the anonymity and confidentiality of the participants were guaranteed.

Sample and Setting

This research was carried out from September 2008 to February 2009 with patients who were hospitalized in the orthopedic and trauma wards of one university hospital in Istanbul, Turkey. The subjects consisted of all patients who were scheduled for a first time THA or TKA who met the following inclusion criteria: 1) were ≥18 years old; 2) could speak, read, and write Turkish; 3) did not have cognitive, affective, or verbal impairment; 4) did not have another acute illness that causes pain and anxiety; 5) had not developed any complications in the perioperative days; and 6) used the same type of analgesic medication for the control of pain in the postoperative period (specifically, opioid drugs administered continuously with patient-controlled analgesia and intramuscular [IM] nonopioid analgesia on the first day, IM nonopioid drugs administered on the second day, and IM nonopioid drugs [taken on an as-needed basis) and oral nonopioid drugs administered on the third day] and nonpharmacologic application (ice packs for 20 minutes).

Sample size was based on a power analysis for repeated-measures analysis of variance (RMANOVA), with a large effect size to achieve a power of 0.80 and $\alpha = 0.05$. All patients (n = 69) scheduled for THA and TKA who met the age requirements were approached in preadmission testing to assess criteria for inclusion in the study and to discuss potential participation in the study. Patients who met the inclusion criteria (n = 63) were offered the opportunity to participate in the study. Three participants (4.76%) failed to complete the study; all three were from the experimental group, resulting in a final sample of 60 participants. A basic randomization was used to allocate patients to either the experimental group (which received relaxation techniques and back massage treatment; n = 30) or the control group (which received only the standard hospital recuperation treatment; n = 30; Fig. 1).

Measures

The measures used in this study included the McGill Pain Questionnaire Short Form (MPQ-SF), and State Anxiety Inventory (SAI). Blood pressure, pulse, and respiratory rate were also measured.

The McGill Pain Questionnaire Short Form. The MPQ-SF provides information on the sensory and affective dimensions of pain and on the intensity component of the pain sensation. Concurrent validity of the MPQ-SF was established with the visual analog scale (VAS) for pain. The MPQ-SF was studied by Melzack (1987), and the validity and reliability study for the Turkish version of the MPQ-SF was conducted by Yakut et al. in 2007 (Yakut, Yakut, Bayar, & Uygur, 2007). The Cronbach alpha value was calculated to be 0.71. In the present study, the mean Cronbach alpha value was calculated to be 0.89. The MPQ-SF was administered by researchers 2-3 minutes before and after interventions to patients who agreed to participate.

A VAS also used to measure anxiety with verbal anchors at each end indicating "no anxiety" at the far left and "most anxious" at the far right.

State Anxiety Inventory (SAI). The SAI is a 4-point Likert scale used to determine how the patient feels in a given time and under determined conditions and is composed of 20 items (Aydemir & Köroğlu, 2000; Öner, 2006). The SAI was studied by Spielberger (1983), and the validity study for the Turkish version of the SAI was conducted by Öner in 1977 and the reliability study for the Turkish version by Öner and Le Compte in 1975 (Aydemir & Köroğlu, 2000; Öner, 2006). Total points of 0-19 signify no anxiety, 20-39 light anxiety, 40-59 moderate anxiety, 60-79 severe anxiety, and >60 that the patient needs professional help (Öner & Le Comte, 1998). The Cronbach alpha value was calculated to be 0.94. In the present study, the mean Cronbach alpha value was calculated to be 0.86. The SAI was administered by the researcher 10-12 minutes before and after interventions to patients who agreed to participate.

Vital signs. Blood pressure was measured with a sphygmomanometer and stethoscope. The same device was used exclusively and consistently throughout this research. The device was calibrated by the Biomedical Engineering Department of the firm from which the device was obtained, in accordance with the recommendations of the producing company,

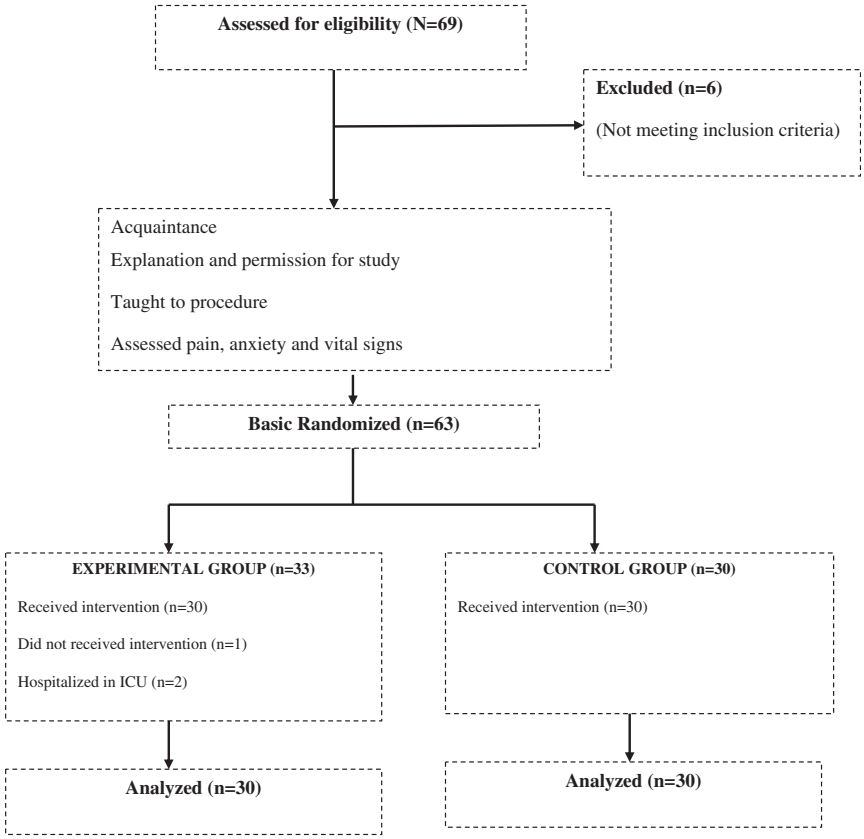

Figure 1. ■ Allocation of subjects.

before the beginning of the data collection. Pulse and respiratory rates were measured by the principal investigator by counting the number of respirations in a 30-second period and multiplying by 2, which provided values for pulse and respiratory rates per minute. The vital signs were measured by a researcher before and after interventions in patients who agreed to participate.

Intervention

Attention was paid to ensuring absence of each patient's relatives in the room, closing of curtains/screens around the patient's bed, no need for excretion, and the silence and quietness of the room for the application of interventions (relaxation techniques and back massage) in a comfortable environment and for independent determination of the pain intensity and anxiety levels of patients. All patients in the experimental group were treated as follows:

- Relaxation techniques were applied twice daily (morning and evening) on the first postoperative day.
- The first mobilizations of patients were monitored by the surgical team in the clinics where the postoperative data were collected on the evening of first postoperative day. Mobilizations included sitting in bed and on the side of the bed; for this reason back massage was applied twice daily (morning and evening) on the second postoperative day to patients who could take this position easily and who did not have limitations to changing position.
- The intervention (relaxation techniques or back massages) preferred by patients according to their pain and anxiety levels was applied on the third day.

Relaxation Techniques. Relaxation techniques include rhythmic respiration, muscle relaxation exercises, and listening to music. A relaxation technique compact disc (CD) prepared by the Association of Turkish Psychologists was used for these exercises. In a 30-minute part of CD, relaxation techniques are explained accompanied by the sound of streams of water and verbal instructions (http://www.saglikplatformu.com/haberler/Ayrinti.asp?HaberNo=2402).

In the present study, a researcher-recorded CD was used to be more easily understandable for patients. Easy exercise was offered with harmonious melody and pleasing rhythms, because it has been shown to produce a calming effect and increased sense of well-being (MacClelland, 1982). It was played through

earphones on a portable video compact disc/digital versatile disc player, and the sound level was adjusted according to the preference of the patient.

Back Massage. The intervention for this protocol consisted of a 10-minute back massage with the patients lying on a sound hip/knee joint in a lateral position on their bed. Patients were positioned comfortably by the researcher with pillows to support their body. The researcher performed back massage as described by Chin (1999) and Şendir (2008), using lanolin massage oil to prevent friction and using relaxation effects. The authors suggested that applied the oil to both hands and began with slow stroke effleurage at the sacrum and continuing to the scapular areas. And then grasped the subcutaneous tissue and muscles between thumb and other fingers to apply petrissage at the scapular and cervical areas. Oil was then applied to both hands and a slow stroke friction with the middle fingers of both hands was begun to mark the fingers of the hand at the upper cervical vertebrae and spine. Effleurage also applied between all applications.

Procedure

Demographic data were collected, the participants in the experimental group were taught how to use the the relaxation technique CD, and all participants filled out the MPQ-SF, VAS, and SAI to measure pain and anxiety in the preoperative period. The planned relaxation technique and back massages were applied on only the experimental groups the mornings and evenings of the first to third postoperative days ~1 hour before treatment time. Both interventions (relaxation technique and back massage) were performed by the same researcher with the patients in bed. The data collected included the MPQ-SF, VAS, and SAI measurements of pain and anxiety, and vital signs of blood pressure, pulse, and respiratory rate. Data collection occurred at four points during this time (T1-T4) in the postoperative period. Data were collected at the same points in time in both groups by the same researcher who applied the interventions. Table 1 describes the times of data collection and which data were collected at each time point.

Data Analysis Procedures

Statistical analysis was performed using the Statistical Package for Social Science for Windows version 11.5. Descriptive statistics were computed; Student *t* test was used to determine the difference between the groups, and RMANOVA was conducted to evaluate the effect of intervention on pain and anxiety scores and physiologic parameters. A p value of $\leq .05$ was considered to be statistically significant.

TABLE 1.
Procedure and Data Collection Plan (Measurements and Times)

	T1	T2	T3	T4
McGill Pain Questionnaire Short Form (MPQ-SF)	X			X
State Anxiety Inventory (SAI)	X			X
Visual Analog Scale: pain	X	X	X	X
Visual analog scale: anxiety	X	X	X	X
Vital Signs	X	X	X	X

T1 = before intervention; T2 = immediately after intervention; T3 = 1 hour after intervention; T4 = 2 hours after intervention.

RESULTS

Demographic Data

A total of 60 patients participated in the study (42 women, 18 men; mean age 58.20 years, range 24-83 years). No significant differences were found between the control group and the experimental group regarding any of the demographic characteristics, including gender, age, education, and marital status (Table 2). Table 3 describes clinical characteristics that included the preoperative period of the sample. No significant differences were found between the two groups regarding any of the clinical characteristics in the preoperative period.

Research Question 1: Relaxation Techniques, Back Massage, and Pain

The mean scores and standard deviations for the experimental group and the control group are provided in Table 4, with graphic representation in Figure 2. According to RMANOVA, subjects within groups experienced significantly different pain scores as measured with VAS over time ($F = 62.17$; $p = .000$). Post hoc pairwise comparisons with a Bonferroni correction found significant differences in pain between T1 and T2 ($p = .000$) and between T1 and T3 ($p = .000$). The T4 pain scores also showed significantly higher values than T3 ($p = .004$). The RMANOVA test showed statistically significant differences in pain scores, as measured with VAS, between the two groups at all measurement points ($F = 14.50$; $p = .000$).

Research Question 2: Relaxation Techniques, Back Massage, and Anxiety

The mean scores and standard deviations for the experimental group and the control group are provided in Table 4, with graphic representation in Figure 3. According to RMANOVA, subjects within groups experienced significantly different anxiety scores as measured with VAS over time ($F = 185.53$; $p = .000$).

Table 2.
Demographic Characteristics of Patients (n = 60)

Characteristics	Experimental Group (n = 30)	Control Group (n = 30)	Statistical Test and *p* Value
Gender, n (%)			
Female	22 (73.3)	20 (66.7)	$\chi^2 = 3.394$
Male	8 (26.7)	10 (33.3)	$p = .573$
Age, year, mean (SD) [range]	57.2 (13.9) [24-83]	59.2 (14) [24-80]	$t = 0.557$
			$p = .580$
Marital status, n (%)			
Single/Widowed	10 (33.3)	13 (43.3)	$\chi^2 = 0.635$
Married	20 (66.7)	17 (56.7)	$p = .426$
Educational status, n (%)			
Can read and write	7 (23.3)	6 (20)	$\chi^2 = 1.223$
Primary school	15 (50)	14 (46.7)	$p = .748$
High school	3 (10)	6 (20)	
College graduate	5 (16.7)	4 (13.3)	

Post hoc pairwise comparisons with a Bonferroni correction found significant differences in anxiety between T1 and T2 ($p = .000$) and between T1 and T3 ($p = .000$). The T4 anxiety scores were also significantly higher than T3 values ($p = .03$). The RMANOVA test showed statistically significant differences in anxiety scores, as measured with VAS, between the two groups at all measurement points ($F = 19.13$; $p = .000$).

Research Question 3: Relaxation Techniques, Back Massage, and Vital Signs

The mean scores and standard deviations for the experimental group and the control group are provided in Table 4, with graphic representation in Figures 4-7. According to RMANOVA, subjects within groups experienced significantly different vital signs of blood pressure (systolic and diastolic), pulse, and respiratory rate measured over time ($F = 37.27, 6.07, 78.73, 34.55$; $p = .000$). Post hoc pairwise comparisons with a Bonferroni correction indicated significant differences in vital signs between T1 and T2 ($p = .000$) and between T1 and T3 ($p = .000$). The RMANOVA test showed statistically lower scores in the experimental group compared with the control groups at all measurement points ($F = 169.61, 9.14, 14.2, 65.64$; $p = .000$).

The first evaluations of patients in the control and experimental groups, on the morning of the first

Table 3.
Clinical Characteristics of Patients in the Preoperative Period, n (%)

Characteristics	Experimental Group (n = 30)	Control Group (n = 30)	Statistical Test and *p* Value
Past surgical history			
Yes	22 (73.3)	23 (76.7)	$\chi^2 = 1.107$
No	8 (26.7)	7 (23.3)	$p = .893$
Use of walking aids			
Yes	20 (66.7)	23 (76.7)	$\chi^2 = 0.739$
No	10 (33.3)	7 (23.3)	$p = .390$
Type of analgesic medication			
Yes (nonopioid as needed)	25 (83.3)	21 (70)	$\chi^2 = 1.491$
No	5 (16.7)	9 (30)	$p = .222$
Pain location			
Joint area	25 (70)	28 (93.3)	$\chi^2 = 1.456$
Joint + pressure areas	5 (30)	2 (6.7)	$p = .228$
Type of surgery			
Total knee arthoplasty	12 (40)	7 (23.3)	$\chi^2 = 1.926$
Total hip arthoplasty	18 (60)	23 (76.7)	$p = .165$

TABLE 4.
Comparison of Pain, Anxiety, and Vital Signs of Patients in the Postoperative Period

	Experimental Group (n = 30)	Control Group (n = 30)	Statistical Test and *p* Value
Pain data (VAS)			
T1	7.13 ± 0.13	7.20 ± 0.14	F = 14.50
T2	5.04 ± 0.22	7.23 ± 0.12	$p = .000$*
T3	4.05 ± 0.28	6.99 ± 0.16	
T4	4.76 ± 0.21	6.56 ± 0.15	
MPQ-SF data			
T1	14.77 ± 4.18	14.70 ± 3.97	$t = -0.63$; $p = .95$
T4	5.73 ± 1.78	9.73 ± 3.50	$t = 5.58$; $p = .000$*
Anxiety data (VAS)			
T1	5.83 ± 0.31	5.99 ± 0.21	F = 19.13
T2	3.84 ± 0.28	6.09 ± 0.21	$p = .000$*
T3	3.31 ± 0.31	6.04 ± 0.22	
T4	3.93 ± 0.27	5.79 ± 0.23	
SAI data			
T1	54.00 ± 6.58	54.73 ± 6.75	$t = 0.43$; $p = .67$
T4	25.78 ± 6.63	34.70 ± 6.12	$t = 5.36$; $p = .000$*
Systolic blood pressure data			
T1	124.86 ± 1.66	127.78 ± 1.32	F = 169.61
T2	116.42 ± 1.61	127.06 ± 1.44	$p = .000$*
T3	116.31 ± 1.77	127.56 ± 1.44	
T4	121.75 ± 1.84	126.22 ± 1.32	
Diastolic blood pressure data			
T1	75.94 ± 1.13	75.50 ± 1.13	F = 9.14
T2	68.72 ± 0.83	76.39 ± 0.80	$p = .000$*
T3	69.95 ± 0.97	76.50 ± 0.82	
T4	73.56 ± 1.22	76.78 ± 0.86	
Pulse data			
T1	87.92 ± 1.36	91.83 ± 1.12	F = 14.23
T2	83.69 ± 1.29	91.01 ± 1.12	$p = .000$*
T3	83.00 ± 1.29	90.81 ± 1.12	
T4	83.94 ± 1.28	89.73 ± 1.04	
Respiratory rate data			
T1	20.77 ± 0.22	20.61 ± 0.22	F = 65.64
T2	19.09 ± 0.21	20.32 ± 0.17	$p = .000$*
T3	18.81 ± 0.20	19.86 ± 0.17	
T4	19.59 ± 0.15	19.57 ± 0.07	

*$p \leq .001$.

postoperative day, according to MPQ-SF and SAI, showed that they had similar mean values, and no statistically significant differences were found ($p > .05$). In the last evaluation of patients, on the evening of the third postoperative day, total pain descriptor scores and SAI levels were lower in the patients in the experimental group than in the control group, and highly significant differences were found between them ($p \leq .001$).

DISCUSSION

This study showed statistically significant differences in pain intensity, anxiety level, and vital signs measured over time between the experimental (relaxation techniques and back massage) and control (standard hospital recuperation) groups.

Nonpharmacologic interventions, such as relaxation techniques, listening to music, massage, hot/cold application, etc., are defined in the literature as providing relaxation by reducing muscle tension and by helping to ease pain and anxiety levels (Gatlin, 2007; Good, 1995; Wentz, 2009). During the present period of study, an evident decrease (2-3 units on average) was noted in all measurement parameters (pain, anxiety, and vital signs) with the relaxation techniques and back massages applied two times daily in the experimental group on the first to third postoperative days, compared with the preapplication period. This change was evident by the values measured before

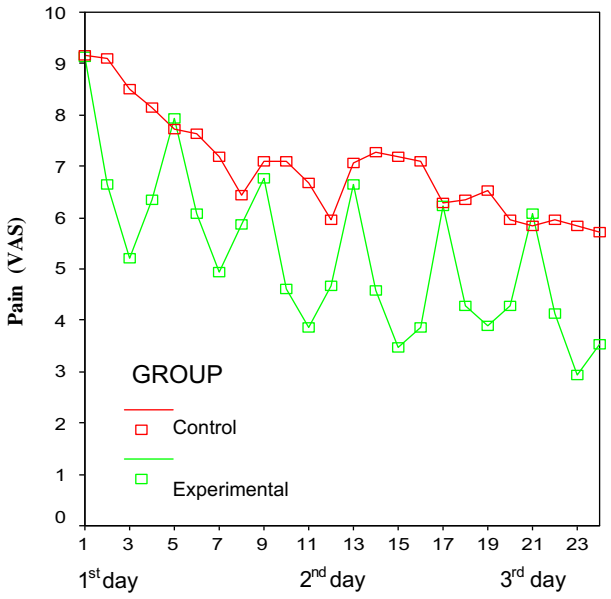

Figure 2. ■ Mean visual analog scale (VAS) pain, control group versus experimental group.

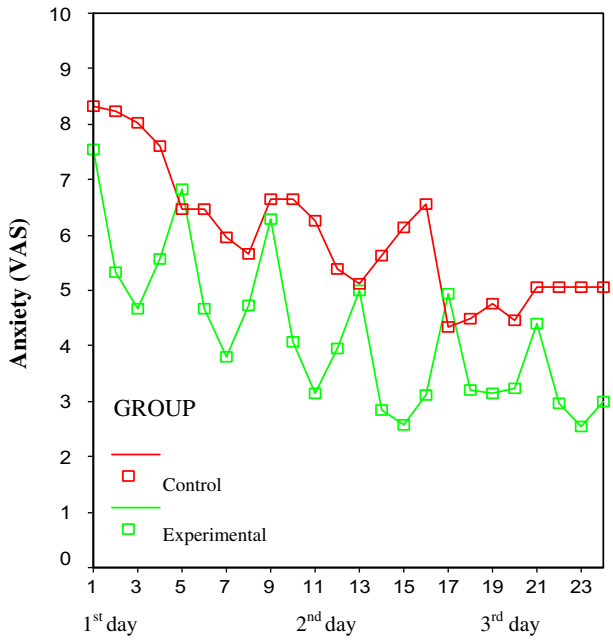

Figure 3. ■ Mean visual analog scale (VAS) anxiety, control group versus experimental group.

application and at the first hour after application. In addition, the values at the second hour were found to increase compared with their levels at the first hour. Relaxation techniques and massage are believed to stimulate endorphin secretion in the brain, which creates the feeling of relaxation in muscles and happiness in patients, and which provides a level of analgesia for 15-60 minutes. Kaada and Torsteinb (1989) evaluated the beta-endorphin level after massages and reported that the endorphin secreted in the brain after massages was effective for up to 1.5 hours. In light of this literature, the present results showing increases in vital signs, pain intensity, and anxiety levels 2 hours after the application could be explained by the fact that the effects of relaxation techniques/massages were wearing off and that the regular clinical application (treatment time, care applications) was about to be initiated.

As explained in the Methods section, the same analgesic treatment was given to all patients included in the study in addition to ice packs for 20 minutes on the first, second, and third postoperative days. However, a statistically significant reduction was observed in the values of pain intensity, anxiety levels, and vital signs, on postoperative days 1-3 in the experimental group ($p \leq .001$; Table 4). For this reason, relaxation techniques, including rhythmic respiration, muscle relaxation exercises, and listening to music, as well as the back massage, were concluded to be effective at reducing pain intensity and anxiety level. Despite the interventions, the researcher found that patients had high pain and anxiety scores in the postoperative period. The findings from the present study can be explained by a lack of effective pain treatment procedures based on individual characteristics and pain and anxiety scores. In addition, patients who underwent hip or knee arthroplasty did not receive any information about the medications and were subjected to routine clinic procedure (e.g., the same drug) by the health care providers. Rakel and Harr (2004) similarly reported that relaxation techniques reduced muscle tension and pain by distracting patients and were the most effective nonpharmacologic intervention when taught and applied to patients. Ceccio (1984) determined that relaxation techniques applied to patients who underwent hip arthroplasty significantly reduced the pain intensity of the surgical area, body tension, and analgesic consumption. Antall and Kresevic (2004) also established that pain intensity and anxiety level were lower in patients who participated in relaxation exercises compared with patients in a control group (average 3 units of difference); in addition, their hospitalization time was shorter. The levels of pain, anxiety, and systolic blood pressure were also lower in patients treated with relaxation exercises in a study by Roykulcharoen and Good (2004) and in patients who listened to music through earphones as reported by Lukas (2004). Seers, Crichton, Tutton, Smith, and Saunders (2008) found statistically significant reductions in pain and no statistically significant difference in anxiety at rest from before to after intervention for both the relaxation group and the control group. In contrast to these results,

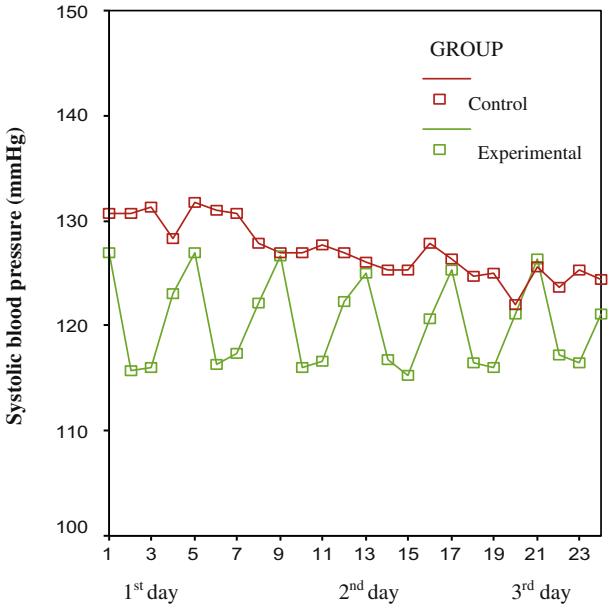

FIGURE 4. ■ Mean systolic blood pressure, control group versus experimental group.

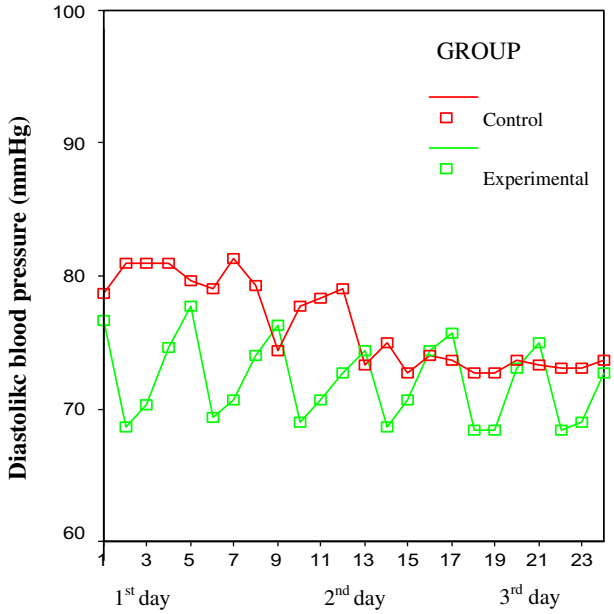

FIGURE 5. ■ Mean diastolic blood pressure, control group versus experimental group.

Allred et al., (2010) found no significant difference between patients who listened to classical music for 20 minutes on the first postoperative day and patients in a control group regarding pain intensity, anxiety level, and vital signs; however, they found an important decrease in pain and anxiety levels of patients listening to music for all the measurement times.

The pain-reducing mechanism of massage is explained by the Gate Control Theory by Melzack. Mechanoreceptors in the skin stimulated by massage and touch-sensitive fibers help to inhibit the transmission of pain sensation to T cells and prevent feelings of pain by stimulating substantial gelatinous cells (the gate is closed) (Delany, 2002; Wentz, 2009). Similarly, Karadeniz (1997) stated that endorphin level increases and pain disappears after a back massage. Rakel and Harr (2004) argued that back massage inhibits the transmission of pain impulses by stimulating touch-sensitive fibers. Chin (1999) determined a 1.6-unit decrease in pain and a 2.8-unit decrease in physical tension in an experimental group of patients compared with a control group after a back massage applied to patients on a lateral bed position for 10 minutes on the first postoperative day. Holland and Pokorny (2001) evaluated the efficacy of 3-minute back massage with lanolin oil and observed significant decreases in the respiration and pulse rates as well as systolic-diastolic blood pressure levels of patients in the experimental group compared with the control group at the end of a 3-day follow-up. Yavuz (2000) also detected a statistically significant decrease (2-3 units) in pain levels considering the measurements before and 2 days after nonpharmacologic intervention and analgesic drug treatment at the second postoperative hour. The present study determined a 2–4-unit decrease in respiration and pulse rates as well systolic-diastolic blood pressure levels of patients in the experimental group after nursing interventions (relaxation exercises, deep respiration, coughing, and dreaming) and analgesic drug treatment. Thus, the

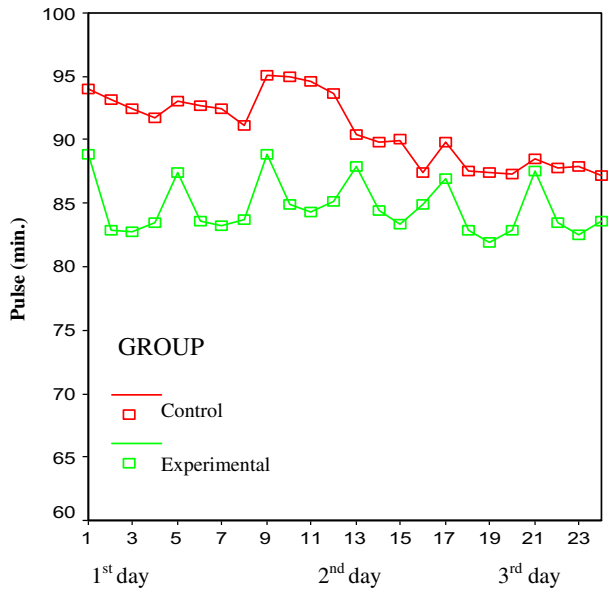

FIGURE 6. ■ Mean pulse rate, control group versus experimental group.

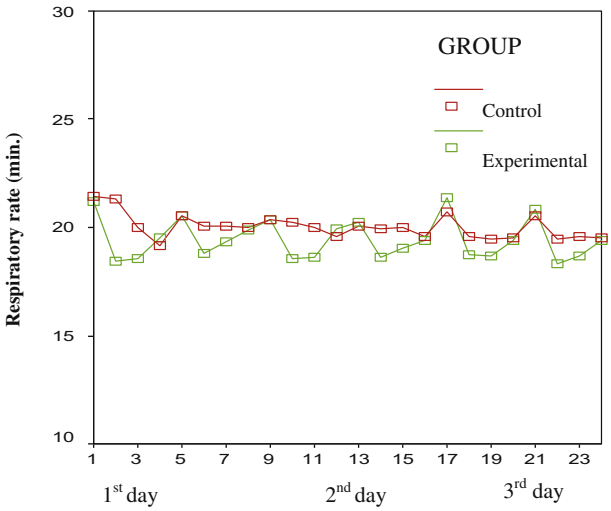

Figure 7. ■ Mean respiratory rate, control group versus experimental group.

findings of the present study are compatible with those of other studies in the literature.

In the last evaluation made on the evening of the third day after the interventions (relaxation techniques and back massage) were applied to the experimental group, a highly significant reduction ($p \leq .001$) was detected in total pain descriptor scores and state anxiety inventories in the experimental group compared with the control group (Table 4). Good et al. (1999) determined that pain quality scores of the patient group treated with music listening and relaxation techniques on the first and second postoperative days were significantly lower than the scores of the control group. Similarly, in the study performed by Eti-Aslan (1997) in Turkey, SAI and pain quality scores of the group treated with interventions were lower than the those of the control group. The mean scores of pain and anxiety of the patients supported the results of the present study. However, in the study by Pellino et al. (2005), which examined the effects of nonpharmacologic interventions on pain and anxiety of patients who underwent total hip and knee arthroplasty, no statistically significant difference was detected between the mean scores of pain intensity and anxiety of the patients during 3-day follow-up. Although these findings are contrary to the findings of the present study, it was noted in the Pellino et al. (2005) study that the opioid drug use on the second day was lower in the experimental group, suggesting some alleviation of pain compared with the control group.

Study Limitations

The most important limitation of the present study was that the 2-hour follow-up of the effects of relaxation techniques and back massage on pain intensity and anxiety level in both morning and evening collided with the bed rest times of patients. Other limitations were that patients were only verbally informed about the effects of the interventions (relaxation techniques and back massage) on pain and anxiety; in addition, the effects on drug use, ambulation, and physical treatment process could not be examined because of the institutional policy of not including vital signs. For this reason, the study can be generalized only to the actual patients included in the sampling.

Clinical Implications

Further research using nursing interventions as an adjuvant to traditional pain management is needed. Accordingly, nonpharmacologic interventions should be applied to patients along with analgesic treatment, taking into consideration personal preferences in controlling effective pain and anxiety in the postoperative period, and the results should be evaluated in this regard. In addition, nursing interventions/nonpharmacologic interventions are required in the applications of physical treatments in addition to bed rest. Institutional policies should be prepared in accordance with the results of pain and anxiety in the postoperative period, and the effects of the interventions on analgesic drug use and patient satisfaction should be examined.

CONCLUSIONS

The present research findings determined that relaxation techniques and back massage had a significant effect in lowering pain, anxiety, and vital signs in the 3-day postoperative rest period in THA and TKA patients. Additionally, experimental patients in the study reported that the intervention (relaxation techniques and back massage) helped them to forget about their pain for a while and improved their anxiety state. Use of these interventions should be implemented by nurses into routine plans of care for patients with THA and TKA.

The authors think that this is a key study showing the effect of interventions on postoperative pain and anxiety. In addition, relaxation techniques and back massages are safe, inexpensive, and easy for nurses to implement and to teach patients to use. These useful interventions should continue to be explored in pain management nursing research and in nursing practice.

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