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The effects of Reiki and back massage on women's pain and vital signs post-abdominal hysterectomy: A randomized controlled trial
The Effects of Reiki and Back Massage on Women's Pain and Vital Signs

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ABSTRACT

Background: Using Reiki and back massage to support pharmacological treatments is increasingly common in nursing. This study aimed to determine the effects of Reiki and back massage on pain, analgesic use, and vital signs among women who had undergone an open abdominal hysterectomy.
Methods: This experimental study involved a single, blinded, pretest-posttest design. The study population comprised women who had undergone an abdominal hysterectomy at the obstetrics clinics of Gazi Yaşargil Training and Research Hospital and Dicle University Hospital between July 2017 and February 2018. Patients were divided into three groups: a Reiki group, a back massage group, and a control group. Each group comprised 34 patients. Reiki or back massage was applied to patients in the respective non-control groups for 20 min once a day. Data were collected using a patient information form, the "Numeric Pain Rating Scale," and the "Vital Signs and Postoperative Analgesic Follow-up Form."
Results: Statistically significant differences in pain intensity and analgesic use were observed between the women in the Reiki group and the women in the back massage and control groups ($p < 0.001$). Significant differences in vital signs were observed between the groups before and after their respective procedures; in the Reiki group, they tended to decrease, while in the back massage and control groups, they tended to increase.
Conclusion: This study's findings confirmed that pain, analgesic use, and vital signs decreased after Reiki among women who had undergone an abdominal hysterectomy.

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Introduction

Hysterectomies are the most common surgery performed by gynecologists worldwide after cesarean surgery. The procedure's prevalence ranges from 6.1 to 8.6 per 1000 women, and the probability of a patient undergoing a hysterectomy is 20% among women in high-income countries.[1] The pain experienced after an abdominal hysterectomy surgery is moderate, and corresponding rates of analgesic use are high.[2] The National Center for Complementary and Integrative Health recommends the use of non-pharmacological treatment to support pharmacological methods.[3] Nonpharmacological methods improve individuals' sense of control, activity levels, and functional capacity; moreover, they also decrease pain levels and required doses of analgesics.[4] Nonpharmacological pain management methods include massage and Reiki.[5]

The modern-day Reiki practiced in the United States originated in Japan with Mikao Usui during the early 1900s. Reiki is a complementary and adjuvant therapy. Reiki, in which practitioners use a light touch to channel "energy," is classified as an "energy healing therapy" and is a technique of channeling universal "energy" to reduce stress, promote relaxation, and enhance well-being.[6,7] Reiki decreases respiratory and pulse rates and blood pressure by activating the parasympathetic nervous system, and it increases immunoglobulin A (IgA) levels, reduces cortisol release, relieves sleep disturbances, and reduces postoperative analgesic use and pain as a result of its pain-relieving effects.[5-7]

`Massage therapy involves the manipulation of the body's soft tissues by touch. It uses gentle movements, such as effleurage and petrissage.[8] The physiological responses that arise from the parasympathetic nervous system's activation through massage therapy help relax muscles, relieve pain, reduce insomnia, heal wounds, improve blood and lymph circulation, decrease stress, and increase physical comfort.[8-10]

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The physiological effect of Reiki and back massage on pain relief can be explained by the "gate control theory" and endorphins' release. The Reiki used in this study was a contact therapy, involving light touch, which is an "energy field".[6,7,11,12] According to the gate control theory, stimulating the skin suppresses the transmission of pain signals by stimulating a-beta thick sensory fibers and suppressing the small-diameter fibers that carry pain messages. Relief is also provided when the hypothalamus is stimulated through the prevention of painful stimuli through naturally secreted endorphins, encephalins, and dynorphin (morphine derivatives).[13] Massage works as a painkiller by increasing the body's production of endorphins. Endorphins reduce signal transduction between nerve cells and decrease pain sensations.[14] Few studies have examined Reiki's effect on pain and analgesic use among women who have undergone an abdominal hysterectomy. [11]

The current study was conducted to determine the effects of Reiki and back massage applications on pain and analgesic use, as well as vital signs, among women who had undergone an open abdominal hysterectomy. It proposed the following two research hypotheses:

Hypothesis 1: Reiki interventions reduce pain, analgesic use, and vital signs after an abdominal hysterectomy.

Hypothesis 2: Back massage interventions reduce pain, analgesic use, and vital signs after an abdominal hysterectomy.

Methods

Design and participants

This study used an experimental pretest and posttest design and two experimental groups (Reiki and back massage), as well as a control group. The study population comprised women who had undergone an abdominal hysterectomy at the obstetrics clinics of the Gazi Yaşargil Training and Research Hospital or Dicle University Hospital between July 2017 and February 2018. Open abdominal hysterectomies are usually performed in clinics on a planned basis. Patients who undergo an open abdominal hysterectomy are hospitalized for one to two days before the surgery, and they are discharged on their third postoperative day if they do not experience postoperative complications. Routine analgesics and antibiotics are given to all patients during the postoperative period.

Patients who underwent surgery under elective conditions were hospitalized for at least two days post-surgery, had not developed any serious complications after surgery, had been operated upon under general anesthesia, had had no previous Reiki or back massage, had pain levels of 3 or higher on the "Numeric Pain Rating Scale," had no cognitive, affective, or communication problems, used only one type of analgesic (a non-narcotic analgesic), and did not use patient-controlled analgesics were included in the study. These criteria ensured the groups' homogeneity and increased the results' reliability. Patients with chronic diseases (such as hypertension or cardiovascular disease), with severe complications after surgery (such as bleeding or infection), or who were taking narcotic analgesics were excluded from the study. One patient with hypertension and two patients with bleeding were excluded from the study.

The study's sample size was calculated using the G*Power 3.1.9.7 program.[15] No randomized studies on Reiki's effect on abdominal hysterectomy pain were available in the literature to provide a basis for the current study. Using Midilli and Gunduzoglu's[16] study to calculate a sample size, an effect size (f) of 0.4, a type I error (α) of 0.05, a test power (1-β) of 0.95, and analysis of variance (ANOVA) test-fixed effects, an omnibus, one-way test, the necessary sample size to determine a significant difference was found to be a minimum of 99. This study's sample comprised 102 patients.

The participants were assigned into three groups: the Reiki group (n = 34), the back massage group (n = 34), and the control group (n = 34). The patients were distributed into experimental groups one by one, according to the protocol number using the one-way blind method in order to prevent bias in the study. Accordingly, the single numeral of the protocol number's last digit was selected for the Reiki group, and the patients with double numerals were selected for the back massage group. To prevent patients in the experimental and control groups from affecting each other, the patients were hospitalized in separate rooms according to their protocol numbers. The participants in the experimental group were not informed about which application (Reiki or back massage) they were to receive. Fig. 1 presents the CONSORT 2010 flow scheme applied in the study.

Nursing interventions

This study was conducted by a single Reiki practitioner trained in the Patients Usui Reiki Lineage (Degree 1), HU, and a nurse with a master's degree in nursing. In First Degree Reiki (Reiki I), "aura attunement" between a practitioner and a patient allows for healing through touch.[17] The researcher had some knowledge of massage's use in nursing education.

Reiki aims to maintain what practitioners regard as an "energy flow" to heal through placement of the practitioner's hands on or two to three centimeters above a patient's problem areas.[18,19] No studies have established what the "energy" referred to in Reiki is; a belief in Reiki is an unsubstantiated belief, rather than an established fact. Reiki practitioners use Reiki with light-hand contact to facilitate an opening of their patients' and their own "energy channels."[12] Reiki practitioners have explained that the body has seven chakras (at the head, between the eyes, the throat, the chest, the abdominal cavity, the groin, and the upper hip).[20,21]

Before the Reiki treatments, each patient's room was made quiet, and the light was dimmed to prevent distractions. To perform Reiki in a comfortable environment and prevent patients' relatives from influencing the study's pain evaluations, patients' relatives were not present for the Reiki treatment. The treatment began with each patient in a supine position, dressed, with their eyes closed, their arms and legs lying straight, and their palms facing upward. In the current study, at the beginning of patients' treatments, the researcher held her hands 2–3 cm above each patient and adjusted the patient's aura by making circular movements from their head to their feet. After this process of "aura attunement," the researcher placed her hands directly on each patient's body. The number of hand positions used depended on each patient's needs. Each position was held for one to five minutes or until the Reiki practitioner felt the "energy" stop.[20] Reiki was applied by the researcher for 20 min in total while three minutes were allocated, on average, to each chakra. In the areas where the practitioner had placed her hands for an average of three minutes, starting from between the eyes, the researcher felt various degrees of warmth and tingling in her palms. She ended the Reiki treatment by placing her hands on each patient's head, throat, chest, abdominal cavity, groin, and both sides of the upper hip region.

To perform back massage in a comfortable environment and prevent patients' relatives from influencing patients' pain evaluations, relatives were not present during the study's massage treatments. The researcher helped each patient adopt Fowler's position to receive their back massage. By placing three to four pillows on each patient's lap or placing one pillow on the dining table in the patient's room and then positioning her forehead on the pillow, each patient's back was accessible. Only patients' backs were left exposed to prevent patients from becoming cold. In each session, the researcher took a small amount of non-aromatic baby oil and heated it, and then she began a 20-min-long massage. The massage comprised 13 min of effleurage (stroking), followed by seven minutes of petrissage (kneading). Mild rhythmic effleurage was applied to patients' upper backs, followed by petrissage of the lower back and hip.[8,22]

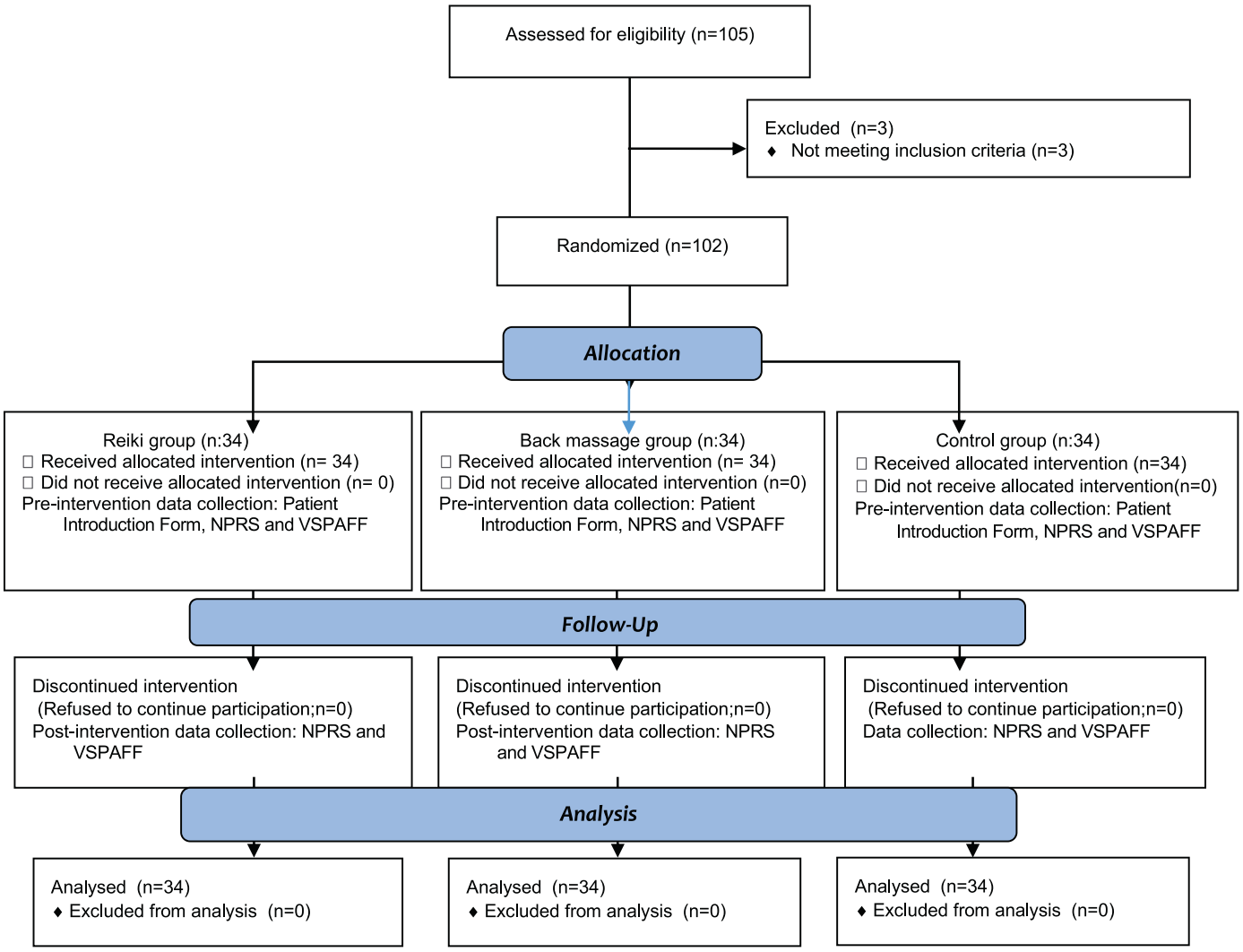


Fig. 1. Consort flow diagram.

Intervention materials

Each treatment application in this study used the following equipment: a digital clock (to determine the treatment durations and measure respiratory and pulse rates), a manual sphygmomanometer (to measure blood pressure), and a stethoscope (to measure blood pressure).

Data collection tools

Data were collected by the researcher the two clinics at two hospitals through face-to-face interviews using a patient information form, the "Numeric Pain Rating Scale (NPRS)," and the "Vital Signs and Postoperative Analgesic Follow-up Form."

Patient Information Form. The first part of the patient introduction form, which the researcher prepared based on the literature,[11] included questions on participants' socio-demographic characteristics (age, education level, employment status, marital status, and number of children), preoperative diagnosis, and disease status. The second part included questions about the duration of patients' hysterectomy and surgical procedure applied.[13,16,20,23]

Numeric Pain Rating Scale (NPRS). The NPRS scale gives pain a numeric score from an absence of pain (0) to unbearable pain (10 or 100). Patients are asked to report pain intensities or their mean pain intensity over the past 24 h. The NPRS is a valid and reliable scale for measuring pain intensity due to the ease of its verbal and written scoring system; previous studies have determined the scale's Cronbach's alpha coefficient to be approximately 0.888.[24-26] The scale's alpha reliability coefficient was found to be 0.893 in the current study.

Vital Signs and Postoperative Analgesic Follow-up Form (VSPAFF). The VSPAFF form comprises questions about Reiki and back massage application, information about patients' vital signs—including their pulse rate (min), respiratory rate (min), and blood pressure (mmHg) at the time of measurement—and information about patients' number and doses (milligrams) of analgesics taken postoperatively.

Data collection

To determine the data collection form's applicability, a pre-application test was conducted with 12 patients, and these patients were not included in the sample group. Reiki and back massage were provided to the patients by the same researcher (HU). The day before patients' operations, the researcher met with them in their rooms, and they completed the first part of the patient introduction form. The researcher used the same equipment with each participant during each of these visits. The researcher, HU, measured patients' vital signs in the experimental and control groups on their first and second postoperative days. Heart rates and respiratory rates were measured with a digital clock. Patients' systolic and diastolic blood pressure

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values across the three groups were measured with a manual sphygmomanometer that had been calibrated.

Pulse rates, respiratory rates, and blood pressure were measured and recorded on the VSPAFF six to eight hours after the administration of routine analgesics on patients' first and second postoperative days. After evaluating pain severity with the NPRS, Reiki or back massage were applied for 20 min once a day to the patients in the Reiki and back massage groups. After both applications, patients rested for five minutes, and their amount of pain, pulse rate, respiratory rate, and blood pressure were measured and recorded again. The analgesic doses or numbers used on patients' first and second postoperative days were obtained from patients' files and included in the VSPAFF. Routine postoperative care was provided to the control group without any intervention, and the data collection tools were applied at similar times to the experimental groups.

Data analysis

The SPSS 25.0 package (SPSS, IBM Corp., Armonk, NY, USA) was used for the statistical analysis of the data obtained in this study. The parameters' compliance with a normal distribution was evaluated using the Kolmogorov-Smirnov test. In evaluating the study's data, number, percentage, arithmetic mean, standard deviation, and chi-square tests were used to analyze patients' descriptive characteristics. The chi-square test was used to test homogeneity. A one-way ANOVA, a repeated-measures ANOVA, a post hoc Bonferroni test, and a t-test were used to compare numerical values between groups, and $p < 0.05$ was considered statistically significant.

Ethical considerations

Before starting the study, ethical committee approval was obtained from the Scientific Research and Publication Ethics Committee of Inönü University (date: July 4, 2017; number: 2017/14-3). Institutional permission was also obtained from the Gazi Yaşargil Training and Research Hospital (date: July 17, 2017; number: 49) and the DicleUniversity Hospital (date: July 18, 2017; number: 14470). The study was registered with ClinicalTrials.gov, (NCT04861753; https://clinicaltrials.gov/ct2/show/NCT04861753), and the trial design followed Consort guidelines. Additionally, all patients included in the sample were informed about the study's content, and their informed, written consent was obtained. They were informed whether their data would be used if they withdrew.

Results

Demographics

All three groups were homogenous in terms of their demographic characteristics ($p > 0.05$) (Table. 1).

Pain and analgesic use

When pain severity was compared between the study groups, a significant difference was found before and after the application on patients' first and second postoperative days ($p < 0.001$). This difference was found to have been caused by Reiki. In repeated measurements, a significant difference was found between the mean scores for pain severity before and after Reiki on the first and second postoperative days for the women in the Reiki group ($p < 0.001$). In the four repeated measurements, a significant difference was found between the mean pain severity scores before and after Reiki on the first and second postoperative days for the women in the Reiki group (F= 325.476, $p < 0.001$). Post hoc Bonferroni test analysis determined that this difference occurred on the second postoperative day after the Reiki treatment ($p < 0.001$) (Table 2). Repeated measurements indicated a significant difference between analgesic use on the first and second postoperative days for the Reiki group, whereas no difference in analgesic use was observed among the women in the back massage group ($p > 0.05$). A test analysis determined that this

Table 1
Comparison of participants' socio-demographic characteristics in the Reiki, back massage, and control groups ($n = 102$).

	Reiki Group ($n = 34$) n (%)	Back Massage Group ($n = 34$) n (%)	Control Group ($n = 34$) n (%)	Tests* p
Educational Status				
Literate	25 (73.6)	20 (58.9)	25 (73.5)	6.114 0.411*
Secondary School	8 (23.5)	13 (38.2)	9 (26.5)	
High School and Above	1 (2.9)	1 (2.9)	0 (0)	
Employment Status				
Employed	2 (5.9)	2 (5.9)	0 (0)	2.082 0.353*
Unemployed	32 (94.1)	32 (94.1)	34 (100)	
Marital Status				
Married	33 (97.1)	33 (97.1)	32 (94.1)	2.582 0.630*
Single	1 (2.9)	1 (2.9)	2 (5.9)	
Preoperative Diagnosis				
Myoma Uteri	17 (50.0)	10 (29.4)	16 (47.1)	15.600 0.210*
Abnormal Uterine Bleeding	9 (26.5)	12 (35.3)	6 (17.6)	
Cancer (Ovarian, Endometrial)	4 (11.8)	2 (5.9)	1 (2.9)	
Pelvic Masses	3 (8.8)	3 (8.8)	4 (11.8)	
Endometrial Polyp	0 (0)	2 (5.9)	3 (8.8)	
Uterine Prolapse	1 (2.9)	5 (14.7)	4 (11.8)	
Additional Illness				
Yes	5 (14.7)	4 (11.8)	6 (17.6)	0.469 0.791*
No	29 (85.3)	30 (88.2)	28 (82.4)	
Surgical Procedures				
Total Abdominal Hysterectomy (TAH)	11 (32.4)	8 (23.5)	13 (38.2)	1.730*
Total Abdominal Hysterectomy and Bilateral Salfingo Oophorectomy (TAH + BSO)	23 (67.6)	26 (76.5)	21 (61.8)	0.421*
Age (Years)	$\overline{X} \pm$ SD 53.97 ± 10.96	$\overline{X} \pm$ SD 51.76 ± 8.32	$\overline{X} \pm$ SD 51.50 ± 9.62	0.665 0.516**
Number of Children	$\overline{X} \pm$ SD 5.764 ± 3.03	$\overline{X} \pm$ SD 5.264 ± 3.01	$\overline{X} \pm$ SD 5.382 ± 2.44	0.288 0.750**
Surgery Duration (Min)	$\overline{X} \pm$ SD 326.0 ± 27.95	$\overline{X} \pm$ SD 317.9 ± 27.44	$\overline{X} \pm$ SD 323.9 ± 26.70	0.802 0.451**

* Data were analyzed using a chi-square test. **One-way analysis of variance (ANOVA).

difference for the Reiki group occurred on the second postoperative day after the Reiki treatment ($\overline{X}$ = 183.8). An intergroup comparison revealed a significant difference in postoperative analgesic use. Paired comparisons revealed this difference to have been caused by the Reiki group ($p > 0.05$) (Table 2).

Vital signs

Repeated measurements indicated a significant difference between the pulse rates of the women in the Reiki and back massage groups before and after their respective treatments on their first and second postoperative days ($p < 0.05$). This difference was determined to be lower among the Reiki group after their procedure and higher among the back massage group. The four repeated measurements revealed a significant difference in mean pulse rate scores before and after Reiki on the first and second postoperative days for the women in the Reiki group (F = 52.465, $p < 0.001$). Post hoc Bonferroni test analysis determined that this difference occurred on the second postoperative day after the Reiki treatment ($p < 0.001$). An intergroup comparison revealed a significant difference in pulse rates on only the first postoperative day ($p < 0.05$), and in paired comparisons, this difference was due to the Reiki group (Table 3). Repeated measurements indicated a significant difference between respiratory rates among the Reiki and back massage groups before and after their respective treatments on first and second postoperative days ($p < 0.01$). This difference was found to indicate a decrease in the Reiki group and an increase in the back massage group. The four repeated measurements revealed a significant difference between mean respiratory rate scores before and after Reiki on the first and second postoperative days for the women in the Reiki group (F = 37.786, $p < 0.001$). Post hoc Bonferroni test analysis determined that this difference occurred on the second postoperative day after the Reiki treatment ($p < 0.001$). Intergroup comparisons indicated a significant difference in respiratory rates before and after the respective treatments on the first postoperative day and before the respective treatments on the second postoperative day ($p < 0.01$). Paired comparisons revealed that this difference was due to the Reiki group. No significant difference was observed between the groups' mean scores after patients' second postoperative day ($p > 0.05$) (Table 3).

Repeated measurements indicated a significant difference between the Reiki group and the back massage group vis-à-vis systolic blood pressure values before and after their respective treatments on the first and second postoperative days ($p < 0.05$). This difference was found to suggest a decrease in the Reiki group and an increase in the back massage group. The four repeated measurements revealed a significant difference between mean systolic blood pressure scores before and after Reiki on the first and second postoperative days for the women in the Reiki group (F = 21.296, $p < 0.001$). Post hoc Bonferroni test analysis determined that this difference occurred on the second postoperative day before the Reiki treatment ($p < 0.001$). A comparison between the groups indicated a statistically significant difference in systolic blood pressure values after the respective treatments on the first postoperative day and before and after the respective treatments on the second postoperative day ($p < 0.05$), and this difference was due to the Reiki group (Table 3). Repeated measurements showed a significant difference between the Reiki and back massage groups' diastolic blood pressure values before and after their respective treatments on the first and second postoperative days ($p < 0.01$). This difference was found to indicate a decrease in the Reiki group and an increase in the back massage group. The four repeated measurements revealed a significant difference between mean diastolic blood pressure scores before and after Reiki on the first and second postoperative days for the women in the Reiki group (F = 85.800, $p < 0.001$). Post hoc Bonferroni test analysis determined that this difference occurred on the second postoperative day after the Reiki treatment ($p < 0.001$). An intergroup

Table 2
Pain severity and analgesic use among participants in the Reiki, back massage, and control groups.

	Day	Time	Reiki Group (1)		Back Massage Group (2)	Control Group (3)	Comparison Between Groups			
			n	$\overline{X} \pm SD$	$\overline{X} \pm SD$	$\overline{X} \pm SD$	p^{b**} 1-2-3	p^{c***} 1-2	1-3	2-3
Pain Severity	1st	Before	34	6.38 ± 0.49	6.79 ± 0.48	6.91 ± 0.28	F = 14.890 <0.001	t = −3.405 0.001	t = −5.405<0.001	t = −1.6560.103
		After		5.02 ± 0.39	6.76 ± 0.43	6.97 ± 0.38	F=266.879 <0.001	t = −17.456 <0.001	t = −22.714 <0.001	t = −1.656 0.103
		p^{a*}		t = 16.263<0.001	t = -1.000 0.325	t = 1.436 0.160				
	2nd	Before	34	4.97 ± 0.30	5.91 ± 0.45	5.97 ± 0.17	F = 99.273 <0.001	t = −10.119 <0.001	t = −16.873 <0.001	t = −0.710 0.480
		After		3.58 ± 0.61	5.94 ± 0.48	6.26 ± 0.51	F = 211.899 <0.001	t = −17.869 <0.001	t = −17.301 <0.001	t = −2.558 0.013
		p^{a*}		t = 16.341 <0.001	t = 1.000 0.325	t = 2.963 0.006				
Postoperative Analgesic Use (Milligrams)	1st		34	297.0 ± 56.3	322.7 ± 72.9	336.0 ± 60.3	F = 3.301 0.041	t = −1.629 0.108	t = −2.752 0.008	t = −0.815 0.418
	2nd		34	183.8 ± 51.4	325.0 ± 71.8	339.7 ± 60.6	F = 64.212<0.001	t = -9.322<0.001	t = −11.190<0.001	t = −0.686 0.495
		p^{a*}		t = 18.895<0.001	t = 1.0000.325	t = −1.407 0.169				

* p^a—paired-samples t-test
** p^b—one-way analysis of variance (ANOVA) test statistics
*** p^c—unpaired t-test.

Table 3
Reiki, back massage, and control group participants' pulse rates, respiratory rates, and systolic and diastolic blood pressure measurements.

Vital Signs	Day	Time	Reiki Group (1)		Back Massage Group (2)	Control Group (3)	Comparison between Groups			
			n	$\overline{X} \pm SD$	$\overline{X} \pm SD$	$\overline{X} \pm SD$	p^{b**} 1-2-3	p^{c***} 1-2	1-3	2-3
Pulse Rate/ Min	1st	Before	34	82.94 ± 5.95	81.47±4.68	81.47±5.44	F = 0.845 0.433	t = 1.132 0.262	t = 1.063 0.292	t= 0.000 1.000
		After		79.47 ± 6.06	82.58±5.17	82.41±5.11	F= 3.491 0.034	t = -2.282 0.026	t = -2.164 0.034	t= 0.141 0.888
		p^{a*}		t = 22.595 <0.001	t = -3.791 <0.001	t = -3.064 0.004				
	2nd	Before	34	82.94 ± 5.97	81.35 ± 5.06	80.35 ± 6.04	F = 1.777 0.175	t = 1.183 0.241	t = 1.776 0.080	t= 0.740 0.462
		After		80.00 ± 6.17	82.52 ± 5.47	81.35 ± 6.51	F = 1.481 0.232	t = -1.789 0.078	t = -0.880 0.382	t= 0.807 0.423
		p^{a*}		t = 13.949 <0.001	t = -4.179 <0.001	t = -3.384 0.002				
Respiratory Rate/ Min	1st	Before	34	20.64 ± 1.61	19.35 ± 1.06	19.47± 1.24	F= 9.907 <0.001	t = 3.900 <0.001	t = 3.376 <0.001	t= 0.420 0.676
		After		19.05 ± 1.65	20.23 ± 1.82	20.11 ± 1.77	F= 4.656 0.012	t = -2.787 0.007	t = -2.550 0.013	t= 0.270 0.788
		p^{a*}		t = 11.282 <0.001	t = -3.447 0.002	t = -3.204 0.003				
	2nd	Before	34	20.23 ± 1.37	19.47 ± 1.13	19.35 ± 1.06	F= 5.427 0.006	t = 2.505 0.015	t = 2.957 0.004	t= 0.440 0.661
		After		19.88 ± 1.47	20.41 ± 1.61	20.23 ± 1.82	F = 0.913 0.405	t = -1.412 0.163	t = -0.877 0.384	t= 0.422 0.675
		p^{a*}		t = 2.659 0.012	t = -3.884<0.001	t = -3.447 0.002				
Systolic Blood Pressure /mmHg	1st	Before	34	117.94 ± 9.77	114.41±10.4	117.64±8.55	F = 1.402 0.251	t = 1.434 0.156	t = 0.132 0.895	t= 1.393 0.168
		After		111.47 ± 11.3	118.97±10.9	120.58±8.24	F= 7.657 0.001	t = -2.780 0.007	t = -3.798 <0.001	t= 0.689 0.493
		p^{a*}		t = 7.778<0.001	t = -4.288<0.001	t = -2.898 0.007				
	2nd	Before	34	118.82 ± 7.69	113.23±9.44	111.82±8.53	F= 4.348 0.015	t = 2.675 0.009	t = 2.538 0.014	t= 0.269 0.788
		After		111.47 ± 7.43	117.05±11.4	117.94±8.88	F = 4. 716 0.011	t = -2.381 0.020	t = -3.256 0.002	t= 0.354 0.724
		p^{a*}		t = 9.574<0.001	t = -3.772 0.001	t = -3.4770.001				
Diastolic Blood Pressure /mmHg	1st	Before	34	74.70 ± 5.63	70.88 ± 7.53	70.29 ± 6.73	F= 4.372 0.015	t = 2.370 0.021	t = 2.930 0.005	t= 0.3390.735
		After		65.00 ± 5.64	74.55 ± 7.11	73.38 ± 7.25	F= 20.531<0.001	t = -6.141 <0.001	t = -5.319 <0.001	t= 0.675 0.502
		p^{a*}		t = 33.000 <0.001	t = -3.687 0.001	t = -3.118 0.004				
	2nd	Before	34	73.52 ± 5.43	68.23 ± 8.69	68.82 ± 7.69	F= 5.226 0.007	t = 3.010 0.004	t = 2.912 0.005	t= 0.295 0.769
		After		63.82 ± 4.93	71.91 ± 8.87	72.79 ± 9.70	F= 12.633 <0.001	t = -4.644 <0.001	t = -4.804 <0.001	t= 0.391 0.697
		p^{a*}		t = 18.863 <0.001	t = -4.451 <0.001	t = -3.101 0.004				

* p^a—paired-samples t-test
** p^b—one-way analysis of variance (ANOVA) test statistics
*** p^c—unpaired t-test.

comparison showed a significant difference in diastolic blood pressure values before and after the respective treatments on the first and second postoperative days ($p < 0.05$). Paired comparisons indicated that this difference was due to the Reiki group (Table 3).

Discussion

Reiki and back massage have been said to have similar effects (relaxation and pain relief) and even to both activate the parasympathetic nervous system by touching the body's "energy" centers (chakras) and stimulating venous circulation.[7,17]

The current study's repeated measurements revealed a highly significant difference between the Reiki group's pain scores before and after Reiki treatment. Given this result, Reiki affected pain levels after patients' abdominal hysterectomies. Several studies support this result, having stated that Reiki offers highly positive effects for pain management.[11,16,21,23,27] The current study found no significant difference in pain scores among the back massage group before and after treatment. Similar to the current study's results, Vergo et al. stated that back massage provided to all patients hospitalized at a university hospital did not effectively reduce pain.[28] Contrary to the current study's results, however, studies have also shown that back massage reduces pain intensity.[29-32] This difference may be due to the position-related increase in incision-area pain among women who have undergone abdominal hysterectomies.

This study's intergroup comparison indicated a highly significant difference between the amount of analgesics used on patients' first and second postoperative days among the Reiki group, with the women in this group using fewer analgesics. Given this result, Reiki affected the amount of analgesics patients used after undergoing an abdominal hysterectomy. No significant difference was found in levels of postoperative analgesic use among the study's back massage group. In accordance with these findings, another study on women who had undergone abdominal hysterectomies found that analgesic use rates decreased significantly in a Reiki group compared to a control group.[11] Reiki applied for 15 min for two days after the administration of routine analgesics has been found to reduce analgesic use among women who had given birth by cesarean section, while a corresponding simple touch group did not experience decreased analgesic use.[16] These findings align with the current study's findings that women in the Reiki group experienced a decreased need for analgesics and required fewer analgesics during the study's follow-up period than the women in the back massage and control groups. This reduced need for analgesics is important for women, given both side effects and care costs. Contrary to the current study's findings, studies have also shown that back massage reduces analgesics use compared to a control group.[30-32] Most studies on back massage involved sample and methodological differences from the current study.[30-32] Most studies that have involved patients who had undergone a cesarean section and abdominal hysterectomy exposed patients to music.[30-32] Since the current study did not expose patients who had undergone an abdominal hysterectomy to music, back massage applied hadn't reduced the effect of analgesic use.

Reiki has been said to affect hemodynamic parameters (such as pulse rates, respiration rates, and blood pressure) by activating the parasympathetic nervous system.[33] The current study found, through repeated measurements, a significant difference in pulse rates across the study's groups, with lower rates in the Reiki group and higher rates in the back massage group. Given these results, Reiki and back massage affect patients' vital signs after an abdominal hysterectomy. A literature review revealed no studies investigating Reiki's effect on the pulse rates of women who had undergone an abdominal hysterectomy. However, previous results have indicated that Reiki applied for 20–30 min for two days after the administration of routine analgesics did not affect the pulse rates of women who had undergone a cesarean section.[23] Moreover, five minutes of massage on the first postoperative day was not found to change such women's pulse rates.[31] Contrary to the current study's findings, studies have also found that massage reduces pulse rates[8,29] or does not affect pulse rates.[31] Postoperative pain causes elevated blood pressure, as well as

elevated respiratory and pulse rates. This difference might be due to back massage not actually reducing pain.

The current study's intergroup comparison found significant differences between respiratory rates before and after Reiki or back massage on patients' first postoperative day and before patients' respective treatment on their second postoperative day, and this difference was due to the Reiki group. Intragroup repeated measurements revealed a significant difference between respiratory rates before and after treatment in the Reiki group and the back massage group. This difference was found to indicate a decreasing trend in the Reiki group and an increasing trend in the back massage group. Supporting the current results, previous studies have found that Reiki reduces respiratory rates after cesarean surgery.[16,23] Contrary to the current results, studies have also found that postoperative back massage reduces respiratory rates.[8,29,31,33]

Moreover, the current study's intragroup comparison indicated a significant difference between systolic and diastolic blood pressure values. Binary comparisons found this difference to be due to the Reiki group. Repeated measurements revealed a significant difference between the Reiki and back massage groups' systolic and diastolic blood pressure values before and after their respective treatments on patients' first and second postoperative days. While blood pressure values decreased among the Reiki group, they increased among the back massage group. Reiki has been said to decrease pain levels and lower blood pressure by providing physical and psychological support.[13,34,35] The literature has also reported that Reiki reduces systolic blood pressure but does not affect diastolic blood pressure.[16] Contrary to the current study's results, studies have also indicated that Reiki does not affect systolic or diastolic blood pressure values.[23,27] Studies have also published contradictory results, finding that postoperative back massage reduces systolic and diastolic blood pressure.[8,29-32] The increase in blood pressure among the current study's back massage group may have been due to pain levels in our sample. In this context, Reiki can be recommended as a nursing intervention to reduce systolic and diastolic blood pressure levels after an abdominal hysterectomy.

Our results supported Hypothesis 1: "Reiki interventions reduce pain, analgesic use, and vital signs after an abdominal hysterectomy".

Limitations

This study was conducted at two different hospitals because of difficulties obtaining the entire necessary sample at a single hospital. Since the data were obtained from patients who had undergone an open abdominal hysterectomy at the obstetrics clinics of the Dicle University and Gazi Yaşargil Training and Research Hospital, the research data can only be generalized to patients in this context. Due to conditions at the study's hospitals, patients could not listen to music while receiving a back massage, unlike previous studies. The current study's methodological limitations were that only single blinding was performed and a placebo group ("sham Reiki") was not used. Additionally, the two clinics at two hospitals' routine analgesic use among the Reiki, back massage, and control groups could not be controlled due to ethical procedures.

Conclusion

Reiki can be recommended as a nursing intervention to reduce pain and the amount of analgesic use after an abdominal hysterectomy. Using complementary therapies, such as Reiki or back massage, in addition to medication will improve the quality of nursing care. We recommend that further studies examine Reiki and back massage among patients about to undergo an abdominal hysterectomy alongside music therapies, comparing Reiki's effectiveness with other techniques'.

The current study's results show that Reiki, a complementary therapy, effectively reduces pain, analgesics use, heart rates, respiratory rates, and systolic and diastolic blood pressure values. Back massage was found not to affect pain levels or analgesic use, and it caused an increase in pulse and respiratory rates, as well as systolic and diastolic blood pressure values (Table. 1).

Author Contribution

Study design: HU, YY; Reiki application and back massage application: HU; Data collection and / or analysis: HU; Data analysis: YY; Writing - review & editing: HU, YY; Preparation of the article: HU, YY.

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Supplementary materials

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