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The effect of bioenergy on postoperative pain in patients experienced abdominal surgery: A nonpharmacological approach

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1. Introduction

Pain is the most common, but most uncomfortable, result that is expected to occur after surgical interventions [7,13,37]. After abdominal surgical interventions, some of the most common operations, pain can occur when using muscles during movement, deep breathing, and coughing, due to trauma to the skin and muscles caused by tubes and drains; pain can also occur when dressings are being changed [5,6]. Indeed, a study determined that patients continued to experience moderate pain 24–48 h after abdominal surgery [12]. Regardless of its cause, pain creates a threat to an organism and induces a stress response to this threat. If the pain lasts for a long time, physiopathological reactions to pain develop in the organism [1]. Therefore, the effective treatment of postoperative pain is of great importance. When the pain is controlled, the patient becomes comfortable, coughing and early recovery become easier, complications are reduced, the length of stay in the hospital is shortened, and healthcare costs are reduced [2,16].

Today, the combined use of pharmacologic and non-pharmacological therapies has increased in the control of surgical pain [1,25]. In the literature, non-pharmacological methods are classified into five groups: mind body interventions, traditional medical practices, biological substance-based practice, manipulative and body-based practices, and energy medicine [15,32,34]. Energy medicine is investigated in two sub-sections: bioelectromagnetics (e.g., magnets and alternating and direct currents) and bio-fields (e.g., acupuncture, bioenergy, chakra therapy, reflexology, reiki, shiatsu, tai chi, qi gong, and therapeutic touch) [15].

Bio-field therapies are therapies that penetrate the human body and affect the energy fields surrounding the body [18,24]. It has been reported that during the application of bioenergy, the heat generated by metabolic activities and the bioenergy generated by ionic movements in tissues are transferred from one person to another with or without touching [19,21,23]. The transfer of bioenergy is achieved through the chakras, which are the energy centers of the body, and the aura, which is associated with these energy centers [26,30]. It has been suggested that if the chakras that are involved in the receipt and transmission of energy are blocked, the health of the body is compromised and diseases emerge [14,30].

The effect of bioenergy on postoperative pain relief can be explained by two mechanisms, although the processes through which this effect occurs have not yet been clarified. In the first mechanism, bioenergy is transferred through skin stimulation. According to the gate control and endorphin theories [8,10,17,25], skin stimulation methods relieve pain. Specifically, according to the gate control theory, nociceptors at free nerve endings in the skin and other organs are stimulated by biochemical mediators released from damaged tissues (e.g., serotonin, histamine, bradykinin, arachidonic acid, leukotrienes, prostaglandin, catecholamines, and substance P). These stimuli are transmitted to the spinal cord through “A” and “C” fibers. Pain impulses are incorporated at the substantia gelatinosa, located in the central nerve fibers in the posterior horn of the spinal cord, and are directed towards the brain [9]. The substantia gelatinosa has a gate that controls the severity of the pain, and the pain stimulus reaches the level of consciousness when this gate opens through the activity of the fine fibers. The closure of this gate, through the activity of thick-diameter fibers, prevents the stimuli from reaching the consciousness level, so that no pain is felt [22,33]. According to the endorphin theory, endorphins, which are endogenous opioids produced in response to skin stimulation, help stop pain impulses in the spinal cord and brain [9,33]. Through the latter mechanism, bio-field therapies help promote relaxation, reduce stress, accelerate wound healing, and reduce inflammation, edema, and pain [18].

The literature review revealed that animal experiments have been used to examine the effects of bioenergy on the growth and metastasis of cancer cells and cortisol levels [27,28]. However, no studies have examined the effects of bioenergy on humans, especially in relation to pain relief. Therefore, it was thought that this study, which is considered a unique study, would make a significant contribution to the literature, and especially to nursing literature related to independent pain relief approaches. This study was conducted to determine the effect of bioenergy on postoperative pain in patients who underwent abdominal surgery. We hypothesized that the postoperative pain intensity in abdominal surgery patients treated with bioenergy is lower than the pain intensity in patients not treated with bioenergy.

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2. Material and methods

This non-randomized controlled clinical trial, which was designed according to a quasi-experimental model with control groups in repeated measures, was conducted between December 2015 and January 2018. Before the research began, the first author received a total of 42 h of hands-on training (basic level) on bioenergy from a Positive Thinking Center, where individual therapies, group therapies, and personal and institutional training were provided for bioenergy application.

The study data were collected from General Surgical and Liver Transplantation Intensive Care Units at a university hospital in Turkey. The General Surgical Intensive Care Unit has 16 beds and 19 nurses (two specialist nurses). In this intensive care unit, patient areas are separated by curtains (ward type), and there are only two isolation chambers. Patients in the units are mainly those who underwent abdominal surgery due to cancer. The Liver Transplant Institute has two intensive care units with a total bed capacity of 24 and a total of 38 nurses. There are separate rooms for each patient in these intensive care units. Patients here mainly consist of those who underwent liver transplantation due to hepatitis, hepatocellular carcinoma, chronic liver failure, or Budd-Chiari syndrome, as well as their donors.

2.1. Sample and sampling method

The study population consisted of patients aged 18 and older who were hospitalized in intensive care units following abdominal surgery. The research sample was composed of patients who met the criteria for inclusion in the study and were selected by the improbable random sampling method. The patients were randomly assigned to the groups by the researcher. Patients did not know which one was assigned to the experimental or control group. In this way, single blinding was ensured. The sample size was determined using power analysis, which calculated that 210 patients should be included (105 experimental and 105 control) in the sample, with an error rate of 0.05%, a confidence interval of 95%, an effect size of 0.5%, and a population representation power of 95%. The sample size was calculated according to the hypothesis testing method.

2.1.1. Inclusion criteria

In this study, we included patients who did not have any communication problems that would prevent them from understanding the information provided and correctly identifying the pain severity, were not intubated and were conscious, underwent open abdominal surgery and were on the first postoperative day, received pethidine hydrochloride (HCI) and paracetamol for postoperative pain control, expressed their postoperative pain as “moderate” or “severe” (i.e., 4 and above according to the visual analog scale [VAS] for pain), did not develop any complications in the early postoperative period and were stable and suitable for mobilization, did not undergo patient-controlled analgesia for postoperative pain control.

2.2. Measurement instruments

In this study, the Patient Identification Form and the VAS were used to collect data. The Patient Identification Form was prepared by the investigator to identify some of the patients’ descriptive and medical characteristics. The form consisted of two parts: the first part contained questions about the sociodemographic characteristics of the individuals, while the second part contained questions about their medical characteristics. There were 13 questions in each section.

The VAS is a pain assessment tool consisting of a 10-point scale, with “no pain” on one side and “worst possible pain” on the other. It has been reported in the literature that the VAS is a sensitive and reliable tool for assessing the severity of pain [4,11].

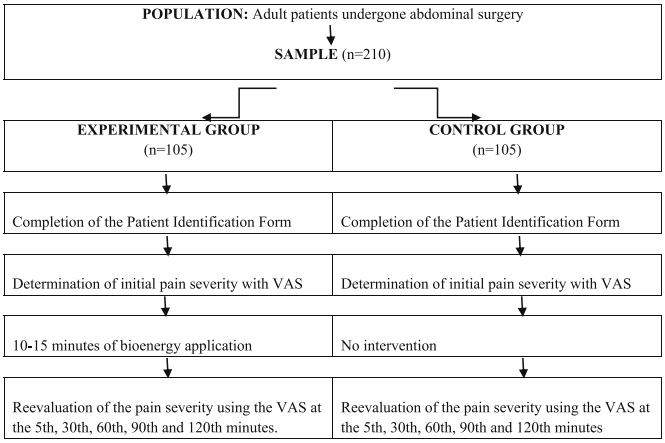

Fig. 1. Flow chart of the study in experimental and control groups.
*VAS: visual analog scale.

2.3. Procedures

In this study, the first author both provided the intervention and collected the data. The data were collected using face-to-face interviews, conducted by the first author in intensive care units between December 2016 and November 2017 on weekdays and on Saturdays. Data were collected during the day time on the first postoperative day. The Patient Identification Form was administered to the patients in the experimental group, and the initial pain levels were then determined according to the VAS. Immediately after determining the level of pain, patients were given bioenergy for 10–15 min, according to the recommendations in the relevant literature [28,29]. The pain levels of the patients were reevaluated using the VAS at the 5th, 30th, 60th, 90th, and 120th minute after bioenergy administration (Fig. 1). Bioenergy treatment was performed according to the half-life of the analgesics used in the clinics (i.e., at the third hour in patients who received pethidine HCl or at the fifth hour in patients who received paracetamol). This treatment was performed with care not to interrupt the routine administration times of analgesics in the clinics.

In the control group, the Patient Identification Form was administered to the patients, and the initial pain levels were then determined according to the VAS. Then, there was a waiting time of 10–15 min during which no interventions occurred. The pain levels were then reevaluated using the VAS at the 5th, 30th, 60th, 90th, and 120th minute at the end of the waiting period (Fig. 1).

2.4. Nursing initiatives

The patient's area was converted to a closed area using a curtain or a portable screen, before applying the bioenergy. Care was taken to protect patient privacy, and the area below the waist was covered and incision area was prepared for application. The monitor connections (e.g., blood pressure monitor, saturation probe, and electrocardiogram connections), which would prevent energy transfer, were removed. It was ensured that the environment was as quiet as possible to allow the investigator and the patient to concentrate. The monitor sounds were reduced, ensuring that the amount of fluid applied to the patient was sufficient to avoid pump and perfusor sounds. The patient's incision line was observed, and the routine supine position used in the intensive care unit was maintained. The height of the bed was brought to a convenient position for the application.

First, the hands were heated, and the fingers were then joined together—to allow the patient to feel the passage of energy—and twisted slightly toward the palm. Later, the solar plexus region immediately behind the umbilicus was roughly identified. Because the incision line could not be touched with bare hands, the researcher's hands were

disinfected and transparent latex-free gloves were worn. On the right side of the patient, the right hand was placed on the solar plexus, while the left hand was placed on the forehead chakra, so that the hands were placed on the chakra centers. Simultaneous breathing with the patient in a rhythmic manner was established, which promoted harmony between both chakras. While continuing the simultaneous breathing, the researcher's hands were positioned with the left hand on the right side of the patient and the right hand on the left side of the patient. Bioenergy was applied starting from the vertex chakra, up to the forehead chakra, throat chakra, heart chakra, solar plexus, and spleen chakra, consecutively.

The patient's aura was cleared by sweeping from the shoulder to the tip of the toes, first on the right side of the body and then on the left side. The solar plexus, where the incision line was located, was placed between the two hands in such a way that the hands were not in contact with the patient (i.e., they were 2–3 cm away), and energy-matching was achieved with the resonance of the vibrations in this area. Until electrification was felt in the hands, the plexus in which the pain was felt was relieved by circular movements made 3–5 cm above the incision area. The hands were then placed on both sides of the incision line, and the process of touching was continued without harsh touches. When there was a sensation of electrification in the hands, the process was terminated, and the hand was positioned 2–3 cm away from the solar plexus, ensuring the integrity of the aura in that region. When the process was finished, the hands were washed (in order to prevent the passage of energy to the researcher; otherwise, the researcher may feel pain in the arms or head).

2.5. Statistical analysis

After the data were coded by the researcher, they were analyzed using the SPSS 17.0 software (SPSS Inc., Chicago, IL, USA). A confidence interval of 95% and an error level of $p < 0.05$ were used when evaluating the results obtained. The number, percentage, mean, and standard deviation were used to distribute the data, and a Chi-square test was used for the comparison of some of the introductory and medical characteristics of patients. An independent-samples *t*-test and repeated measures analysis of variance (rANOVA) were used for the comparison of the pain levels of the experimental and control groups according to time.

2.6. Ethical aspects of research

The study protocol was approved by the InonuUniversity, Malatya Clinical Research Ethics Committee (date: 13/01/2016; protocol code: 2016/8) in accordance with the Helsinki Declaration. Approvals were also obtained from the participating hospital. All the participants were informed of the confidential nature of the data and signed an informed consent form in which the study procedures and patients' rights (e.g., that they have the opportunity to withdraw at any time) had been delineated.

3. Results

3.1. Baseline characteristics

The characteristics of the patients are shown in Table 1. Of the patients in the experimental group, the mean age was 42.84 ± 15.35, 53.3% were females, 83.8% were married, 46.8% were primary and secondary school graduates, 58.1% were not employed, 55.2% had an income level less than their expenses, and 48.6% were living in the city center of Malatya. Of the patients in the control group, the mean age was 44.09 ± 16.38, 64.8% were males, 79% were married, 61.9% were primary and secondary school graduates, 50.5% were employed, 55.2% had an income level equal to their expenses, and 49.5% were living in the city center of Malatya.

Table 1
Patients' characteristics.

Characteristics	Experimental group (n = 105)		Control group (n = 105)		Statistical significance level
Age	(Mean ± SD) 42.84 ± 15.35		(Mean ± SD) 44.09 ± 16.38		= 0.570
	n	**%**	**n**	**%**	
Gender					
Female	56	53.3	37	35.2	
Male	49	46.7	68	64.8	= **0.008**
Marital status					
Married	88	83.8	83	79.0	
Single	17	16.2	22	21.0	= 0.478
Educational level					
Illiterate	6	5.7	4	3.8	
Literate	7	6.7	9	8.6	= 0.177
Primary and secondary education	51	48.6	65	61.9	
High school	22	21	18	17.1	
Tertiary education and higher	19	18.1	9	8.6	
Employment status					
Employed	44	41.9	53	50.5	
Unemployed	61	58.1	52	49.5	= 0.213
Income status					
Less than expense	58	55.2	44	41.9	
Equal to expense	41	39.0	58	55.2	= 0.054
More than expense	6	5.7	3	2.9	
Place of residence					
City center	51	48.6	52	49.5	
District	45	42.9	40	38.1	= 0.597
Village/Township	9	8.6	13	12.4	

*SD: standard deviation.

Table 2
Patients' medical characteristics.

Medical characteristics	Experimental group (n = 105)		Control group (n = 105)		Statistical significance level
	n	**%**	**n**	**%**	
Surgical history					
Yes	61	51.8	63	60.0	
No	44	41.9	42	40.0	= 0.779
Presence of chronic disease					
Yes	18	17.1	23	21.9	
No	87	82.9	82	78.1	= 0.486
Diagnosis					
Gastric diseases	5	4.8	2	1.9	
Bowel diseases	13	12.4	16	15.2	= 0.168
Hepatopancreatobiliary diseases	76	72.4	68	64.8	
Hernias	5	4.8	10	9.5	
Acute abdomen	6	5.7	5	4.8	
Other (leiomyosarcoma, fornier gangrene, testicular malignant neoplasm)	0	0	4	3.8	
Type of surgery					
Gastrectomy	6	5.7	1	1.0	
Bowel resections	13	12.4	16	15.2	= 0.128
Hepatectomy/liver donor	41	39.0	36	34.3	
Liver transplant recipient	14	13.3	19	18.1	
Pancreas/biliary surgery	15	14.3	7	6.7	
Incisional hernia repairs	4	3.8	10	9.5	
Liver cyst/mass excision	4	3.8	4	3.8	
Other (splenoraphy etc.)	8	7.6	12	11.4	
Analgesic type					
Paracetamol	40	38.1	53	50.5	
Pethidine hydrochloride	65	61.9	52	49.5	= 0.071

Table 3
Comparison of pain severity in experimental and control groups according to time.

Time	Experimental group	Control group	t value	Significance level
	Mean ± SD	Mean ± SD		
Prior to bioenergy	5.87 ± 1.36	5.22 ± 1.30	3.527	***0.001**
5th min.	4.98 ± 1.60	5.10 ± 1.57	−0.564	0.573
30th min.	4.78 ± 1.93	5.20 ± 1.97	−1.555	0.121
60th min.	4.72 ± 1.97	5.40 ± 2.26	−2.339	***0.020**
90th min.	4.82 ± 2.15	5.68 ± 2.48	−2.672	***0.008**
120th min.	5.02 ± 2.38	5.79 ± 2.75	−2.141	***0.033**
F value	= 9.388	= 1.538		
Significance level	***0.000**	0.185		

*p < 0.05; SD: standard deviation; min: minute.

3.2. Medical characteristics

Table 2 shows that, of the patients in the experimental group, 51.8% had undergone a previous surgery, 17.1% had chronic diseases, 72.4% had a diagnosis related to a hepatopancreatic disease, 39% underwent hepatectomy, and 61.9% received pethidin HCI as an analgesic treatment in the postoperative period. In addition, of the patients in the control group, 60% had undergone a previous surgery, 21.9% had chronic diseases, 64.8% had a diagnosis related to a hepatopancreatic disease, 34.3% underwent hepatectomy, and 50.5% received paracetamol as an analgesic treatment in the postoperative period.

3.3. Primary outcomes

A comparison of the pain severity of the experimental and control groups according to time is given in Table 3. Prior to the administration of bioenergy, the pain severity was found to be 5.87 ± 1.36 in the experimental group and 5.22 ± 1.30 in the control group (p = 0.001). There was no statistically significant difference between the levels of the experimental and control groups at the 5th minute (p = 0.573) or 30th minute (p = 0.121) after bioenergy. However, the difference between the groups was statistically significant at the 60th (p = 0.020), 90th (p = 0.008), and 120th (p = 0.033) minutes (Fig. 2).

When the results of the repeated pain severity measurements of the patients in the experimental group were examined, it was seen that the pain severity, which was higher prior to bioenergy administration, decreased at the 5th, 30th, and 60th minutes after bioenergy. The pain severity started to rise again at the 90th and 120th minutes; however, the levels to which it rose were still lower than those of the control group at all the times (p = 0.000). In the control group, the severity of pain decreased at the 5th minute after bioenergy administration but increased gradually from the 30th minute (p = 0.185) (Table 3).

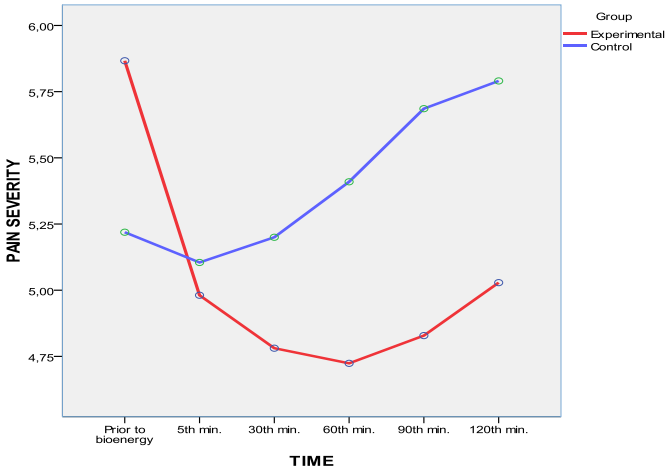

Fig. 2. Pain severity in experimental and control groups according to time. *min: minute.

4. Discussion

The severity of pain is known to be higher after surgical interventions applied to the abdominal region [33]. Indeed, a study determined that patients continued to experience moderate pain 24–48 h after abdominal surgery [12]. This information reveals the importance of controlling pain after abdominal surgery using either pharmacological or non-pharmacological methods.

This study was carried out to determine the effect of bioenergy, a bio-field therapy, on pain after abdominal surgery. As shown in Table 3, bioenergy is very effective in decreasing pain after abdominal surgery. Through their systematic review, Jain and Mills found that bio-field therapies show strong evidence of reducing pain intensity in pain populations [20].

Further studies are needed to elaborate on the effectiveness and underlying mechanisms of bio-field therapies [27]. Similarly, the mechanism by which pain relief occurs through bioenergy has not yet been clarified. However, bioenergy is thought to relieve pain by several different mechanisms. Bioenergy is a method that stimulates the skin. According to the first mechanism, bioenergy relieves pain by stimulating the skin according to the gate control and endorphin theories. Bio-field therapies help to relax patients and reduce stress [18]. In fact, Running and Hildreth determined that bioenergy was effective in reducing the stress of university students [29]. Similarly, according to the second mechanism, bioenergy may help to relax patients by reducing stress and, thus, reducing pain [18].

When the literature was examined, it was seen that there are limited number of studies about bioenergy. One of these studies, carried out in Turkey by Yilmaz and Cavdar, examined the complementary medicine methods used to relieve pain from disk herniation before surgery, and one of the most frequently used methods in this study was bioenergy [36]. In a study examining the effect of bioenergy on tumor size and metastasis in breast cancer, breast cancer cells were injected into mice. After the injection, bioenergy was applied for 10 days. Mice treated with bioenergy had smaller tumors and lower rates of metastasis [28]. Another study examined the effect of bioenergy on cortisol levels in mice injected with breast cancer cells. The first group underwent bioenergy on a daily basis, and in the second group, bioenergy was applied every other day; the last group was not subjected to any intervention. The fecal cortisol levels in mice that underwent bioenergy were found to be lower than those in mice that were not subjected to any intervention [27].

The studies that have been done on bioenergy are currently very limited. Therefore, the findings of this study were compared with the results of other studies examining the effects of bio-field therapies on patients undergoing abdominal surgery [3,31,35]. A similar study to ours examined the effect of reiki, a bio-field therapy, on post-cesarean pain, anxiety, and hemodynamic parameters. Reiki applied once daily

for 2 days in the first 24–48 h postoperatively was shown to significantly reduce pain severity and analgesic requirements [31]. In addition, another study found that reiki applied after abdominal hysterectomy reduced pain severity [35]. In a further study, it was determined that the healing touch applied after bariatric surgery decreased the pain level of patients [3]. The results of these studies are similar to our findings. As a result, it can be concluded that the results of this research support those of other relevant studies in the literature. It was determined that the postoperative pain intensity after abdominal surgery in patients who underwent bioenergy was lower than the pain severity in patients who did not undergo bioenergy.

This study includes a few limitations. This study was conducted only on patients who underwent abdominal surgery in a single institution. In addition to this, randomization could not be performed in patient selection. Therefore, the results cannot be generalized to all abdominal surgery patients. In ward-type intensive care units where the study was conducted, the ambient light and sounds could not be controlled at some points during the bioenergy application. The only outcome measure was the VAS. The positive effects of bioenergy may have been secondary to its effect on patients' emotional states. However, an assessment of the emotional status of patients was not conducted. As the application of bioenergy has only recently begun to be used, the results of the study can only be compared to a limited number of similar studies in the literature. The first author both provided the intervention and collected the data. This condition may have caused the author to act unintentional prejudice. The final limitation of this study is that the qualitative feedback and intervention experiences of the patients were not investigated. Therefore, quantitative findings could not be enriched with qualitative details.

5. Conclusion

Our results were found to be consistent with the results of other relevant studies in the literature. We have demonstrated that the postoperative pain severity in abdominal surgery patients treated with bioenergy is lower than the pain severity in patients not treated with bioenergy. Therefore, bioenergy should be applied in addition to analgesics for pain control after abdominal surgery. Further research should be done on the effect of bioenergy on pain in groups of patients where different surgical procedures are applied. In this study, the qualitative feedback and intervention experiences of the patients were not investigated. However, in order to provide a more thorough perspective in future research, the qualitative feedback and intervention experiences of patients should also be investigated.

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Contributors

Aslan contributed by collecting the research and entering the data into the database for analysis. Aslan and Özkan contributed to the writing and editing of all sections of the research.

Declaration of interest

None.

Disclosures

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ctcp.2019.07.005.

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