Supportive Care in Cancer (2025) 33:749
https://doi.org/10.1007/s00520-025-09814-x

RESEARCH

The effect of the Emotional Freedom Technique (EFT) on pain and depression in cancer patients: a randomized controlled trial

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Received: 23 February 2025 / Accepted: 25 July 2025 / Published online: 4 August 2025

Abstract

Purpose Cancer patients frequently experience both physical and psychological challenges, including chronic pain and depression. While conventional treatments primarily rely on pharmacological interventions, complementary approaches such as the Emotional Freedom Technique (EFT) may help alleviate both physical and psychological distress. This study aimed to assess the effects of EFT on pain and depression in individuals with cancer.

Methods This randomized controlled trial was conducted in the oncology ward of a high-capacity hospital in eastern Turkey between December 2023 and March 2024. Seventy cancer patients were randomly assigned to either the EFT group (n = 35) or the control group (n = 35). The EFT group received four structured 30-min sessions over two weeks, led by a certified EFT practitioner, with symptom reassessment after each session. The control group received routine care. Data were collected using a Participant Information Form, the Beck Depression Inventory (BDI), and the Visual Analog Scale (VAS) before and after the intervention.

Results VAS scores in the EFT group significantly decreased from 4.82 ± 2.47 to 2.44 ± 1.97 ($p < 0.05$), whereas the control group showed a smaller reduction from 5.36 ± 2.42 to 4.25 ± 2.75 ($p > 0.05$). BDI scores in the EFT group improved significantly, decreasing from 31.44 ± 17.68 to 18.44 ± 7.0 ($p < 0.05$), while the control group's scores increased from 27.94 ± 16.26 to 31.42 ± 12.65 ($p > 0.05$).

Conclusion These findings suggest that EFT was effective in significantly reducing both pain and depression levels in cancer patients.

Keywords Cancer · Complementary and alternative medicine · Depression · EFT · Energy psychology · Non-pharmacological intervention · Pain

Introduction

Although cancer involves numerous physical symptoms as well as psychological and existential concerns, pain is widely regarded as the most critical symptom. When left unmanaged, pain severely impairs a patient's ability to tolerate treatment, recover as a survivor, or die peacefully [1, 2]. In addition to chronic physical symptoms such as pain, patients with cancer frequently experience psychological symptoms, including depression [3]. Epidemiological studies show that 55% of patients undergoing active cancer treatment and 66% of those with advanced or terminal disease report moderate-to-severe pain, while approximately 20–25% of all cancer patients experience clinically significant depressive symptoms [4, 5]. These statistics reveal the high prevalence of both physical and psychological distress in cancer patients. Chronic pain not only limits daily activities but also reduces adherence to treatment, leading to a significant decline in quality of life [1, 6]. While pain complicates every moment of daily life for cancer patients, depression delays the recovery process by causing a loss of hope and morale [7–9]. Depression can negatively affect treatment motivation and the immune system, potentially accelerating disease progression and increasing mortality risk [10]. The literature indicates that pain exacerbates emotional distress, and anxiety or depression increases pain perception, creating a feedback loop that makes it difficult to manage symptoms and achieve positive treatment outcomes [11, 12]. Therefore, managing pain and depression

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effectively is a crucial part of cancer care. Successful pain management depends on a comprehensive assessment that considers physical, psychological, social, and spiritual factors, forming the foundation for multidisciplinary interventions [6].

Traditional approaches to treating pain and depression in cancer patients primarily rely on pharmacologic interventions, which while often effective can carry significant side effects and limitations [13, 14]. Although these drugs are effective in the short term, their serious side effect profiles can cause various problems with long-term use [15–17]. An analysis by Ripamonti & Chelazzi (2024) shows that opioids increase tumour growth, reduce the effectiveness of immunotherapy, and negatively affect survival [17]. Another study explains that opioids trigger neuroinflammatory processes through immune cells in the central nervous system and the Toll-like receptor 4 pathway [18]. Additionally, depression in cancer patients has been found to lead to opioid misuse [19]. In this context, it is suggested that traditional approaches focusing solely on symptom suppression may be insufficient, and that complementary and alternative methods should be considered. One such approach is the Emotional Freedom Technique (EFT), a psychological acupressure method that has gained attention for its potential to alleviate pain and emotional stress [20, 21]. EFT involves gently tapping specific acupressure points, which is believed to influence the body's energy meridians and reduce psychological distress. Research suggests that EFT may exert its effects by modulating the amygdala's stress response and altering neural pathways involved in emotional regulation [22, 23].

The EFT is a technique designed to address mental and emotional imbalances by gently tapping on the body's energy meridians while focusing on specific emotional experiences [24]. For cancer patients, this method may help restore inner resilience and significantly reduce symptoms such as depression and pain. The theoretical foundation of EFT combines principles from Traditional Chinese Medicine (TCM) and energy psychology, which propose that disruptions in the body's energy flow can contribute to emotional and physical distress. At the same time, contemporary research investigates EFT's effects through neurobiological and psychological frameworks, including its potential role in stress regulation and cognitive restructuring [23, 25–27]. Cancer patients often endure a complex pain experience that encompasses not only physical discomfort but also the emotional and psychological impact of the disease. EFT offers a comprehensive approach to pain management by addressing this interplay between physical and emotional factors. Studies have shown that EFT can reduce physiological markers of stress and improve psychological outcomes [25, 28, 29]. These findings suggest that EFT may serve as an alternative treatment for alleviating pain and depression in cancer patients. Rooted in both psychological and somatic practices, this technique offers a distinctive approach to addressing the complex nature of cancer-related pain and emotional distress. Given the substantial impact of pain and depression on quality of life in cancer patients [30–32], integrating complementary therapies such as EFT may significantly enhance overall cancer care and patient outcomes. This study addresses a critical gap in the literature by investigating the effectiveness of the Emotional Freedom Technique (EFT) as a complementary approach to alleviating pain and depression in cancer patients, an area with limited empirical evidence. Although numerous studies on EFT exist in the current literature, randomized controlled trials evaluating both pain and depression outcomes simultaneously in cancer patients remain extremely limited. To our knowledge, this is the first EFT intervention trial conducted with oncology patients in Turkey and is positioned to address a significant gap in the relevant literature. This study aims to elucidate the therapeutic potential of EFT in oncology care through the use of rigorous scientific methods and to provide a comprehensive, reproducible framework for future clinical applications.

Research hypotheses

H_1a: Cancer patients who receive the EFT intervention will report a significantly greater reduction in pain levels, as measured by the Visual Analog Scale (VAS), compared to those receiving routine care.
H_1b: Cancer patients who receive the EFT intervention will report a significantly greater reduction in depression levels, as measured by the Beck Depression Inventory (BDI), compared to those receiving routine care.

Methods

Study type

This study followed a randomized controlled experimental design.

Place and time of study

The study was conducted in the oncology ward of a high-capacity oncology hospital in eastern Turkey, between December 2023 and March 2024.

Study sample and population

The study population included 332 cancer patients who were receiving treatment at the designated hospital during the

study period. Using a 95% power, 95% confidence interval, 0.5% effect size, two-sided significance level of 0.5%, and a 5% margin of error, the required sample size was calculated to be 68 patients (EFT group: 34; control group: 34). To enhance representativeness and account for potential attrition, the study was completed with 70 participants. The final sample comprised 35 patients in the experimental group and 35 in the control group.

Randomization was performed by an independent statistician after baseline data collection, using a computer-generated block randomization method with a block size of 4. Allocation concealment was maintained through the use of sequentially numbered, opaque, sealed envelopes, which were prepared and opened by an individual not involved in delivering the intervention.

Inclusion and exclusion criteria

Patients were included in the study if they met the following criteria: (1) aged 18 years or older and receiving oncological treatment; (2) able to communicate; (3) had no vision or hearing impairments; (4) had no psychiatric diagnosis; (5) were not receiving psychotherapy; (6) voluntarily agreed to participate and signed the informed consent form; (7) were not in the terminal phase; and (8) had no pain, scar tissue, open wounds, or infections at the EFT application sites. Patients were excluded if they (1) were pregnant or (2) chose to withdraw from the study.

Data collection

The study data were collected using a participant information form developed by the researchers, the Beck Depression Inventory (BDI), and the Visual Analog Scale (VAS). The questionnaire took approximately 15–20 min to complete.

Participant Information Form: This form was developed by the researchers to gather sociodemographic and clinical information. It included eight questions covering age, gender, marital status, occupation, cancer stage, duration of illness, pain treatment status, and psychiatric treatment status.

Visual Analog Scale (VAS): The VAS consists of a line divided horizontally or vertically into 10 equal segments, with endpoints labeled "No Pain" and "Unbearable Pain." The line may be a simple straight line, equally spaced, or annotated with descriptive terms to indicate pain intensity. Vertical formats are generally considered easier to interpret. When the VAS is modified into a different layout, it is referred to as a "Graphic Evaluation Scale" (Fig. 1) [33].

Beck Depression Inventory (BDI): Developed by Beck et al. (1961), this self-report scale is designed to assess the severity of physical, emotional, cognitive, and motivational symptoms associated with depression. It includes 21 symptom categories, each with four response options scored from 0 to 3. The total depression score is calculated by summing the item scores, yielding a range from 0 to 63. Higher scores indicate more severe levels of depression. The Turkish validity and reliability study was conducted by Hisli (1988) [34, 35]. In that study, the Cronbach's alpha coefficient was reported as 0.63. In the present study, Cronbach's alpha was calculated as 0.72. The total score obtained from the inventory reflects the overall severity of depression. Score ranges are usually categorized as follows:

- 0–13: Minimal depression
- 14–19: Mild depression
- 20–28: Moderate depression
- 29–63: Severe depression

Data collection procedures

The oncology hospital where the study was conducted includes five wards with a total of 150 beds. It provides services in medical oncology, radiation oncology, hematology, surgical oncology, and palliative care, as well as housing an outpatient chemotherapy unit. After baseline data were collected (Participant Information Form, VAS, and BDI), an independent statistician used a computer-assisted block randomization program with a block size of 4 to allocate 70 eligible patients into two groups. Allocation concealment was maintained using sequentially numbered, opaque, sealed

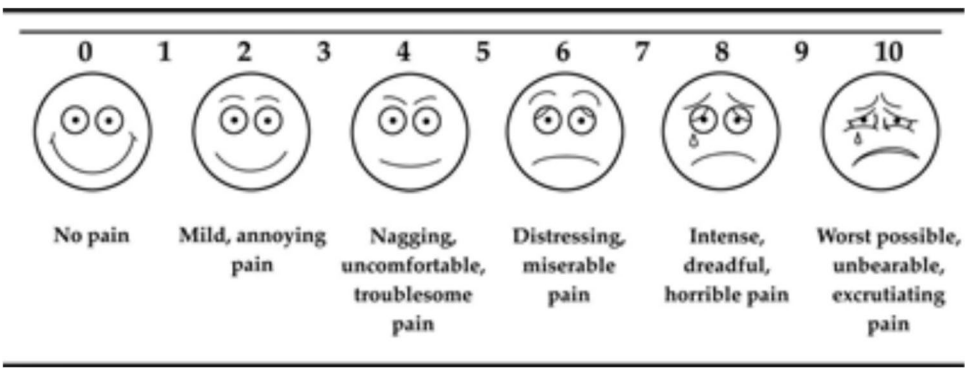


Fig. 1 VAS (Visual Analog Scale)

envelopes, which were prepared and opened by an individual not involved in delivering the intervention. As a result, 35 participants were assigned to the EFT group and 35 to the control group. Due to the nature of the intervention, blinding of participants and practitioners was not feasible. However, to minimize detection and performance bias, outcome assessors and data analysts were blinded to group assignments. The researcher who delivered the EFT intervention had completed 16 h of EFT Basic Training and 16 h of EFT Master Training and supervision, and was certified.

Intervention group application

To ensure the reliability of the intervention, the certification process and qualifications of the trainer were carefully considered. EFT sessions were delivered by a certified practitioner with extensive experience using the technique with cancer patients. The practitioner held an accredited EFT certificate from a recognized professional body and had received specialized training in managing emotional and physical distress in oncology patients.

A room within the clinic was arranged according to the researchers' specifications, providing a suitable environment for the technical application of the intervention and for informing participants about the procedure. Patients in the EFT group received 30-min sessions twice a week for two weeks, totaling four sessions. The literature indicates that EFT can produce lasting changes within 4 to 10 sessions [30, 36]. In this study, considering potential participant dropout, the number of sessions was set at four in alignment with the literature. The goal of this structured, regular intervention was to relieve patients' physical and emotional symptoms. Each session was individually tailored to the patient's current condition and needs, and progress was continuously monitored to maximize the effectiveness of EFT. The biweekly schedule ensured that both emotional and physical symptoms were addressed comprehensively. Each 30-min session specifically targeted negative symptoms such as anxiety, stress, and pain, which are commonly experienced during cancer treatment. Throughout the process, EFT techniques were adapted to help patients cope with their cancer diagnosis and treatment. The four-session program was designed to help patients become familiar with EFT practices and maximize their therapeutic benefit. After each session, patients' emotional states and symptom severity were regularly assessed, and intervention strategies were adjusted as needed to meet individual needs. This structured, targeted approach aimed to optimize the effectiveness of EFT in managing depression and pain symptoms in cancer patients. Potential adverse events such as fatigue, dizziness, or skin sensitivity were monitored during and after each session using a standardized symptom checklist. No adverse events were reported by participants during or after the intervention. All events were classified according to the Common Terminology Criteria for Adverse Events (CTCAE v5.0) (U.S. Department of Health and Human Services, 2017).

EFT is a therapeutic approach that integrates elements of cognitive therapy, exposure therapy, and acupressure. In this study, EFT was applied to patients in the treatment group using the following protocol:

EFT application steps:

The problem is identified: The specific issue to be addressed is first identified. This may include emotional responses related to the cancer diagnosis and treatment (e.g., fear of death, hopelessness, or loneliness), physical symptoms (e.g., pain or fatigue from chemotherapy), or traumatic memories associated with the illness. Patients are guided to clearly define these concerns.

The intensity is evaluated: Before the tapping begins, the patient rates the intensity of the issue on a scale from 0 to 10. This scale reflects the current level of distress, with 0 indicating no distress and 10 indicating extreme distress. For example: "The pain I feel after chemotherapy is now at a level of 8."

Determining a statement: The patient creates an attitude statement that includes acceptance of self and the current situation. This statement helps the patient to accept the situation and is usually structured as follows: "Although I am dealing with this [specific problem], I deeply and completely accept myself." For example, "Despite this intense pain/fatigue/depression after chemotherapy, I deeply and completely accept myself."

Tapping sequence: Acupressure is a traditional method used to regulate the flow of energy and alleviate various physical and emotional conditions by applying light pressure to specific points on the body. In the EFT technique, while light pressure is applied to specific acupressure points, a reminder phrase is repeated to help the patient focus on the problem. This reminder helps to alleviate emotional or physical reactions by allowing the problem to be consciously addressed. For example, short phrases such as'This tiredness'or'This pain'can be used.

The tapping points include:

- Karate-chop point: Side of the hand, under the pinky finger.
- Eyebrow point: At the beginning of the eyebrow, near the bridge of the nose.
- The edge of the eye: On the bone surrounding the outer corner of the eye.
- Under the eye: On the bone just below the eye.
- Under the nose: Between the nose and the upper lip.
- Chin Point: Midway between the lower lip and chin.

- Collarbone point: Where the collarbone meets the breastbone.
- Armpit: About ten centimeters below the armpit.
- Top of the head: Directly on top of the head (Fig. 2).

The intensity is re-evaluated: After the tapping sequence is completed, the patient re-evaluates the intensity of their distress using the same 0–10 scale. This reassessment helps determine whether there has been a reduction in distress. The tapping sequence is repeated as needed until the intensity decreases to a satisfactory level ideally between 0 and 2. This process is repeated to increase the level of relief the patient feels. While tapping may continue until the ideal range is reached, a maximum of three full rounds has been predetermined in the literature to ensure consistency among participants. Studies indicate that EFT interventions typically include two to three rounds per session [37] and that three-round protocols have been effectively implemented in clinical settings [38]. This flexible yet limited approach allows for the standardization of procedures while also accommodating individualized responses. After completing three rounds of tapping, only one participant in the intervention group (score:3) did not reach the target distress level, and all participants were included in the analysis. Before participating in the study, the purpose and procedures were explained to the participants in detail, and all of them completed the study.

After the EFT sessions were completed, post-test data was collected from the participants in the experimental group using measurement tools such as the Participant Information Form, Visual Analog Scale (VAS) and Beck Depression Inventory (BDI). These data were used to evaluate the effects of the EFT on the emotional and physical symptoms of the patients.

To minimise the risk of contamination between the intervention and control groups, both assessments and EFT sessions were conducted at different times and in separate rooms. In addition, participants were politely advised not to disclose any details about the intervention to other patients during their hospital stay. As all EFT sessions were conducted individually by the same certified practitioner, there was no group interaction during the intervention, further reducing the likelihood of information exchange.

Control group application

As in the intervention group, participants in the control group received routine oncological treatment and care. No psychological or therapeutic interventions, such as EFT, were provided. Participants received information about their cancer treatment and care upon request, in accordance with standard care procedures. To ensure methodological consistency, the Participant Information Form, Visual Analog Scale (VAS), and Beck Depression Inventory (BDI) were administered at the same time points as in the intervention group before the intervention (pre-test) and after a comparable period (post-test). No adverse events were reported by control group participants. All assessments were conducted in a separate location and at times distinct from the intervention sessions to minimize the risk of contamination between groups.

Figure 3 presents a detailed CONSORT flow diagram outlining participant recruitment, allocation, follow-up, and analysis.

Thn ethical statement

Prior to starting the study, permission was obtained from X University Health Sciences Scientific Research and Publication Ethics Committee (E-33117789–044-96750) and X hospital where the study was conducted. Researchers followed the rules stated in the Declaration of Helsinki throughout the research. At the same time, the patients were informed about the study in detail before they were included, the patients who agreed to participate in the study were asked to sign a voluntary consent form and were informed that they could leave the study at any time.

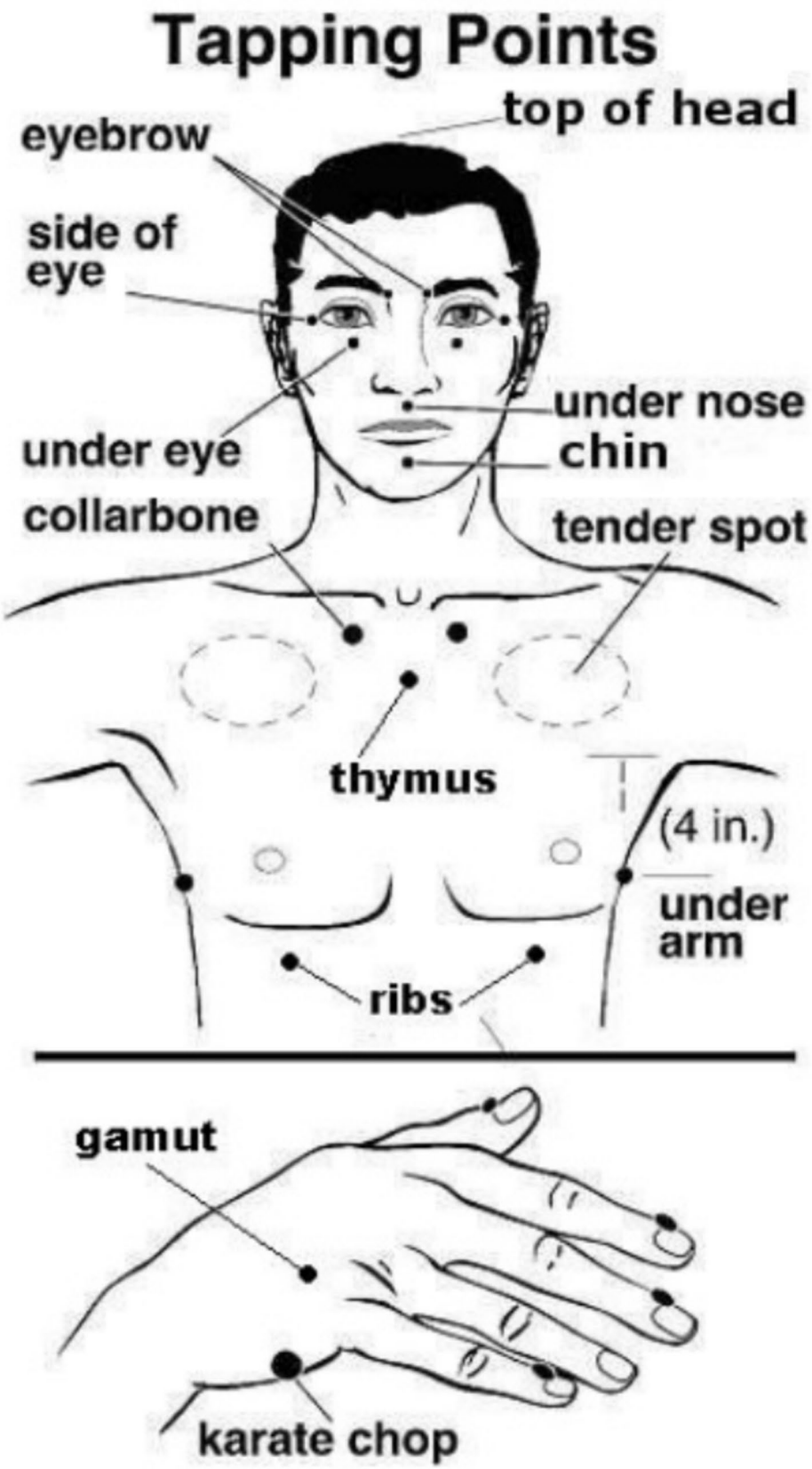
Data analysis

While evaluating the data obtained from the study, the SPSS 23.0 package program was used for statistical analysis. Percentage, mean and standard deviation were used to evaluate the descriptive characteristics of the patients, chi-square was used to compare the control variables, the dependent groups t-test was used to evaluate repeated measurements, and the Cronbach α test was used to evaluate the scale reliability coefficient.

CONSORT compliance and bias control

The study was conducted in accordance with the 2010 CONSORT guidelines for reporting randomized controlled trials. Randomization was carried out by an independent statistician using a computer-based block randomization system. Allocation was concealed using sealed, opaque envelopes. Although blinding of participants and practitioners was not feasible due to the nature of the intervention, outcome assessors and data analysts were blinded to group assignments to minimize bias. Potential adverse events were monitored using CTCAE v5.0 criteria, and no adverse effects were reported [39]. To minimize contamination between groups, all assessments and intervention sessions were scheduled and conducted separately.

Fig. 2 EFT tapping points



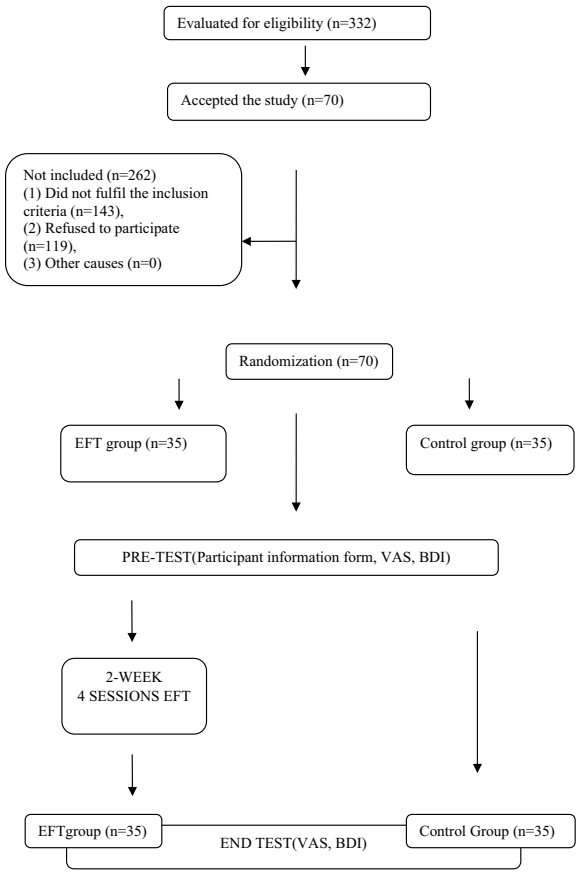


Fig. 3 CONSORT Flow Chart. * Vizüel Analog Scale (VAS), Beck's Depression Inventory (BDI)

Table 1 Sociodemographic characteristics of the participants

Characteristics	Experimental Group		Control Group	
Mean age	59.06 ± 17.26		57.19 ± 13.59	
	n	%	n	%
Gender				
Female	17	48.57	16	45.71
Male	18	51.43	19	54.29
Marital status				
Married	24	68.57	25	71.43
Single	11	31.43	10	28.57
Cancer stage				
Stage 1	9	27.27	9	25.71
Stage 2	11	33.33	10	28.57
Stage 3	4	12.12	6	17.14
Stage 4	9	27.27	10	28.57
Occupation				
Housewife	6	17.14	8	22.86
Retired	9	25.71	9	25.71
Self-employed	4	11.43	2	5.71
Civil servant	7	20.00	7	20.0
Other	9	25.71	9	25.71
Duration of disease				
1–3 years	12	34.29	8	22.86
4–6 years	10	28.57	14	40.0
7–9 years	9	25.71	8	22.86
10 years or more	4	11.43	5	14.29
Receiving treatment for pain				
Yes	23	65.71	21	60.0
No	12	34.29	14	40.0
Total	**35**	**100**	**35**	**100**

Results

Table 1 presents the demographic and clinical characteristics of participants in the experimental and control groups. The mean age was 59.06 ± 17.26 years in the EFT group and 57.19 ± 13.59 years in the control group. Regarding gender distribution, 48.57% of participants in the EFT group were female and 51.43% were male, while in the control group, 41.71% were female and 54.29% were male. In the EFT group, 68.57% of participants were married, 33.33% had stage 2 cancer, 34.29% had been living with the disease for 1–3 years, and 65.71% were receiving treatment for pain. In the control group, 71.43% were married, 28.57% had stage 2 cancer, 40.00% had a disease duration of 4–6 years, and 60.00% were receiving treatment for pain (Table 1).

Participants in both the experimental and control groups received treatment for pain (non-narcotic analgesics, etc.). When comparing the mean VAS and BDI scores of participants in the experimental and control groups to assess group comparability, no statistically significant differences were found ($p > 0.05$). This result indicates that analgesic use did not significantly affect baseline pain and depression levels (Table 2).

Table 3 presents the mean scale scores of participants in the EFT and control groups before and after the intervention. For the VAS scores, the EFT group had a pre-intervention mean of 4.82 ± 2.47 and a post-intervention mean of 2.44 ± 1.97. In the control group, the pre-intervention score was 5.36 ± 2.42, and the post-intervention score was 4.25 ± 2.75. The reduction in VAS scores in the EFT group was statistically significant ($t = -3.15$, $p = 0.002$) (Table 3). Regarding BDI scores, the EFT group showed a decrease from 31.44 ± 17.68 before the intervention to 18.44 ± 7.00 afterward. In contrast, the control group's scores increased from 27.94 ± 16.26 to 31.42 ± 12.65. The change in the EFT group was statistically significant ($t = -5.27$, $p = 0.000$) (Table 3).

Table 2 Comparison of pre-test mean VAS and BDI scores between patients receiving pain treatment and those not receiving treatment

	Receiving treatment for pain		
	Yes	No	t-p
Experimental group VAS pre-test	4.72 ± 2.34	4.91 ± 2.28	0.53–0.59
Control group VAS pre-test	5.30 ± 3.01	5.46 ± 2.77	0.64–0.52
Experimental group BDI pre-test	31.35 ± 13.98	31.62 ± 14.35	0.70–0.46
Control group BDI pre-test	28.63 ± 12.45	30.07 ± 12.78	0.62–0.71

Table 3 Comparison of the mean scale scores of the participants in the EFT and control groups before and after the application

n = 70	EFT (n = 35) Intervention group Before Mean(SD)	Control group (n = 35) Control group Before Mean(SD)	EFT (n = 35) Intervention group After Mean(SD)	Control group (n = 35) Control group After Mean(SD)
VAS	4.82(2.47)	5.36(2.42)	2.44(1.97)	4.25(2.75)
p-value[a]	t:−0.92 p:0.36		t: −3.15, p:0.002**	
BDI	31.44(17.68)	28.94(16.26)	18.44(7.0)	31.42(12.65)
p-value[a]	t: 0.86, p: 0.39		t: −5.27, p:0.000**	

** $p < 0.01$, VAS: Visual analog scale, BDI: Beck's Depression Inventory, SD: standard deviation, [a]Pearson's chi-square

Discussion

This review highlights that, despite the availability of various treatment modalities for cancer patients, comprehensive studies evaluating the effectiveness, safety, and success of alternative approaches such as EFT remain extremely limited. The present study represents an important step toward investigating the potential benefits of EFT for individuals undergoing cancer treatment. As such, it is expected to contribute to the theoretical foundation for future treatment strategies targeting this population. This study specifically examined the effects of EFT on pain and depression levels in cancer patients. The experimental and control groups were found to be comparable in terms of demographic characteristics and disease stages. The basic demographic variables of the participants such as age, gender, marital status, and education level were similar between the experimental and control groups. Examination of clinical characteristics revealed that the most common cancer types in the sample were breast, colorectal, and lung cancer. In terms of disease stage, the majority of patients had a stage II diagnosis. These findings indicate that the groups in the study were homogeneous not only in terms of sociodemographic characteristics but also in clinical characteristics. This sample structure strengthens the validity of the results and supports their generalisability to similar clinical contexts. EFT appears to be a valuable complement to existing treatment and rehabilitation programs. The study findings indicate that EFT is an effective method for managing pain and depression in cancer patients.

In the present study, a significant reduction in pain levels was observed in the experimental group receiving EFT ($p < 0.01$), while no change was noted in the control group. A review of the literature supports these findings, showing that EFT has been effective in reducing pain across various conditions. For example, Brattberg (2008) reported that EFT significantly reduced pain in patients with fibromyalgia [40]. In another study, the EFT was reported to reduce pain in frozen shoulder patients [41]. These clinical and literature-based analgesic findings align with neuroendocrine–biopsychosocial mechanisms that modulate systemic stress physiology by regulating the hypothalamic–pituitary–adrenal (HPA) axis, thereby influencing pain perception across multiple levels [29, 42]. Studies by Church et al. (2012), later replicated by Stapleton et al. (2020), demonstrated that EFT regulates HPA axis activity, leading to a 24%–43% reduction in salivary cortisol levels [29, 42]. This reduction in cortisol is consistent with decreased central sensitivity and reduced activation of nociceptive brain networks, thus supporting the analgesic effects of EFT in conjunction with conventional treatments [43, 44]. On a psychological level, EFT integrates touch, verbal exposure, and cognitive reframing mechanisms known to restructure maladaptive pain schemas and enhance self-efficacy [45, 46].

The first study to investigate the EFT for chronic pain offered a short and intensive 4-h treatment program to participants in the Persistent Pain program. At the end of the study, it was found that there was a significant reduction in the participants'pain severity [47]. Chronic pain in cancer

patients is one of the most common and most feared symptoms [48–50]. Current neuroimaging data show that EFT modulates limbic circuits involved in both nociceptive processing and emotion regulation. Neurobiological findings reveal that EFT activates prefrontal cortical regions associated with executive control, while simultaneously downregulating hyperactivity in limbic structures such as the amygdala and anterior insula regions involved in processing fear, threat, and negative emotions [51–53]. This top-down regulatory capacity supports adaptive emotional responses that are effective in alleviating both pain perception and depressive symptoms. Functional neuroimaging findings demonstrate that, following EFT sessions, functional connectivity between the medial prefrontal cortex and the periaqueductal grey (PAG) increases, indicating activation of neural networks involved in emotion regulation and stress-response modulation. Indeed, in a functional magnetic resonance imaging (fMRI) study targeting chronic pain, a significant decrease in signal intensity in the amygdala and anterior insula was observed, along with increased connectivity between the medial prefrontal cortex and PAG following EFT application; these findings suggest the strengthening of descending pain inhibitory pathways [53]. These patterns of neuroplastic change are consistent with effects reported in other EFT-based interventions targeting emotion regulation and provide a coherent neurophysiological basis for the concurrent reduction in pain and depression observed in our study. Although amygdala-focused findings have sparked some methodological debates, recent real-time neurofeedback studies and high-field (7 T) imaging data suggest that protocols reducing amygdala reactivity and integrating top-down regulation strategies may yield rapid and meaningful symptomatic improvements [54, 55].

The quality of evidence reported on the efficacy of physical therapy to treat and improve chronic pain has been shown to lack rigor [56]. Furthermore, although pharmacologic treatments, especially opioid prescriptions, have increased exponentially [57], these drugs often carry a high risk of addiction and mortality [58]. Similarly, meta-analytic evidence on the use of cognitive behavioral therapy (CBT) to treat chronic pain in addition to physical therapy suggests limited or no incremental benefit [59]. The findings show that CBT provided a significant reduction in pain levels in the experimental group, while there was no change in the control group, and there is evidence in the literature that CBT is effective in various diseases, especially in patient groups with chronic pain, suggesting that CBT can be used in addition to existing treatment methods in the treatment of pain in cancer patients.

In this study, it was determined that the mean depression score of both the experimental group and the control group was at a level of "severe depression" prior to the EFT application. When the literature is examined, it is reported that cancer patients have high levels of depression [60, 61]. This data is consistent with previous studies measuring depression levels of cancer patients. Considering that the majority of the participants in this study received treatment for pain, it is an expected result that their depression levels are high; in fact, the study by Stapleton et al. (2017) shows that there is a significant relationship between pain, anxiety and depression [47]. After the application of the EFT to the cancer patients in the experimental group, it was determined that there was a very significant decrease in the depression level of the experimental group ($p < 0.01$). There was no decrease in the control group ($p > 0.05$). Literature findings indicate that the emergence of depressive symptoms in cancer patients is driven by a multi-level biopsychosocial interaction. On the one hand, an increased inflammatory response triggers depression by disrupting mood-regulating systems through cytokine-mediated neuroimmune pathways [62]. On the other hand, persistent pain during treatment limits functional capacity, creating a high psychosocial burden due to both physical limitations and the loss of social roles; this significantly increases susceptibility to depression. Additionally, the existential threat that persists from diagnosis through survivorship particularly anxiety about death and uncertainty has been closely linked to the severity of depressive symptoms [63]. These processes reinforce one another within a chronic stress cycle characterized by glucocorticoid resistance: the weakening of the cortisol feedback mechanism due to HPA axis dysfunction perpetuates pro-inflammatory cytokine release, further fueling the inflammation–stress–depression spiral [64]. Therefore, depression in cancer should not be regarded merely as a psychological side effect but as a complex pathophysiological process driven by the interaction of inflammatory signaling, pain-induced functional impairment, and existential anxiety. While our study demonstrated that EFT application significantly reduced depression levels in cancer patients ($p < 0.05$), this effect was not confined to oncological samples but was also validated in postmenopausal women [65] and pregnant women [66], indicating that the therapeutic impact of EFT on depression may be broadly applicable across different life stages and clinical contexts particularly those shaped by the biopsychosocial pathophysiology involving inflammation-related neuroimmune processes, functional impairment due to persistent pain, and existential threat. These findings suggest that the EFT is an alternative treatment method that can be used in addition to all other treatment methods.

Although EFT has shown promising results in alleviating both pain and depression symptoms, some studies in the literature report that its effects may be limited or conditional. For example, Stapleton et al. (2025), in a randomized controlled trial with chronic pain patients, found that while EFT significantly reduced pain intensity, the decrease in depression scores was not significantly different from that

in the control group [67]. Salicru (2025), in a comprehensive review, highlighted inconsistencies in controlled conditions and blinding practices across study designs, concluding that "the evidence is promising but not yet definitive" [68]. In a study by Jasubhai and Mukundan (2018), both EFT and CBT reduced depression scores in an eight-week RCT, but EFT did not offer any additional benefit over CBT [69]. These findings suggest that, despite EFT's therapeutic potential, certain factors may limit its effectiveness.

Strengths and weaknesses of the study

One of the strengths of this study is the similarity between the experimental and control groups in terms of demographic characteristics, which enhances the reliability of the results. However, the short duration of the study and the small sample size limit the generalizability of the findings. Future research with larger sample sizes is needed to more thoroughly evaluate the effects of EFT.

Limitations of the study

This study has several methodological limitations. First, measurements were taken only at baseline and after the fourth EFT session; therefore, the findings reflect short-term effects only, and the long-term sustainability of EFT could not be assessed. Second, since both the EFT practitioner and participants were aware of the intervention content, double-blinding was not feasible. Although outcome assessors were blinded, this limitation may have introduced bias by increasing positive expectations toward treatment, particularly in self-report measures such as the VAS and BDI. Furthermore, the exclusive use of participant-reported tools to measure pain and depression reflects a lack of objective clinical indicators. The use of 'routine care' alone in the control group also limited the ability to isolate the specific therapeutic effects of EFT from other factors such as focused attention, physical touch, or cognitive restructuring.

Conclusions

This study provides strong evidence that EFT is an effective complementary intervention for reducing both pain and depression in cancer patients. Our findings showed a statistically significant reduction in pain intensity, as measured by the VAS, and an improvement in depressive symptoms, as indicated by the BDI, among patients who received the EFT intervention. In contrast, no such improvements were detected in the control group, which continued to receive routine care without EFT. These findings suggest that EFT may be a valuable adjunctive therapy in oncology settings, particularly for patients experiencing psychological distress or refractory pain.

From a clinical perspective, EFT offers several advantages: it is non-invasive, cost-effective, and easy to administer, and it can be integrated into existing psycho-oncological support services with minimal resource requirements. Given the increasing emphasis on holistic and patient-centered care in oncology, EFT could complement conventional interventions by addressing the emotional and cognitive dimensions of symptom burden. The specific effects of EFT may be distinguished from equivalent elements such as attention, touch, or cognitive reframing by comparing it with active control conditions such as CBT, relaxation training, or sham acupressure in future studies. Although these findings are promising, further research with larger samples and long-term follow-up is required to comprehensively assess the effectiveness and safety of EFT.

Acknowledgements We would like to thank the staff of Turgut Özal Medical Centre Training and Research Hospital for their help in data collection.

Authors' contribution All authors contributed to the study conception and design. MK drafted the paper. HÇ collected the data. MK was responsible for data and statistical analyses. All authors (MK, HÇ) critically analysed the data and revised the manuscript.

Funding The authors reported there is no funding associated with the work featured in this article.

Data availability No datasets were generated or analysed during the current study.

Declarations

Conflicts of interest The authors declare no competing interests.

Ethics approval Bingöl University Health Sciences Scientific Research and Publication Ethics Committee Approval (2023- E-33117789–044-96750) was obtained to carry out the study. Researchers followed the rules stated in the Declaration of Helsinki throughout the research.

Consent to participate Informed consent was obtained from all the individual participants included in the study.

Statistics The statistics were checked prior to submission by an expert statistician, Behice ERCİ, behice.erci@inonu.edu.tr.

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