RESEARCH ARTICLE

Comparison of Pain, Cortisol, and IL6 Levels Pre and Post SEFT in Stage III B Cervical Cancer Patients

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Abstract

Objective: The objective of the study is to assess the impact of Spiritual Emotional Freedom Technique (SEFT) intervention on pain severity, cortisol, and IL6 levels in stage III B cervical cancer patients undergoing chemoradiation. **Methods:** A quasi-experimental study with a one-group pre-test post-test design was conducted at Gatot Soebroto Hospital, Jakarta, Indonesia, focusing on stage III B cervical cancer patients who received chemoradiation. Pain severity was quantified using the Numeric Rating Scale (NRS), while cortisol and IL6 levels were determined via serum specimen collection and ELISA analysis. Statistical analysis revealed significant disparities in pain severity, cortisol levels, and IL6 levels pre- and post-intervention. A significant correlation emerged between pain severity, cortisol, and IL6 levels (p<0.001). **Result:** The average pre-intervention pain severity was 4.5 and the average post-intervention pain severity was 1.6. The average pre-intervention cortisol level was 632.9 and the average post-intervention cortisol level was 305.3 (p-value <0.001). The average pre-intervention IL6 level was 260.1 and the average post-intervention IL6 level was 106.7. **Conclusion:** The SEFT proves highly effective in alleviating pain among cervical cancer patients undergoing chemoradiation.

Keywords: Cervical cancer- Cortisol- IL6- Pain severity- Spiritual Emotional Freedom Technique (SEFT)

Introduction

Cervical cancer is the fourth most common cancer in women worldwide, with an estimated 604,000 new cases and 342,000 deaths in 2020. Approximately 90% of new cases and deaths worldwide in 2020 occurred in low- and middle-income countries [1]. The impact of cervical cancer, especially at stage III B, is profound, affecting both physical and psychological well-being.

Patients at this stage often experience severe pelvic pain, lower abdominal discomfort, weight loss, hair loss, nausea, vomiting, and fatigue [2]. The treatment of cervical cancer depends on the extent of the disease at diagnosis and local resource availability and may involve radical hysterectomy chemoradiation, or a combination of both [3]. Uncontrolled pain can significantly disrupt patients' daily activities, necessitating effective pain management techniques, which may encompass both pharmacological and non-pharmacological interventions [4].

Non-pharmacological pain management, particularly the Spiritual Emotional Freedom Technique (SEFT), focuses on altering patients' pain perception through psychological approaches. SEFT, a cost-effective and efficient relaxation technique involving tapping specific body points, is used in healthcare settings [5]. Programmed chemoradiation can affect physical function, social roles, fatigue, and pain triggering stress that affects the body's metabolism, including changes in cortisol hormone

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levels [6]. The relationship between the stress of the chemoradiation process and IL-6 involves psychological threats or pressures that activate the hypothalamic-pituitary axis, which regulates inflammatory activity, leading to the onset of pain [7]. Pain is the most common complaint in cancer patients, affecting about 30–60% of individuals, and cervical cancer is a prevalent cause of pain among women [8].

Research on interleukin-6 (IL-6) in cancer has been conducted in several countries. Interleukin-6 (IL-6) is a pleiotropic cytokine with a wide range of biological activities. It has several effects on cancer cells and plays a significant role in the immune system, as well as in the initiation, development, and metastasis of cancer [9]. Cancer cells, lymphocytes, monocytes, and macrophages can secrete interleukin-6 (IL-6). In vitro studies indicate that IL-6 serves as a paracrine and autocrine growth factor for prostate, lung, melanoma, kidney, ovarian, and cervical cancers[10].

Other research related to reducing stress levels in cervical cancer patients with SEFT therapy has shown that stress significantly decreased after SEFT intervention [11, 12]. However, research related to SEFT therapy for pain levels in cervical cancer patients undergoing chemoradiation is limited and not widely conducted. In addition, SEFT is a relatively new method in Indonesia, necessitating various studies to assess its effectiveness. The objective of the study is to assess the impact of SEFT intervention on pain severity, cortisol, and IL6 levels in stage III B cervical cancer patients undergoing chemoradiation.

Materials and Methods

Study Design

This research adopts a quasi-experimental design with a one-group pre-test – post-test pattern. The design follows the O1 X O2 pattern, encompassing the pre-test, treatment, and post-test phases. The study was conducted in December 2021.

Study Subjects

The study involved female patients diagnosed with stage III B cervical cancer who had undergone chemoradiation at Gatot Soebroto Hospital in Jakarta. A total of 30 women were selected as research subjects.

Measurements

Pain severity was assessed using the Numeric Rating Scale (NRS), with a scale ranging from 0 to 10. Cortisol and IL6 serum levels were measured using the ELISA technique, following the LsBio protocol (Human Cortisol Catalog No. LS-F26720 and Human IL6 Catalog No. LS-F11809). These levels were measured only pre- and post-intervention, with a 1 cc blood sample collected between 08:00 and 09:00 WIB (West Indonesia Time).

The implementation of SEFT therapy and serum collection followed these steps:
Pre-test

The researcher explained the study to the respondents,

conducted a pain assessment, and asked respondents to express their pain level before receiving treatment. A 1 cc blood sample was then drawn between 08:00 and 09:00 WIB for serum analysis.

Treatment

The researcher informed the respondents about the SEFT technique, conducted a pain assessment, and asked the respondents to express their pain using a numerical pain rating scale. This lasted for approximately 5-10 minutes in bed. Afterward, SEFT therapy with three methods (the set-up, the tune-in, and the tapping) was carried out within the 30th minute by the researcher, with assistance from another nurse who had received SEFT training or an explanation from the researcher to ensure objectivity. Each pain assessment result was recorded and documented in the respondent's research data. SEFT therapy was administered once a day for four days at 08:00-09:00 WIB for three rounds. The stages of applying SEFT therapy to respondents include:

The Set-Up

This step aims to ensure that the respondent's energy flow in the body is correctly directed. It neutralizes psychological resistance in the form of negative thoughts by redirecting them towards positivity. The respondent is asked to press their chest at the pain point or tap the karate chop area with two fingers while uttering positive affirmations.

The Tune-In

In this phase, to address physical issues, the respondent is instructed to focus their thoughts on the area experiencing pain. They are asked to accept their health condition and anticipate healing with unwavering faith in the Divine. To address emotional issues, respondents are prompted to think about specific events that evoke negative emotions they wish to eliminate. When negative reactions (anger, fear, sadness) occur, respondents are encouraged to utter sentences accepting their condition, such as "Oh God... I am willing, I surrender."

The Tapping

In this stage, respondents are asked to lightly tap two specific points on their body while continuing to tune in. These points are key points along the major energy meridians. Tapping these points several times will neutralize emotional disturbances or perceived pain, allowing the body's energy to flow normally and balance itself. All these stages are performed in three rounds lasting 5-10 minutes each, and the intervention is administered four times over four days (Figure 1). The SEFT method given to the patients was conducted by the researcher and enumerators who had received SEFT training from an instructor. Pain assessment results were recorded and documented daily for four days in the respondents' research data. The post-test results were obtained on the fourth day.

Post-test

In the final stage, researchers conducted a re-assessment

for pain and asked respondents to express their pain after receiving treatment. During the intervention, the results of the pain assessment were recorded and documented in the pain development data in the respondent's research data and continued with a 1 cc blood sample taken at 08:00-09:00 WIB to check the serum.

Statistical Data Analysis

The research data were analyzed using SPSS software. The correlation between pain severity, cortisol levels, and IL6 levels pre- and post-intervention was analyzed using Spearman's correlation test.

Results

A total of 30 respondents diagnosed with stage III B cervical cancer met the criteria to be included as research samples. The frequency distribution of respondent characteristics is presented in Table 1. Based on the table above, it shows that a higher proportion of respondents were aged ≥ 45 years, accounting for 56.7% (n=56.7%).

Figure 1. The EFT Tapping Points. (Source: http://www.healingtherapies.info/EFT.htm)

The majority of respondents had a higher education level, which was 66.7% (n=20). Most respondents were housewives, making up 80% (n=24) of the sample. Regarding the age of first marriage, the majority of respondents got married at the age ≥ 20, amounting to 63.3% (n=19). The number of children respondents had given birth to was mostly greater than 2, with 66.7% (n=20). In terms of contraceptive history, the majority of respondents had used non-LTCM contraception, which accounted for 83.3% (n=25). Looking at nutritional status based on BMI, most respondents had a normal BMI, comprising 60% (n=18), while respondents with malnutrition accounted for only 13.3% (n=4).

Table 1. Frequency Distribution of Research Subject Characteristics

Characteristics	Frequency	Percentage (%)
Age		
< 45 years	13	43.3
≥ 45 years	17	56.7
Education		
High (Senior High School-Collage)	20	66.7
Low (Primary School-Junior High School)	10	33.3
Occupation		
Employees/Professional	6	20.0
Housewife	24	80.0
Age at First Marriage		
≥ 20 years	19	63.3
< 20 years	11	36.7
Parity		
≤ 2 persons	10	33.3
> 2 persons	20	66.7
Contraceptive History		
Non LTCM*	25	83.3
LTCM	5	16.7
Nutritional Status (BMI)		
Malnutrition (<18,5)	4	13.3
Normal (18,5-24,9)	18	60.0
Overweight (≥ 25)	8	26.7

*LTCM (Long-Term Contraceptive Methods)
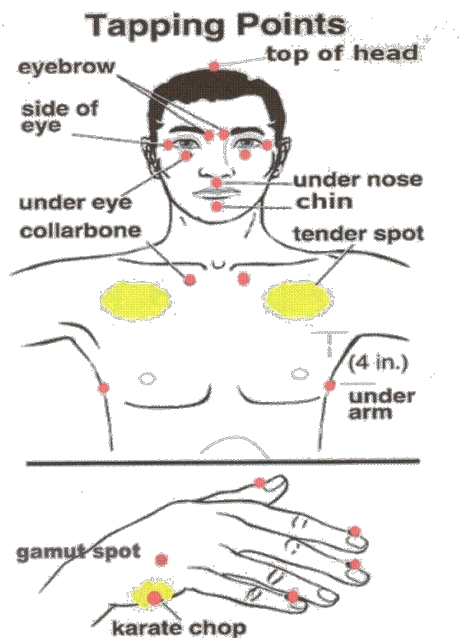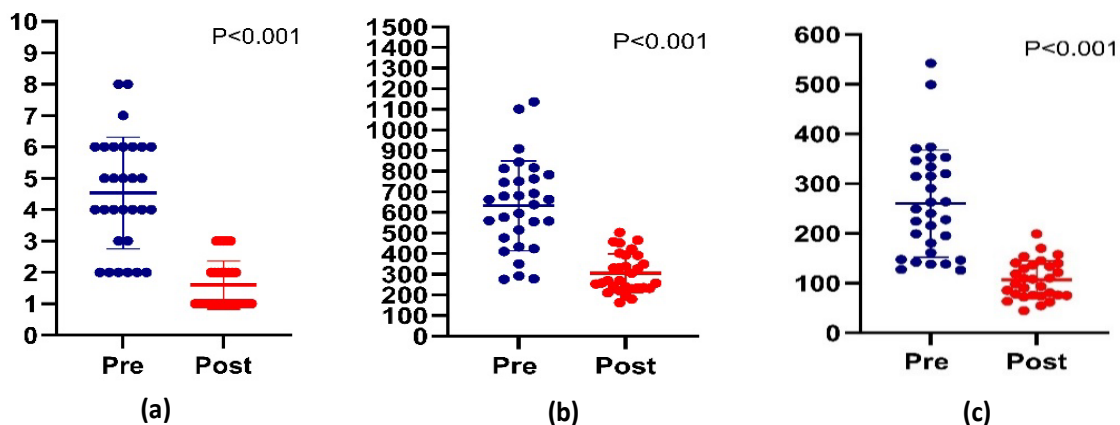

Figure 2. Comparison in Pain Severity (a), cortisol levels (b), and IL6 levels (c) pre and post-intervention SEFT

Table 2. Comparison of Mean Differences in Pain Severity, Cortisol Levels, and IL6 Levels Pre- and Post-SEFT Intervention

Comparison	Pre-Intervention SEFT	Post-Intervention SEFT	Mean Different	p-value
Pain severity	4.5	1.6	2.9	<0.001
Cortisol	632.9	305.3	327.7	<0.001
IL6	260.1	106.7	153.4	<0.001

Table 3. Correlation of Pain Severity with Cortisol and IL6 Levels

		R	R square (R^2)	P-value*
Pain severity	Cortisol levels	0.886	0.785	<0.001
	IL6 levels	0.870	0.757	<0.001

* Spearman Correlation Test; R, Correlation Coefficient; R square (R^2), Coefficient of Determination

Table 4. Changes in Pain Severity during SEFT Intervention

Pain Severity	Mean±SD	Median	Minimum	Maximum
Intervention 1	6.37±1.96	6	2	10
Intervention 2	4.43±1.48	4	2	7
Intervention 3	2.83±1.15	2	1	5
Intervention 4	1.60±0.80	1	1	3

Table 5. Differences in Mean Pain Severity, Cortisol Levels, IL6 Levels Pre- and Post-SEFT Intervention

Variable	Mean±SD	p-value
Pain severity		
Pre-test	4.5±1.8	<0.001
Post-test	1.6±0.8	
Cortisol levels		
Pre-test	632.9±218.0	<0.001
Post-test	305.3±94.2	
IL6 levels		
Pre-test	260.1±107.7	<0.001
Post-test	106.7±37.9	

Comparison of mean differences in pain severity, cortisol levels, and IL6 levels pre and post-SEFT intervention in stage III B cervical cancer patients can be seen in Table 2. Based on the table above, it can be observed that the mean difference in pain severity between pre-intervention and post-intervention is 2.9. The mean difference in cortisol levels between pre-intervention and post-intervention is 327.7. Meanwhile, the mean difference in IL6 levels between pre-intervention and post-intervention is 153.4.

Based on the analysis results above, it can be seen that the correlation between post-intervention pain severity and post-intervention cortisol levels and IL6 levels is significantly correlated with a p-value < 0.05 and has a positive relationship, falling into the strong category. Cortisol levels can explain 78.5% of the variation in pain severity, and IL6 levels can explain 75.7% of the variation in pain severity (Table 3). The results of examining respondents' pain severity during the intervention showed a decrease in pain severity from intervention 1 to intervention 4 (Table 4). Differences in pain severity, cortisol levels, and IL6 levels pre and post-SEFT intervention can be seen in Table 5.

Based on Table 5, it is evident that the administration of the SEFT method can significantly reduce pain severity, cortisol levels, and IL6 levels in stage III B cervical cancer patients. The reduction in pain severity, cortisol levels, and IL6 levels is statistically significant at $\alpha=0.05$ (p-value = <0.001).

Comparison in pain severity, cortisol levels, and IL6 levels among the research subjects can be observed in Figure 2.

Discussion

The high severity of pain experienced by cervical cancer patients exacerbates the seriousness of the disease [13]. Excessive pain contributes to an increased incidence of stress, anxiety, and depression [14, 15]. Individuals experiencing chronic pain and fatigue tend to pray and seek spiritual support as a coping method. Increased bilateral blood flow in the frontal cortices, cingulate gyrus, and thalamus, as well as decreased blood flow to the superior parietal cortices, has been found during meditation and prayer [16]. Moreover, individuals with chronic pain and fatigue who engage in religious and spiritual practices tend to exhibit better psychological well-being and adopt positive coping strategies [17]. Approximately one-third of adults report praying to manage health problems or specific medical conditions [18]. The spiritual component has a significant relationship with physical and mental health [19].

In this study, one of the pain management approaches applied to cervical cancer patients is the implementation of a mind-body-spirit method known as the SEFT. SEFT aims to assist individuals or groups in reducing

both psychological and physical pain [5]. The results of statistical analysis indicate a significant relationship between pain severity pre and post-application of the SEFT. Pain involves both objective (sensory pain) and subjective (emotional and psychological) components [20]. Previous research has also indicated that the SEFT method has an impact on reducing anxiety levels among substance users [21]

The body's response to pain can worsen the patient's condition, slowing down the healing process.[13] Furthermore, pain can diminish patients' quality of life and productivity, leading to increased costs associated with pain management [22]. As pain severity increases, patients may experience depression and frustration [23]. Increased cortisol and interleukin (IL6) levels reflect the psychological pressure experienced by patients [24]. Patients who feel fearful and anxious release cortisol, which can negatively impact other organ systems [25].

The application of the SEFT can help patients overcome anxiety and fear. This can be observed in the reduction of cortisol levels pre- and post-intervention. Statistical analysis also shows that the application of the SEFT is significantly related to the reduction of cortisol levels. Another study using the Emotional Freedom Technique (EFT) therapy significantly reduced cortisol levels as well [26]

The correlation between pain severity and cortisol and IL6 levels has a strong and positive relationship. The higher the severity of pain, the higher the levels of cortisol and interleukin in patients [27]. The main etiology of cancer pain is attributed to inflammation processes triggering neuropathic pain. Proinflammatory cytokines such as IL-1β, TNF-α, and IL6 play a role in cancer pain, and serum IL-6 levels increase in malignant tumors, making it a potential biomarker for proinflammatory effects in cancer pathology [28]

In patients with chronic cancer, complaints such as pain, fatigue, anorexia, psychological stress, and insomnia often occur. These complaints are related to increased IL6 cytokine levels [29]. The use of IL6 blockers is known to reduce complaints such as fatigue and pain in cancer [30]

In summary, the SEFT appears to be an effective approach for managing pain and reducing anxiety and cortisol levels in various patient populations, including cancer patients. It combines elements of tapping on meridian points with a spiritual component, making it a holistic approach to pain management. The research you've presented supports the potential benefits of SEFT in improving the well-being of individuals experiencing pain and emotional distress.

Author Contribution Statement

Conceptualization, methodology investigation, data analysis, and writing the original draft: Hamidah Hamidah, Syahrul Rauf, Sharvianty Arifuddin, Andi Muhammad Takdir Musba; Conceived the study, investigated, provided methodology, supervised, reviewed, and edited the manuscript: Prihantono Prihantono, Nugraha Utama Pelupessy, Irfan Idris, Agussalim Bukhari, Andriany Qanitha; Helped investigate, supervised, reviewed, and edited the manuscript: Nasruddin Andi Mappeware, Mochammad Hatta, Tria Astika Endah Permatasari, Rohman Rohman, Nurzalia Safanta; Approve the final version of manuscript: All authors.

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