

## Effectiveness of Applying Finger Handheld Relaxation Technique on Pain Intensity and Fatigue among Children Undergoing Chemotherapy

Manal Mohamed Ahmed Ayed<sup>(1)</sup>, Fatma Mohamed Amin<sup>(2)</sup>, Azza Abdalsemia Elewa<sup>(3)</sup>

(1) Assistant Professor of Pediatric Nursing, Faculty of Nursing, Sohag University, Egypt

(2) Assistant Professor of Pediatric Nursing, Pediatric Faculty of Nursing Mansoura University, Egypt

(3) Assistant Professor of Pediatric Nursing, Faculty of Nursing, Helwan University, Egypt

### Abstract

**Background:** Chemotherapy is a standard cancer treatment, but it can cause side effects like pain and fatigue that can affect children's quality of life. Complementary and alternative therapies, including Finger handheld relaxation, have gained popularity as potential solutions to alleviate these symptoms. **Aim:** Evaluate the effectiveness of applying the finger handheld relaxation technique on pain intensity and fatigue among children undergoing chemotherapy. **Methods:** Quasi-experimental research design was utilized. **Setting:** This study was carried out at the Oncology Institute in Sohag City. A purposive sample of children receiving chemotherapy which were randomly classified into study and control groups (35 in each group). **Tools:** Three tools were used to collect data: a structured interviewing questionnaire, the numeric pain rating scale, and a fatigue assessment scale. **Results:** Children in the study group experienced severe pain at a rate of 4%, while the rate for the control group was 70%. Additionally, 58% of the study group reported mild pain, while only 10% of the control group reported mild pain. In addition, 46% of the study group reported mild fatigue, while 37% of the control group reported the worst fatigue. **Conclusion:** The results of the present study concluded that children who received the finger handheld relaxation technique exhibited less pain and fatigue compared to children who did not receive it. **Recommendations:** The finger handheld relaxation technique should be integrated into the care of children undergoing chemotherapy to help reduce pain intensity and fatigue.

**Keywords:** Children undergoing chemotherapy, complementary therapy, fatigue, finger handheld relaxation, pain

### Introduction

Chemotherapy is a widely used treatment modality for children with cancer, aiming to eradicate malignant cells and improve long-term outcomes. However, chemotherapy often leads to several distressing side effects, including pain and fatigue, which significantly impact the quality of life for these children. Managing these symptoms is crucial to enhance the overall well-being of children undergoing chemotherapy (American Cancer Society, 2016; Hockenberry & Wilson, 2018).

Cancer diagnosis and subsequent chemotherapy treatment impose significant physical and emotional burdens on children. Pain is a prevalent symptom experienced by pediatric oncology patients, with estimates suggesting that approximately 50% to 80% of children undergoing chemotherapy experience pain (Macmillan Cancer Support, 2021). Moreover, fatigue is a pervasive complaint reported by pediatric cancer patients, often resulting in decreased physical functioning, impaired

cognitive abilities, and reduced overall quality of life among children. Today, the use of complementary and alternative medicine has increased among the public throughout the world (Worldwide Organization, 2019).

Pain can be managed using both pharmaceutical and non-pharmacological techniques. Acute procedural pain can be considerably decreased in children using a variety of non-pharmacologic techniques (Cunsoo et al., 2021). The child's age, cognitive capabilities, culture, behavioral characteristics, pain type, pain coping mechanisms, and behavioral aspects should all be taken into account when choosing non-pharmacologic treatments (Karakaya & Gözen, 2016). Therefore, finding effective non-pharmacological interventions to alleviate pain and fatigue is of paramount importance to improve the well-being and treatment outcomes of these children (Levesque et al., 2022).

The Finger Handheld Relaxation Technique (FHRT) is a non-invasive, cost-effective, and easily applicable intervention that has shown promising results in reducing pain and fatigue in

various populations, including adults and older adults (Nunes et al., 2019). This technique is based on the principles of acupressure, a traditional Chinese medicine practice that involves applying pressure to specific points on the body to stimulate the body's natural healing processes. Acupoints on the fingers are thought to be closely connected to different organs and systems within the body, and stimulating these points can promote relaxation and alleviate symptoms (Suryadi & Agustina, 2021).

The underlying mechanisms through which FHRT may exert its effects on pain and fatigue are not yet fully understood. It is hypothesized that stimulating the acupoints on the fingers may activate neural pathways and release endogenous opioids, such as beta-endorphins, leading to pain relief and relaxation. Furthermore, FHRT may modulate the autonomic nervous system, promoting a shift towards the parasympathetic state, which is associated with relaxation and restoration. Investigating these potential mechanisms will contribute to a comprehensive understanding of the physiological effects of FHRT in the pediatric oncology population (Calisanie & Ratnasari, 2021; Sulung & Rani, 2017).

Nurses are in a prime position to facilitate the application of FHRT in pediatric oncology settings. They can receive specialized training in the technique, allowing them to effectively and safely administer the intervention to children undergoing chemotherapy (Jacobs et al., 2016; Parás-Bravo et al., 2017). With their expertise in pediatric patient assessment and communication, nurses can also educate and guide children and their families on the proper use of FHRT ensuring its optimal benefits are achieved (Calisanie & Ratnasari, 2021).

#### **Significance of the study:**

---

The finger-handheld relaxation technique may improve children's capacity for adaptation, reduce pain and fatigue, and is simple enough for children to use. Additionally, it is easily accepted and cooperated with by both parents and children. Several studies have demonstrated the effectiveness of relaxation techniques in reducing discomfort associated with cancer (Singh & Chaturvedi, 2019). The finger-held technique, along with other relaxation techniques, is used to alleviate pain and fatigue (Suryadi & Agustina,

2021). It can be easily practiced by anyone and is associated with the flow of energy in our bodies and the relaxation of finger clenching. This technique utilizes subtle hand motions and breathing to calm emotions and balance the body's energy (Yuliasuti, C. (2015).

Despite the potential benefits of FHRT, there is limited research exploring its effectiveness specifically in pediatric oncology populations. Most studies examining the use of FHRT have focused on adult populations or individuals with chronic pain conditions (Safariyah et al., 2022; Yuliasuti, 2015). Understanding the impact of FHRT on the efficacy of FHRT specifically for children undergoing chemotherapy is essential to inform clinical practice and enhance the holistic care provided to pediatric cancer patients (Skinner, 2020). Therefore, there is a critical need to evaluate the effectiveness of applying finger handheld relaxation techniques on pain intensity and fatigue among children undergoing chemotherapy.

#### **Aim of the study:**

---

The study aimed to evaluate the effectiveness of applying finger handheld relaxation technique on pain intensity and fatigue among children undergoing chemotherapy through:

- Assessing pain levels among the children undergoing chemotherapy.
- Assessing fatigue levels among the children undergoing chemotherapy.
- Evaluating the effectiveness of applying the finger handheld relaxation technique on pain intensity and fatigue among the children undergoing chemotherapy.

#### **Research hypothesis:**

Children who receive the finger handheld relaxation technique may exhibit less pain and fatigue compared to children who do not receive it.

#### **Subjects and Method:**

---

##### **Research design:**

The quasi-experimental research design was utilized.

**Setting:**

The research was conducted at the Oncology Institute in Sohag City, which is located in Sohag Governorate, Egypt. The institute includes two buildings: one for adults and one for pediatric patients. The complex includes a chemotherapy treatment area on the second floor of the pediatric building. The pediatric building is classified into two sections. Section one comprises 5 rooms each room containing two beds, 2 toilets, and a bathroom. Section Two involves 6 rooms, each room equipped with 2 beds, 2 toilets, & a bathroom.

**Subjects:**

A purposive sample of children receiving chemotherapy which were randomly classified into the study and the control group (35 in each group). To determine group assignments, participants were given cards labeled with the numbers one and two, and randomization was done by allowing every child to choose two enumerated cards. Children who selected the card labeled "one" were assigned to the study group, while those who chose the card labeled "two" were assigned to the control group. Unlike the control group, which received routine care, the study group received a finger handheld relaxation technique.

The inclusion criteria for this study were children between the ages of 6 to equal or more than 14 years old who provided assent to participate, free from hand problems, no history of chronic pain, damage of their extremities, seizures, agitation, or other chronic conditions and willing to participate.

**Sample size calculation:**

The sample size was calculated by considering a power analysis threshold of

significance of 0.95 (corresponding to a significance level of 0.05, one-sided) and a large effect size of 0.5. Additionally, a high level of significance was set at 0.001.

**Tools of data collection:**

**Tool I:** A structured interview questionnaire was created by the researchers after reading recent related literature (**Worldwide Organization 2019; American Cancer Society 2021**). The questionnaire consists of 2 parts:

**Part 1:** This section gathers the demographic characteristics of children, which are divided into four categories: age, gender, educational level, and place of residence.

**Part 2:** This section focuses on children's medical history which includes two items such as children's age at the time of diagnosis with cancer and the disease duration.

**Tool (II) Numeric Pain Rating Scale (NPRS):**

According to **McCaffery et al. (1989)**, the Numeric Pain Rating Scale (NPRS) was adopted to assess the level of pain experienced by children undergoing chemotherapy. The NPRS consists of a blank line with verbal descriptors representing the extremes of pain intensity at each end. Typically, a line enumerated up to 10 is used to facilitate measurement. The NPRS (Fig. 1) is a horizontal bar ranging from 0 to 10, where respondents choose the proper number that represents their level of pain. The scale ranges from 0, indicating "no pain," to 10, indicating "severe pain." The pain intensity score was interpreted as follows: zero refers to (no pain), "score 1:3 refers to (mild pain), score 4: 6 refers to (moderate pain), & 7:10 refers to (worst or severe pain).

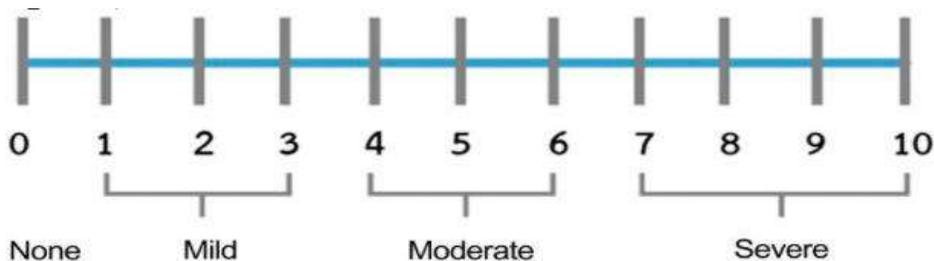


Fig. 1. Numerical rating scale (NRS)

**Tool (III): Fatigue assessment scale:**

This scale was adopted by **De Kleijn et al. (2011)**. It was a self-developed rating scale consisting of a 10-point rating system to assess the level of fatigue that children felt from a range of various activities, accounting for physical, social, psychological, and mental domains and relationships with time. Children rate their fatigue level on a scale from zero (indicating no weariness) to ten (100, the total score range). The scale includes descriptors indicating the degree of fatigue. Total scores can range from 0 to 100. Scores range from 0 (no fatigue) to 10 (worst fatigue). No fatigue (score zero), mild (score 1–9), mild (score 10–30), moderate (score 31–60), severe (score 61–80), and worst fatigue (score 81–100).

**Procedure:****Validity of Tools:**

The content validity of the tools is evaluated by five experts in pediatric nursing. The experts examined the sentence clarity, relevance of the content, and item order. Based on their evaluation, no modifications were deemed necessary for the tools.

**Reliability of the tools:**

Cronbach's alpha was utilized to assess the reliability of the tools. The reliability coefficients for Numeric Pain Rating Scale & Fatigue Assessment scale were 0.89 and 0.81, respectively, indicating the trustworthiness of the tools. These coefficients demonstrate that the measurement tools consistently measured the intended constructs and can be considered reliable.

**Pilot Study:**

To ascertain the optimal and comprehensive data collection method, a pilot study was done on a subset of the sample. Specifically, 7 children, constituting 10% of the overall sample, were included in the pilot study. The findings and insights obtained from the pilot study informed the selection of the main study sample, which included the children from the pilot study.

**Ethical and administrative considerations**

The study received ethical approval from the Sohag Faculty of Nursing's Ethical Research Committee prior to initiation. In order to obtain the necessary permissions and ensure understanding and agreement, the researchers engaged in discussions with the medical and nursing directors of the selected setting, clarifying the study's goals and obtaining their consent. For mothers and their children undergoing chemotherapy, oral consent was sought to secure their cooperation in the study. Data collection procedures were voluntary and maintained confidentiality. The researchers provided a comprehensive explanation of the study's objectives and methods to all participants. Furthermore, participants were explicitly informed of their right to reject to join the study, which was respected throughout the research process.

**The procedure of Data collection:**

To obtain the needed formal approvals for gathering the data, the researchers presented the directors of the research setting with an official letter from the dean of the Faculty of Nursing. The data collection phase started from April 2022 to September 2022, encompassing six months. The researchers went to the study setting twice per week, specifically from 9:00 am to 12:00 pm, to conduct various activities including preparation, interviews, assessments, implementation, and evaluation.

**Assessment phase:**

In addition the utilizing books, journals, periodicals, and internet searches, the researchers conducted a comprehensive review of both earlier and recent literature that was available on the topic. This literature review served to enhance the researchers' understanding of the subject matter and informed the development of their study.

During the data collection process, the researchers prioritized the collection of demographic data, medical history, pain intensity, and fatigue levels. These variables were considered fundamental and formed the initial focus of data collection. To gather this information, interviews were conducted with each child in each group. The interviews provided valuable insights and allowed for a

deeper exploration of the participants' experiences and perspectives.

### Implementation Phase:

The implementation of the finger-handheld relaxation technique (Fig. 2) followed a structured approach. First, the researchers presented and demonstrated the method to the participants, providing a clear understanding of its purpose and benefits. The children were encouraged to choose a peaceful and quiet environment where they felt comfortable. The technique focused on the connection between the fingers and the body's energy conduits known as meridians. Pain intensity before and after chemotherapy children were given the handheld finger relaxation techniques for 30-50 minutes. Specifically, the child was instructed

to hold each finger, starting from the thumb and moving towards the little (pinky) finger, for a period of three to five minutes whenever they experienced pain. During this time, the child was guided to take deep inhalations, allowing for relaxation and the release of physical and mental stress. The FHRT applied to the fingers during the technique served to stimulate the energy entry points on the fingertips, promoting a sense of warmth and aiding in the reduction of stress, pain, and discomfort. This finger-handheld relaxation technique designed according to **Skinner, (2020), Sulung & Rani, (2017), and Yuliastuti, (2015)** and implemented for the studied children.

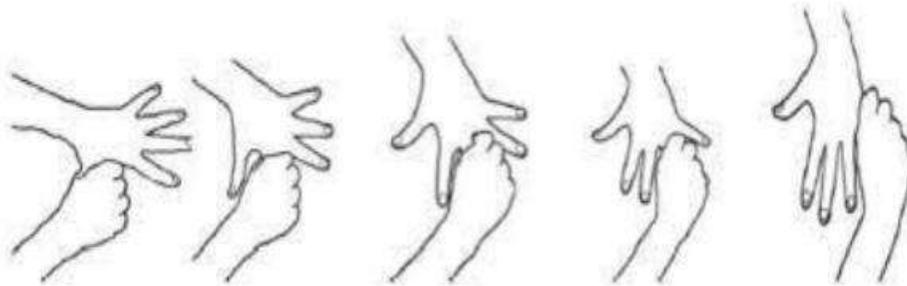


Fig. 2. Finger handheld relaxation technique

Following hand washing and cleansing of the children's hands, the researchers proceeded with the finger-handheld intervention. For children undergoing chemotherapy, the intervention took place while they were lying on the bed with closed eyes and taking a breath deeply. Hold one finger by one, starting with the thumb till the little finger. Each finger took around 2-3 minutes. After finishing one hand, the fingers of the other hand were handheld in the same manner. The discomfort caused by chemotherapy was noticed by the researchers both before and after the intervention. After three hours, both the study & control groups were evaluated. In the study group, the finger-handheld intervention was administered. Pain and fatigue levels were measured once again as a post-test assessment for both groups, enabling a comparison of the changes in sensitivity before and after the intervention. This evaluation aimed to detect the impact of the finger-hand relaxation technique on pain and

fatigue levels in the study group when compared to the control group.

### For the control group:

The researchers engaged in direct, face-to-face conversations with every child in the control group. During this interaction, the researchers introduced themselves, provided a clear explanation of the study's objectives, and sought verbal agreement from the participants. However, unlike the study group, the Finger Handheld relaxation technique was not applied to the control group. Instead, the researchers collected data related to the children's demographic information, pain intensity, and fatigue levels. The control group received the routine standard care provided by the hospital, ensuring that their experiences aligned with the standard practices typically followed for children undergoing similar treatments.

**Evaluation phase:**

Pain and fatigue levels were assessed and evaluated for all children in both the study and control groups. The participants' pain and fatigue levels were measured and rated at specific intervals, specifically "posttest" evaluations conducted every 3 and 6 hours following the completion of the intervention. This assessment schedule allowed for monitoring and comparison of the changes in pain and fatigue levels over time between the two groups. By conducting regular evaluations, the researchers aimed to capture the immediate and cumulative effects of the intervention on the participants' pain and fatigue experiences.

**Statistical analysis**

All data collected in the study were managed and analyzed using IBM Corporation's software. Specifically, the researchers utilized the IBM SPSS Statistics software, version 23.0 for Windows, developed by IBM Corp in Armonk, NY (IBM Corp, 2015). Quantitative data were presented using measures such as mean, standard deviation (SD), range, and number of observations. Quantitative data were expressed as percentages. To compare two groups with normally distributed variables, the t-test was employed. The Chi-square test was used to compare the percentages of categorical variables. In terms of statistical significance, p-values of 0.05 were considered statistically significant, while p-values of 0.001 were regarded as highly significant. Conversely, p-values higher than 0.05 were considered inconsequential or not statistically significant.

**Results**

**Table (1)** presents the demographic characteristics of the children in both the study and control groups. It was noticed that greater than half of the studied children in both groups were aged 10 to less than 14 years old, with 57% in the study group and 69% in the control group falling into this age range. In terms of gender, 54% of children in the study group were boys, compared to 49% in the control group. Regarding education level, 49% of children in the study group and 51% in the

control group were at the preparatory educational level. Less than three-quarters of children in the study group (71%) and control group (66%) were living in rural areas. There were no significant differences between the two groups regarding their demographic characteristics.

**Table (2)** illustrates that the median age at cancer diagnosis for the chemotherapy children in the study group was 6.3 years (range: 0.6-14), compared to 6.7 years (range: 0.5-15) in the control group. Concerning the duration of cancer in years, the median cancer duration was 6.2 years (range: 0-13) and 6.4 years (range: 0-13) in both groups.

**Table (3)** demonstrates the comparison of mean pain scores among the studied children's pain rating scale of the study and control group pre and post-intervention. As shown, there were highly statistically significant variances in the pain scores among the two groups post-intervention ( $P < 0.001$ ), with a significant reduction in pain observed among the chemotherapy children in the study group following the intervention. The mean pain score of the study group post-intervention was  $6.0 \pm 0.5$ , while the control group was  $8.2 \pm 0.7$ . However, there was no significant variance in the pain scores between the two groups before the intervention, with a p-value greater than 0.05.

**Figure (1)** shows the rates of pain experienced by both the study & the control group. Children in the study group experienced severe pain at a rate of 4%, while the rate for the control group was 70%. Additionally, 58% of the study group experienced mild pain, while only 10% of the control group reported mild pain.

**Table (4)** displays the mean fatigue scores for both the study & the control group. The mean score of fatigue level was 15.22 (1.9) among the study group, while it was 26.12 (3.89) for the control group. In addition, 46% of the study group reported mild fatigue, while 37% of the control group reported the worst fatigue.

**Table (1):** Demographic characteristics of children in the study and control group according to their (n= 70)

Demographic data	Study group (n=35)		control group (35)		X2	P-value
	No.	%	No	%		
<b>Age:</b>						
6 < 10	9	26.0	7	20.0	0.72	0.325 <sup>NS</sup>
10 < 14	20	57.0	24	69.0		
≥14	6	17.0	4	11.0		
<b>Gender:</b>						
Boys	19	54.0	17	49.0	0.43	0.556 <sup>NS</sup>
Girls	16	46.0	18	51.0		
<b>Educational level:</b>						
Primary	8	22.0	10	29.0	2.33	1.432 <sup>NS</sup>
Preparatory	17	49.0	18	51.0		
Secondary	10	29.0	7	20.0		
<b>Residence:</b>						
Rural	25	71.0	23	66.0	2.0	1.26 <sup>NS</sup>
Urban	10	29.0	12	34.0		

NS = Non-Significant P &gt;0.05

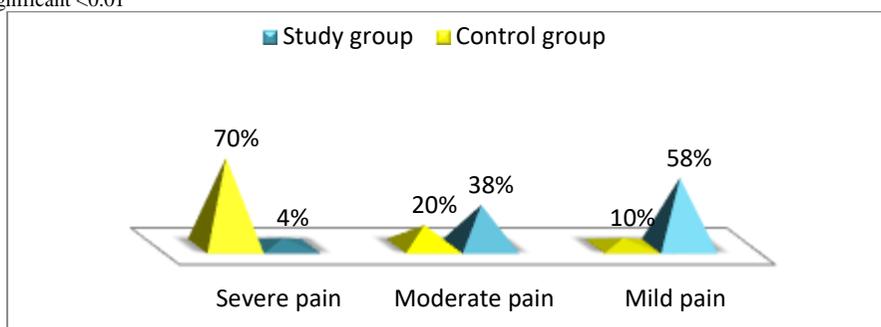
**Table (2):** Distribution of children in the study and control group according to their medical history (n= 70)

Medical history	Study group (n=35)	Control group (n=35)	Test	P-value
	Median (Min-Max)	Median (Min-Max)		
Children's age of diagnosis with cancer	6.3 (0.6-14)	6.7 (0.5-15)	0.442	0.546 <sup>NS</sup>
Duration of the disease	6.2 (0-13)	6.4 (0-13)	0.463	0.353 <sup>NS</sup>

NS=Non-significant P &gt;0.05

**Table 3:** Comparison of the mean pain scores among the studied children pain rating scale of the study and control group pre and post-intervention (n=70).

Mean pain scores	Study group (n=35)	Control group (n=35)	t-test	P-value
	Mean ±SD	Mean ±SD		
<b>Pre-intervention</b>	8.2 ±0.3	8.3 ±0.2	0.563	0.670
<b>Post-intervention</b>	6.0 ±0.5	8.2 ±0.7	6.678	<0.001 <sup>**</sup>

<sup>\*\*</sup>high significant <0.01**Figure (1):** Pain levels between chemotherapy children of the study and control group post-intervention**Table (4):** Fatigue levels among studied chemotherapy children post-intervention (n= 70)

Fatigue level	Study Group (n=35)		Control group (n=35)		Test	P-value
	No	%	No	%		
No fatigue (0)	5	14	0	0.0	Chi-square 22.67	<0.001 <sup>**</sup>
Very little (1-9)	10	29	0	0.0		
Mild (10-30)	16	46	0	0.0		
Moderate (31- 60)	4	11	7	20		
Severe (61-80)	0	0.0	15	43		
Worst (81-100)	0	0.0	13	37		
Mean (SD)	15.22 (1.9)		26.12 (3.89)		T. test 123.78	<0.001 <sup>**</sup>

<sup>\*\*</sup>high significant <0.01

**Discussion:**

Chemotherapy is a commonly used treatment for cancer, but it can cause significant pain and fatigue for patients, which can negatively impact their quality of life. While medication is often used to manage these symptoms, non-pharmacological interventions such as relaxation techniques have gained attention as complementary treatments (Meryk et al., 2023). Finger handheld relaxation techniques have been identified as a simple and accessible technique that children can use to manage their pain and fatigue during chemotherapy (Robison & Smith, 2016). Thus, this study aimed to evaluate the effectiveness of applying finger handheld relaxation techniques on pain intensity and fatigue among children undergoing chemotherapy.

Regarding the demographic characteristics of the studied children, there was no significant difference between groups related to age, gender, education level, and residence. The current study found that more than half of the studied children in both groups were aged 10 to less than 14 years old. This finding is contradicted by Kamal, et al., 2018 who found that greater than half of the children in the control & study group are 4 to < 8 years old. Regarding the child's gender, these results revealed that more than half children in the study group were boys. The results of the present study are consistent with Syan et al., (2017) who reported that more than half of the studied subjects were male. Similarly, Allam et al., (2018) discovered that more than half of the studied children were male. In addition American cancer society, (2016) reported that men were more likely than women to develop cancer when they were less than 15 years old.

Less than two-thirds of the studied children in both groups who were in the intervention group, according to our findings, were in rural regions. The findings of the current study do not agree with those of Syan et al., (2017), who examined 90 leukemic children at the Southern Egyptian Cancer Institute and discovered that more than two-thirds of them were from rural areas. Also, The findings of the current study are supported by Kamal et al., (2018) who discovered that more than two-thirds of children were from rural areas.

Concerning the medical history of studied children there was no significant variance among groups related to children's age of diagnosis with cancer and duration of the disease. The finding of the present study revealed that the mean age at cancer diagnosis for the chemotherapy children in the study group was 6.3 years (range: 0.6-14), compared to 6.7 years (range: 0.5-15) in the control group. The finding of the present study is supported by the **Coalition Against Childhood Cancer, (2021)** who reported that the average age of children at diagnosis is 6 years old for children (aged 0 to 14).

The current study finding revealed a highly significant variance in the pain scores among the two groups after chemotherapy, with a significant decrease in pain noticed in the chemotherapy children in the study group following the intervention. From the researchers' point of view, this finding explains the positive effects of relaxation techniques on pain intensity. These results may be due to during periods of stress or pain, the body's sympathetic nervous system is activated, leading to increased heart rate, blood pressure, and muscle tension. This response can exacerbate pain. However, relaxation techniques, such as finger handheld relaxation, activate the parasympathetic nervous system, leading to a decrease in heart rate, blood pressure, and muscle tension. This response can reduce pain and promote relaxation and feelings of well-being. The results of this study are supported by Skinner, (2020) who indicated that the finger handheld technique had a beneficial impact on pain decrease, supporting the usefulness of practicing FHRT as a therapeutic intervention to lessen children's pain due to their emotional distress.

The current study results are supported by the findings of Karakaya & Gözen, (2016) who showed that the distraction technique is beneficial in lowering the pain experienced by the children of the control group was significantly greater than the experimental group. Similarly, Syan, et al. (2014) found that Children who used diversion techniques had much lower pain scores than kids who received standard hospital care. The findings of the current study are supported by Salama et al.

(2017) who found that it significantly reduced exhaustion in the children.

The results are also consistent with Yuliasuti, (2015) who revealed that handheld finger relaxation has a noticeable effect in lowering pain severity among adolescents. Vambheim et al., (2021) reported that relaxation techniques reduce pain and influence secondary outcome measures in patients with chronic pain. Moreover, Safariyah et al., (2022) suggested that finger grip relaxation intervention could be effective in reducing pain in appendicitis patients based on subjective patient reports. Additionally, Haun et al., (2019) found that massage therapy may enhance the quality of life by reducing physical and mental suffering, of children with blood disorders and cancer. Together, these studies provide further evidence for the effectiveness of non-pharmacological interventions in decreasing pain and fatigue among cancer children.

The current study's findings demonstrate extremely significant variations and decrease in the levels of fatigue in children receiving chemotherapy, highlighting the lower fatigue scores seen in the intervention group when compared to the control group. The results, in the opinion of the researchers, demonstrate a favorable impact of employing FHRT to meet the needs and assist in lowering the levels of weariness experienced by the study's pediatric chemotherapy participants. The findings of this study are explained by the physiological effects of relaxation, which lessen tiredness and enhance well-being by lowering nervous system agitation and muscle tension. Children find the game to be very entertaining and calming while also enjoying the relaxation techniques. These findings matched with those of **Kamal et al., (2018)** looked into how therapeutic massage affected children with leukemia who had just finished chemotherapy. They discovered that these kids were less fatigued after receiving therapeutic massage, and this resulted in a statistically significant difference in their fatigue scores between the two groups compared to children who merely receive routine hospital treatment.

**Salama et al., (2017)** reported that therapeutic massage was effective in

decreasing fatigue levels among chemotherapy children. **Haun et al., (2019)** suggested that massage therapy could help children with cancer cope with their physical and emotional suffering. **Taheri et al., (2019)** found a significant reduction in fatigue levels between pre-and post-tests. Moreover, **Karagozolu and Kahve (2018)** reported a significant decrease in fatigue levels in the intervention group the day after chemotherapy. In addition, **Parás-Bravo et al., (2017)** revealed that Patients with cancer who employed muscle relaxation reported an increase in their quality of life.

Finally, this study provides evidence that the finger-handheld technique intervention is an effective approach for managing fatigue and pain among children receiving chemotherapy. The results indicate a significant difference in mean test scores pre and post-intervention in the study group compared to the control group. The finger-handheld technique intervention may be a suitable and practical intervention for healthcare professionals to implement in clinical practice, providing a non-invasive and accessible approach to managing symptoms of fatigue and pain in children undergoing chemotherapy.

### **Conclusion**

---

Children who received the finger handheld relaxation technique exhibited less pain and fatigue compared to children who did not receive it.

### **Recommendations:**

---

- Finger handheld relaxation techniques should be integrated into the care of children undergoing chemotherapy to help reduce pain intensity and fatigue.
- Awareness should be raised among healthcare providers, children undergoing chemotherapy, and their parents about the benefits of finger handheld relaxation techniques in reducing pain intensity and fatigue.
- Further research should be conducted with larger sample sizes and in different settings to replicate the current study's findings.

**References:**

- Allam, R. A., Bahgat, R. S., Maria, A.M., Saed, M.A. (2018).** Effect of Distraction Technique on Pain Control for Children Receiving Chemo-Radiotherapy. *International Journal of Novel Research in Healthcare and Nursing*, 5(1), 294-305.
- American cancer society. (2016).** Key statistics for childhood cancer. Available at <https://www.cancer.org/cancer/types/cancer-in-children/key-statistics.html>.
- American cancer society. (2021).** Cancer facts and figures –A Guide for patient Atlanta; American cancer society Inc. Retrieved from: <http://www.Cancer.org/Pdf>.
- Calisanie, N. N. P., & Ratnasari, A. N. (2021).** The Effectiveness of the Finger Grip Relaxation Technique to Reduce Pain Intensity in Post-Appendectomy Patients: A Literature Review. *KnE Life Sciences*, 753-757.
- Coalition Against Childhood Cancer, utilizing statistics from (2021).** Available at <https://cac2.org/interest-groups/awareness/childhood-cancer-fact-library/>.
- Cunsolo, S., Cebotari, V., Richardson, D., & Vrolijk, M. (2021).** How relaxing develops and affects well-being throughout childhood. *United Nations Children's Fund (UNICEF)*, 1-33.
- Haun, J., Graham-Pole, J., & Shortley, B. (2019).** Children with cancer and blood diseases experience positive physical and psychological effects from massage therapy. *International Journal of Therapeutic Massage and Body Work*; 2(2):7-14.
- Hockenberry, M. J., & Wilson, D. (2018).** *Wong's nursing care of infants and children-E-book*. Elsevier Health Sciences.
- Jacobs S., Mowbray C., Cates L., Baylor A., Gable C., Skora E., Estrada M., Cheng Y., Wang J., Lewin D., & Hinds P., (2016).** Pilot Study of Massage to Improve Sleep and Fatigue in Hospitalized Adolescents With Cancer, *Pediatr Blood Cancer, Wiley*,(63),880–886.
- Kamal, F. E. Z., Abd-Alasis, A., Sayed, H. A. R., Yousef, Y. E. S., & Zaki, N. A. E. (2018).** Effect of Therapeutic Massage on Fatigue among Children with Leukemia following Chemotherapy. *Assiut Scientific Nursing Journal*, 6(13), 83-91.
- Karagozoglul, S., & Kahve, E. (2018).** Effects of back massage on chemotherapy-related fatigue and anxiety: Supportive care and therapeutic touch in cancer nursing. *Applied Nursing Research*; 26(4): 210-217.
- Karakaya, A., & Gözen, D. (2016).** The effect of distraction on pain level felt by school-age children during venipuncture procedure—Randomized controlled trial. *Pain Management Nursing*, 17(1), 47-53.
- De Kleijn, W. P., De Vries, J., Wijnen, P. A., & Drent, M. (2011).** Minimal (clinically) important differences for the Fatigue Assessment Scale in sarcoidosis. *Respiratory medicine*, 105(9), 1388-1395.
- Levesque, A., Caru, M., Duval, M., Laverdière, C., Marjerrison, S., & Sultan, S. (2022).** Cancer-related fatigue in childhood cancer survivors: A systematic scoping review on contributors of fatigue and how they are targeted by non-pharmacological interventions. *Critical reviews in oncology/ hematology*, 179, 103804.
- Macmillan Cancer Support. (2021).** Possible Side Effects of Chemotherapy: <http://www.Macmillan.org.UK/information-and-support/treating/chemotherapy/side-effects-of-chemotherapy/possible-side-effects.htm>
- McCaffery, M., Beebe, A., et al. (1989).** Pain: Clinical Manual for Nursing Practice. St. Louis, MO: Mosby.
- Meryk, A., Kropshofer, G., Hetzer, B., Riedl, D., Lehmann, J., Rumpold, G., ... & Crazzolara, R. (2023).** Disagreement between mothers' and fathers' rating of

- health-related quality of life in children with cancer. *Quality of Life Research*, 1-9.
- Nunes, M., Silva, M., Rocha, E., Lima, R., & Nascimento, L. (2019)** Measurement of fatigue in children and adolescents with cancer. *Text Context Nursing. Florianópolis*, 23(2), 493.
- Parás-Bravo, P., Salvadores-Fuentes, P., Alonso-Blanco, C., Paz-Zulueta, M., Santibañez-Margüello, M., Palacios-Ceña, D., ... & Fernández-De-Las-Peñas, C. (2017)**. The impact of muscle relaxation techniques on the quality of life of cancer patients, as measured by the FACT-G questionnaire. *PloS one*, 12(10), e0184147.
- Robison, J., & Smith, C. (2016)**. Therapeutic Massage during Chemotherapy and/or biotherapy Infusions: Patient Perceptions of Pain, Fatigue, Nausea, Anxiety, and Satisfaction. *Clinical Journal of Oncology Nursing*; 20(2):34.
- Safariyah, E., Salsabilla, N., & Setiawan, H. (2022)**. A Case Study of the Finger Grip Relaxation Intervention on Lowering Pain Scale in Appendicitis Patients. *International Journal of Nursing and Health Services (IJNHS)*, 5(5), 412-417.
- Salama, A., Khalifa, M., El – Sharkawy, O., & Fayed, N. (2017)**. Effect of Therapeutic Massage on Reducing Pain and Fatigue in Children with Cancer. A thesis submitted in partial fulfillment of the requirements for a master's degree in pediatric nursing, Menofia University. Egypt, Pp. 60: 80.
- Singh, P., & Chaturvedi, A. (2019)**. Complementary and alternative medicine in cancer pain management: a systematic review. *Indian Journal of Palliative Care*; 21(1): 105–115. Doi: 10.4103/0973-1075.150202.
- Skinner, H. (2020)**. Gentle techniques to help calm your kids 30 minutes of 'Magical' practices. [https:// strongmindsstrongkids.org](https://strongmindsstrongkids.org) > common.
- Sulung, N., & Rani, S. D. (2017)**. Teknik Relaksasi Genggam Jari Terhadap Intensitas Nyeri Pada Pasien Post Appendiktomi. *Jurnal Endurance*, 2(3), 397. [https:// doi. org/ 10. 22216/ jen. v2i3. 2404](https://doi.org/10.22216/jen.v2i3.2404).
- Suryadi, B., & Agustina, M. (2021)**. Anxiety Levels in Patients Pre-Operative Ca. Mamae Can Be Lowered with Finger-Holding Relaxation Techniques. *Journal of Complementary Nursing*, 1(01), 27-31.
- Syan, A., Ali, A., & Gadallah, M. (2014)**. Efficacy of distraction on pain relief during lumbar **puncture** in children with leukemia at South Egypt Cancer Institute - Assuit University. A thesis submitted in partial fulfillment of the requirements for a master's degree in pediatric nursing. Egypt, Pp. 46 -49.
- Taheri, H., Naseri-Salahshour, V., & Abedi, A. (2019)**. Comparing the Effect of Foot and Hand Reflexology on Pain Severity after Appendectomy: A Randomized Clinical Trial. *Iran J Nurs Midwifery Res*; 24 (6): 451–456, doi 10. 4103/ inner. IJNMR\_85\_18, indexed in Pubmed: 31772920.
- Vambheim, S. M., Kylo, T. M., Hegland, S., & Bystad, M. (2021)**. Relaxation techniques as an intervention for chronic pain: A systematic review of randomized controlled trials. *Heliyon*, 7(8), e07837.
- Worldwide organization (2019)**. Cancer priorities in developing countries. *Annually Oncology*, 12(8):112-120. Retrieved from [www. globalhealth. org/ cancer-priorities-in-developing-countries](http://www.globalhealth.org/cancer-priorities-in-developing-countries), annually oncology, 12(8): 1120120. retrieved from [ww. globalhealth.org](http://ww.globalhealth.org).
- Yulastuti, C. (2015)**. Effect of handheld finger relaxation on reduction of pain intensity in patients with post-appendectomy at inpatient ward, RSUD Sidoarjo. *International Journal of Medicine and Pharmaceutical Sciences (IJMPS)*, 5(3), 53-58.