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Guided Imagery in COMPACT Application to reduce Pain Level among Children with Cancer

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ABSTRACT

Pain in children with cancer is still a concern for caregivers who care for children with cancer at home. There is a COMPACT application as a Communication on Palliative Care Treatment that makes for cancer patients to manage their pain. One of therapy that can reduce the pain level of cancer patients is guided imagery. This study aims to desrcribe the effect of *guided imagery therapy* based on the COMPACT application on reducing pain levels in pediatric patients with cancer. This study used quasi experimental design with one group pre test and post test. There were 20 children with cancer was conducted to this study. The pain level was measured using NRS (Numeric Rating Scale), while the data analyzed by using t-test dependent. This study showed that p value was 0.007, meaning that there was an effect before and after being given guided imagery therapy based on the COMPACT application on reducing the pain scale of child and adolescent patients with cancer. Guided imagery therapy is concluded to be effective in reducing pain in cancer patients. The use of COMPACT (Communication on Palliative Care Treatment) as an effort to reduce pain in children with cancer in managing the pain they feel. This is also valuable in increasing the knowledge of children and families who care for them in managing pain. It is hoped that the cancer community and families can actively use the COMPACT application to be able to improve their quality of life in pain management during palliatie care.

Keywords: Pain, Children, Cancer, Guided Imagery, COMPACT

Introduction

Cancer is a disease characterized by massive cell growth to decreased function, genetic mutations and cell proliferation. This disease can occur in children to the elderly. Cancer in children can occur in children aged infants-18 years (Putri, et al. 2020). According to data from the Indonesian Ministry of Health (2011), cancer is also one of the diseases included in the top ten causes of death in children in Indonesia. The prevalence of childhood cancer in Indonesia is also increasing every year. Data from the Ministry of Health (2015) shows that the incidence of childhood cancer has reached 176,000 and the incidence of death due to cancer in children in the world has reached 90,000 cases each year.

In data obtained from the 2013 Riskesdas of the Republic of Indonesia, the prevalence of cancer in Indonesia was around 1.4 per 1000 population or around 347,792

people had cancer (Hartini et al., 2020). The Indonesian Hospital reported that the incidence of childhood cancer in Indonesia is around 2-4%. Every year there are 11,000 cases of cancer in children, and 10% of them cause death (Hendrawati et al., 2019). Globally, based on data from the World Health Organization (WHO) in 2018, around 300,000 children aged 0 to 19 years were diagnosed with cancer and around 90,000 children died from cancer (Fatmiwiryastini et al., 2021). Data in England in 2009 - 2011, showed that the incidence of cancer in children was found to be 1,574 new cases and 525 children died from cancer. According to the 2018 Basic Health Research, the prevalence of cancer in West Sumatra Province is around 2.4 per 1000 population, higher than the national prevalence of around 1.7 per 1000 population and is in great need of developing appropriate prevention and control programs for cancer, especially in West Sumatra (Rini Febrianti & Mugi Wahidin, 2022).

There are several physical complaints that occur in children with cancer, such as sleep disturbances, fatigue, pain, and nausea and vomiting. The results of previous studies showed that children with cancer experienced symptoms of sleep-wake disturbances in the severe category (56.7%), experienced nausea in the mild category (53.3%), experienced mood disorders in the mild category (53.3%), experienced changes in appearance in the severe category (53.3%) (Ghozali & Eviyanti, 2016) . Cancer patients also have difficulty in self-management and pain management to improve their quality of life in terminal conditions nearing death (palliative) that they experience (Adistie et al., 2018) . Another study reported that the results of the analysis of symptom descriptions in cancer found that the most common respondent symptom was pain discomfort disorders 66.7% (Arini, 2018).

Pain management in pediatric cancer patients can be done pharmacologically and non-pharmacologically. Pharmacological pain management often uses drugs in its implementation, while non-pharmacological pain management can be done with various actions, one of which is play therapy as a form of distraction/diversion of children's pain (Lestari et al., 2020). Someone who feels pain will have an impact on the client's life activities and rest and sleep. Pain management is divided into two, namely pharmacological and non-pharmacological treatment. Pain assessment and the appropriateness of analgesics must be considered in order to ensure that the pain felt by the client can be overcome (Dylan Trotsek, 2017) . One of the non-pharmacological techniques includes: meditation, autogenic training, progressive relaxation training, *guided imagery, rhythmic breathing, operant conditioning, biofeedback, acupressure, aromatherapy* , and murotal (Udkhiyah & Jamaludin, 2020).

In the era of digitalization, the use of information technology can now touch almost all fields, including the health sector. As a health development, the application of information technology is very necessary both in data collection activities and in service activities for patients and families. The application created for health management, especially the handling of palliative diseases where chronic pain symptoms often occur, is named COMPACT (*Communication on Palliative Care Treatment*). The COMPACT application is a system that helps people to improve their health, improve pain management to their quality of life during palliative and terminal disease diagnoses, and can also overcome pain problems that are felt. This application is android-based, so it is easy to use and can be installed directly on a smartphone device. PHP and MySQL are used as scripting languages in the COMPACT program, and XAMPP is used as a data storage database. The program is tested manually with the black box method, and the waterfall software development process is applied. The

login page, register, education menu, and home therapy management options, assessment pages and admin pages are all subject to manual blackbox testing. Based on the findings of the adoption of the COMPACT application, the community really needs it in their self-management of cancer; the pain management techniques offered in the COMPACT application can help minimize discomfort during the pain period. The COMPACT application has a guided imagery pain management option.

One of the non-pharmacological relaxation techniques that researchers use is *guided imagery*. According to Tamsuri, audio *guided imagery* is a therapeutic action that relies on pleasant thoughts, and concentrates on the image and gradually frees oneself from thoughts of the pain felt. This therapy can reduce pain levels because this technique contains therapeutic elements that can function to relax the mind for healing purposes. Hart stated that guided imagery is a technique that relies on stories or narratives to influence the mind; this therapy is often combined with musical accompaniment that can make you comfortable (*audio recorded guided imagery*). *Audio Guided Imagery therapy* uses a diversion of attention so that it can reduce the level of pain felt by imagining something pleasant, so that clients are able to reduce the client's perception of the pain felt (Ayu, 2021) . A study also stated that adolescent said that pain was reduced by listening to *guided imagery* in the COMPACT application. The results obtained showed the effectiveness of using the application with a significant reduction in pain. The pain scale which was initially an average of 5.67 can decrease to 3.42. It was concluded that this application can be useful for overcoming pain problems (Kartika et al., 2022).

Based on data from the Cahaya Community Foundation in Padang City from 2018 to 2022, it was found that the total number of children with cancer was 179 people. The Cahaya Community Foundation stated that the types of cancer in children include leukemia, retinoblastoma, brain tumors, lymphoma, neuroblastoma, Wilms tumor, skin cancer, liver cancer, nasopharyngeal cancer, and osteosarcoma. Cancer is the growth of abnormal cells that grow continuously and uncontrollably in the human body. Cancer in children is a disease that requires continuous treatment and care (Nuraini & Mariyam, 2020) . Cancer is one of the diseases that must be treated orally and systemically. These drugs contain cytotoxics which can cause physical discomfort. In addition to physical treatment, psychological support from parents of children who experience cancer recurrence or remission is also very necessary. A study stated that parents who have children with cancer who experience recurrence show less psychological adjustment, because the parents themselves have adjusted to the symptoms of physical complaints felt by the child (Wechsler et al., 2021).

Pain in children with cancer is still a concern for caregivers who care for children with cancer at home. Based on data obtained from an initial survey at the Yayasan Komunitas Cahaya as Cancer Foundation in Padang City, it was found that on average children complained of pain with a moderate level of pain, usually children were prescribed painkillers, while for non-pharmacological treatment, caregivers had never provided non-pharmacological techniques specifically, especially *Guided Imagery Techniques.* Based on the data above, the researcher is interested in conducting research on the effect of *guided imagery therapy* based on the COMPACT application on reducing pain levels in pediatric patients with cancer.

Research Method

1. Research Design

This study uses a quasi-experimental design with a *one group pre-test post-test approach.* The intervention in this study was to use Guided Imagery Therapy in the COMPACT (*Communication on Palliative Care Treatment*) application to reduce pain in adolescents who experience pain due to the cancer they suffer from. Guided Imagery Therapy is a therapy option in the COMPACT application that is given when a child feels pain. In the application, there will be a choice of pain levels felt by the child in the range of 0-10. Therapy is carried out for 30 minutes and then a post-measurement is carried out on the patient's pain intensity scale after being given therapy.

2. Research Sample

This study used a sample of adolescent child patients with cancer who experienced pain. The research was conducted at the "Yayasan Komunitas Cahaya" as a Cancer Foundation in Padang. A total of 20 children and adolescents were selected as respondents using purposive sampling techniques with several inclusion criteria. The inclusion criteria for selecting samples in this study were (1) adolescent children with cancer; (2) age range 10-17 years; (3) patients who were relaxed and accompanied by caregivers (family); (4) patients who had no contraindications for *guided imagery therapy*; (5) cancer patients who experienced moderate pain, could communicate verbally and could hear well; (6) patients who did not use traditional medicines.

3. Research Instruments

This study uses a research instrument to measure and assess the pain scale with the NRS *Numeric Rating Scale*). The Numeric Pain Scale (NRS) is the simplest and most commonly used scale to measure a patient's pain. There are eleven numbers on this numeric scale, ranging from 0 to 10, with 0 being "no pain" and 10 being "the worst pain imaginable." Patients select the number that best describes the intensity of their pain in the COMPACT app. The advantages of this pain scale are reproducibility, easy understanding, and sensitivity to small changes in perceived pain. This scale is more likely to be used in adults (Hansen et al., 2020).

4. Data analysis

The analysis used in this study is a description of the characteristics of respondents with frequency distribution. In this study, a normality test was used to determine whether the data obtained was normally distributed or not. From the normality test, it was obtained that the data was normally distributed, this can be seen from the value of the Shapiro Wilk normality test results marked with a p-value> 0.05. To see the effect of *guided imagery* therapy in the COMPACT application used to reduce pain in children and adolescents with cancer, this study used the *t-dependent test.*

5. Research Ethics

This study has obtained ethical approval with Number: 282/KEPK/VII/2024. This study was also conducted by following ethical principles by maintaining confidentiality and providing *informed consent* before starting treatment on all respondents.

Results and Discussions

1. **This research produced respondent characteristics which can be seen in the table below:**

Table 1. Respondent Characteristics (N=20)

No.	Variables	Mean (SD)	Frequency (%)	Percentage (%)
1.	Age	14.44 (2.161)		
2.	Gender			
	Man		13	65
	Woman		7	35
3.	Types of Cancer			
	Leukemia AML		4	20
	ALL Leukemia		7	35
	Retinoblastoma		1	5
	Synovial Sarcoma		2	10
	Ewing's sarcoma (SE)		4	20
	Primitive Neuroectdermal *Tumor* (*PNET*)		2	10
4	Time of suffering from cancer			
	More than 5 years		5	25
	Less than 5 years		15	75

Table 1 shows the frequency distribution data of respondent characteristics with an average age of 14.44 (SD=2.161). This age range is the early adolescent age range. The gender of the respondents is mostly male (65%) with the most common type of cancer being ALL Leukemia.

2. **Frequency Distribution Based on Exclusive Breastfeeding, Birth weight, and Stunting Incidence.**

Table 2. Average Pain Scale in Children and Adolescent Patients with Cancer Before and After *Guided Imagery Therapy* COMPACT application based (N=20

Variables	Mean	SD	Min	Max	Category
Guided imagery therapy based on the COMPACT application (pre)	5.20	0.850	4	6	Moderate Pain
Guided imagery therapy based on the COMPACT application (post)	2.35	0.988	1	4	Mild Pain

Based on table 2, it is known that the average pain intensity of respondents before and after being given *guided imagery therapy* based on the COMPACT application. The average pain intensity of

respondents before being given *guided imagery therapy* (pre) was 5.20 (0.850), which is in the pain range moderate with a minimum-maximum M value ranging between 4 and 6. Meanwhile, the average pain intensity of respondents after being given *guided imagery therapy* (post) was 2.35 (0.988) which is in the mild pain range with a minimum-maximum value ranging between 1 and 4

3. *Guided imagery* therapy based on the COMPACT application which is carried out to reduce the pain scale of children and adolescents with cancer. The results of the study processed using the dependent t-test can be seen in the table below:

Table 3. Effect of *guided imagery* therapy based on the COMPACT application to reduce pain levels in children and adolescents with cancer (N=20)

Variables	N	Mean (SD)	Min-Max	p-value
guided imagery therapy based on the COMPACT application (pre)	30	5.20 (0.850)	4-6	0.007
guided imagery therapy based on the COMPACT application (post)		2.35 (0.988)	1-4	

*α=0.005

Guided imagery therapy based on the COMPACT application showed a difference in average results, namely the average value before being given *guided imagery therapy* was 5.20 (moderate pain) and the average after being given guided imagery therapy was 2.35 (mild pain) there was a difference in the decrease of 2.85 and a p value = 0.007, meaning that there was an effect before and after being given *guided imagery therapy* based on the COMPACT application on reducing the pain scale of child and adolescent patients with cancer.

Pain is very disturbing and makes it more difficult for people than any other disease (Hidayatulloh et al., 2020). Patients who feel pain will feel miserable or depressed and look for efforts to reduce the pain they feel. One of the actions taken by nurses is to intervene in pain or relieve pain to return the patient to a comfortable state (Sumariadi et al., 2021). *Guided imagery* is a pain distraction technique that can be used in pain management, lowering blood pressure, lowering cholesterol levels, glucose and increasing cell activity. Guided imagery is a technique that encourages patients to divert their thoughts to something beautiful according to the instructions of the nurse so that the pain experienced by the patient will disappear or decrease (Indriani & Darma, 2021).

One of the studies examining guided imagery was conducted by Lolo and Novianty (2018), who performed guided imagery on post-appendicitis surgery patients, with a p-value of 0.000 stating that there was an effect on reducing pain in gastritis patients (Udkhiyah & Jamaludin, 2020). Another study was conducted by Patasik, Tangka & Rottie (2018), namely that the effectiveness of deep breathing relaxation techniques and guided imagery on reducing pain in post- *cesarean section patients* , with a p-value of 0.000 stating that the intervention can reduce pain intensity in post-cesarean section patients. Pain management is only focused on pharmacology and deep breathing relaxation therapy. In other studies, it was found that guided imagery had an effect on reducing pain in gastritis patients (Astuti & Respati, 2018).

Based on the results of the discussion above, the researcher assumes that cancer pain

has various pain scales from (moderate-severe pain) according to the type of surgery, some are light-severe. According to several journals that the researcher found, guided imagery is an intervention of the human mind and body using the power of imagination to obtain physical, emotional and spiritual affects. *Guided imagery* is categorized in *mind-body medicine therapy* by Bedford (2012) by combining guided imagery with mind meditation as a cross-modal adaptation. Imagination is a mental representation of an individual in the relaxation stage. Imagination can be done with various senses including visual, auditory, olfactory and tactile. Guidance of imagination is a powerful technique to be able to focus and imagine which a therapeutic process is also. Providing this *guided imagery therapy technique* is very helpful in reducing the pain felt by a person. During the study, researchers found various types of operations with varying pain scales. The use of *guided imagery* as an additional intervention for pain control can involve and empower patients in self-care activities, which may have an impact on how they perceive cancer care. *Guided imagery* is a low-cost, easy-to-implement non-pharmacological approach that can be incorporated into patient care to reduce anxiety and pain that usually uses opioid analgesia (Cole, 2021).

The researcher conducted the research by starting an interview for consent to become a respondent and accompanied by an explanation of the purpose of providing therapy along with measuring the scale of pain felt by the respondent. After that, the researcher began providing intervention by providing a comfortable position to the respondent and starting to listen to audio *guided imagery* to the respondent using headphones and after finishing, the researcher asked again and recorded the client's response after being given *guided imagery intervention*.

The Effect of Guided Imagery Therapy Based on the COMPACT Application on Reducing Pain Scale in Child and Adolescent Patients with Cancer

The COMPACT application created contains basic management of palliative patients through communication, including pain management. There are several pain management options that can be done by pediatric cancer patients. The COMPACT application aims to facilitate health workers and the community in the process of pain assessment, pain management and evaluation obtained after implementing the points of pain management. In this application there is a choice of *guided imagery* as a non-pharmacological therapy in patient pain management. *Guided imagery* is chosen for all cancer patients so that there is the same treatment. Patients listen to *guided imagery* audio sounds with relaxation themes and guided imagination so that patients feel relaxed (Kartika et al., 2022).

Relaxation techniques are a form of treatment by inviting and guiding clients to rest or relax, with the assumption that resting the muscles can help reduce psychological tension (Utami & Kartika, 2018). When the body is in a relaxed state, the parasympathetic nerves work to suppress the sympathetic nerves when anxious. Guided imagery is a technique that can cause a relaxing effect on its users. The concept of guided imagery uses the imagination of individuals in a guided manner that aims to develop relaxation and improve the quality of life of individuals. By imagining a pleasant place or situation, individuals will find their relaxation point, especially if when imagining it involves the senses they have such as sight, smell, touch, hearing, and even taste (Astuti & Respati, 2018).

In line with Afiana Udkhiyah's research, before implementing *guided imagery therapy,* the researcher assessed the level of pain scale with *the Numeric Rating Scale* (NRS) with a pain scale result of 5, which means that the patient is experiencing moderate pain. When the relaxation technique using *guided imagery therapy was to be carried out*, the researcher

explained the procedure first, then the author gave an example, after the *guided imagery* relaxation technique was carried out for ± 15 minutes and then the respondent said he was relaxed and smiled. Then re-assess the degree of pain with a pain scale result of 2, which means that the patient's pain level was reduced to a mild degree. Providing *guided imagery* therapy techniques can reduce the pain scale in cancer patients, seen from the results of the average pain intensity of respondents who experienced a decrease, it can be seen that *guided imagery* is a therapy technique that can reduce pain in cancer patients. After being given *guided imagery therapy* to respondents, their responses said they felt comfortable and relaxed and there were also some who said the pain they felt was reduced (Ramadhanti, 2022).

According to researchers from several explanations from respondents after being given *guided imagery therapy*, this therapy is a new lesson learned by respondents to reduce pain and the audio given makes respondents feel very relaxed so that they can enter the respondent's imagination which makes respondents comfortable and can reduce the level of pain in respondents. And also according to researchers, the benefits of comfort caused by *Guided Imagery Therapy* greatly affect the pain sensory felt by patients. In this comfortable condition, it indirectly activates the analgesia system in the brain. In the analgesia system in the brain there are many areas that have important opiate receptors. The opium ingredients in the analgesia system are endorphins, met-enkephalin, leu-enkephalin and dynorphin. The enkephalin material can be found and plays a role in the brain stem and spinal cord in the analgesia system, while endorphins and dynorphins can be found in the hypothalamus and pituitary gland. So this analgesia system helps block pain signals at the place where pain signals are sent in the spinal cord. So that patients who have done *guided imagery techniques* are able to be calmer and adapt to the pain they experience (Kartika et al., 2023).

Guided imagery is a relaxation technique that involves visualizing a place with a calm and peaceful situation. This technique can relieve symptoms of stress and anxiety, and help the body and mind become more relaxed. *Guided imagery* can help reduce the pain that is being felt by patients by managing the stress caused by the pain. When stress can be managed well, the pain felt will decrease by itself. Guided imagery is done by inviting patients to do deep breathing relaxation, and imagine themselves in a relaxed, cool place that makes the patient feel comfortable being there, bringing them into a relaxed state and drifting in their imagination (Kartika et al., 2022). Several kind of stress management techniques used by children and adolescents are important to reduce anxiety, stress, and depressive symptoms, improve social skills, reduce stress-related physical pain, and achieve academic improvement across settings and diagnoses (Zisopoulou & Varvogli, 2023).

Conclusion

This study tries to use the COMPACT application in pain management of children and adolescents with cancer. In the application there is a choice of pain management, namely *guided imagery therapy*. Guided imagery therapy is concluded to be effective in reducing pain in cancer patients. The use of COMPACT (Communication on Palliative Care Treatment) as an effort to reduce pain in children with cancer in managing the pain they feel. This is also valuable in increasing the knowledge of children and families who care for them in managing pain. Furthermore, one of the non-pharmacological pain management techniques in applications such as hypnocommunication, guided imagery and murrotal al-quran contained in the COMPACT application, is considered to be able to reduce the pain felt by children with cancer when experiencing

pain at home or during hospitalization. It is hoped that the foundation and cancer community and families who care for them can actively use the COMPACT application to be able to continue activities to improve the quality of life in this pain management in pediatric patients, so that it can be used to improve the health of children with cancer both at home and when undergoing hospitalization.

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Conflic of Interest

We certify that there is no actual or potential conflict of interest in relation to this article.

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