



# Literature Review: Effectivity of Complementary Therapies in Children with Acute Lymphoblastic Leukemia

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**Abstract.** Leukemia is a chronic disease that affects children's physiology, psychology, also their growth, and development. It also impacts children life quality. Acute lymphoblastic leukemia (ALL) disease and its chemotherapy give some effects on children. The effects can be reduced by the nurse through an atraumatic care intervention using implementing complementary therapies. The objective of this therapy is to improve and maintain children's life quality. The goal of this research is to describe the effectiveness of complementary therapies in children with ALL (Acute Lymphoblastic Leukemia). This study uses the literature review method by selecting some journal articles using the PICO technique. The exclusion-inclusion criteria in selecting the journal article are: published in the latest 5 years (2016–2021), used Indonesian and English language, available in the full-text format, and has a specific theme in complementary therapy for children with ALL. Based on the analysis of the articles, it is concluded that most of the interventions in therapy can reduce some symptoms because of ALL diseases and the side effect of chemotherapy. From this study, it is suggested that some successfully proven interventions can be applied and implemented independently by the family with ALL diseases children. It is also recommended to be used as a nursing care intervention in development centers/services.

**Keywords:** Children · Acute Lymphoblastic Leukemia (ALL) · Complementary therapy

## 1 Introduction

Acute lymphoblastic leukemia (ALL) is a malignancy or cancer with a fairly frequent incidence in children. The representation of ALL cases alone reaches 25% of cancers that occurs in children under the age of 15. ALL in children is a condition where the spinal cord produces too many immature lymphocytes. This type of ALL cancer can progressively worsen if it is not treated immediately. Children with ALL have too many stem cells that become lymphoblasts, B lymphocytes, or T lymphocytes. These cells do

not work like normal lymphocytes in general and cannot attack infections in the body properly. The increase of leukemia cells in the blood and spinal cord leaves no room for normal white blood cells, red blood cells, and platelets. This condition can result in infection, anemia, and bleeding [1].

Based on the non-communicable disease profile report based on the Hospital Information System (SIRS) in 2016 there were 3,063 cases of leukemia in males and 2,263 cases in females in Indonesia. The largest distribution of leukemia cases occurred in the age group <15 years with a total of 2,269 cases. South Sumatra was recorded as the province with the most leukemia cases at 984 cases, while Central Java had the second highest number after South Sumatra at 746 cases [2].

Leukemia is a chronic disease that causes various impacts on children, either physiological, psychological, or growth and developmental impacts that further affect the children's quality of life. Physiological effects that occur in children with ALL after chemotherapy could include infection, mucosal ulceration, hemorrhagic cystitis, peripheral neuropathy, nausea, vomiting, and constipation [3]. One of the physiological impacts on ALL children caused by chemotherapy such as a weak body and loss of appetite which can cause children to experience nutritional deficits [4]. In addition to physiological impacts, children with ALL can also experience psychological impacts such as anxiety, fatigue, psychological stress, and depression. Exhausting diagnostic procedures can trigger emotional stress and can be worse if the pain is not treated properly which will lead to negative behavior because they cannot adapt [5]. Directly or indirectly leukemia can give an impact on child growth and development.

The effects of ALL and chemotherapy can be reduced by nurses through the provision of atraumatic care interventions by applying complementary therapies to children with ALL which aims to improve and maintain children's quality of life. In providing the implementation of atraumatic care, nurses have an important role. Apart from being a caregiver, support from nurses is very meaningful for parents and patients of ALL children. According to Mulyani et al. research, support from nurses can reduce anxiety in patients' parents and make them adapt to the conditions they have [6]. The statement from the study is in line with the conditions in several articles to be analyzed because there is parental involvement in providing complementary therapy.

Complementary therapy that can be applied to children with ALL can be in form of directed imagination, music, storytelling, journaling, hypnotherapy, massage, exercise, acupressure, and aromatherapy. One of the results of research in Taiwan using psychosocial interventions concluded that, after the intervention, there was a decrease in stress in children with ALL who underwent bone marrow aspiration and lumbar insertion [5]. One article in an American nursing journal concluded that progressive muscle relaxation has a positive effect on reducing nausea and vomiting. The study was applied to a group of children with leukemia [7].

Based on the results of several previous studies and data on ALL children that have been obtained, researchers would like to conduct a literature review on the topic of complementary therapy in children with ALL. The results of this literature review are expected to provide provisions for the researcher's practice at the hospital in providing nursing care to ALL children. This literature review study aims to obtain a comprehensive

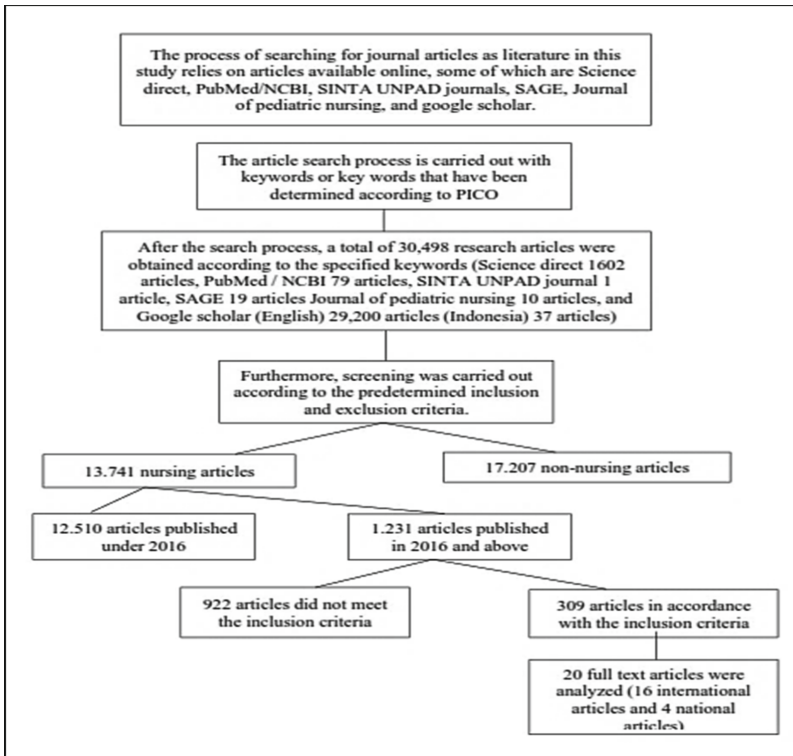


Fig. 1. Literature search scheme

description of the types and effectiveness of complementary therapies performed on patients with ALL.

## 2 Methodology

Research with a literature review design requires researchers or journal reviewers to conduct in-depth, detailed, and thorough literature searches. This research aimed to find out what topic other researchers have researched and prevent duplication of existing work [8]. This literature review research uses academic search Medline Complete with full text, such as science direct, PubMed/NCBI (National Center for Biotechnology Information), journal of pediatric nursing, SCImago journal, and google scholar. The literature search was done by entering keywords, such as complementary therapy in children with ALL or *terapi komplementer pada anak leukemia*. The next step after conducting a literature search is to select articles from various journals that have been obtained using the PICO technique and adjust to the predetermined inclusion and exclusion criteria, namely research articles published for a maximum of 5 years (2016–2021), using Indonesian and English, articles available in full text, the theme of the research article is complementary therapy in ALL children (Fig. 1).

### 3 Finding and Discussion

Complementary therapies are additional therapies that can be given to patients in addition to the main therapy. Pediatric patients with ALL usually receive main therapy such as chemotherapy. In practice, chemotherapy can cause several side effects such as nausea and vomiting, fatigue, disturbed sleep quality, and even a decrease in quality of life. The purpose of complementary therapy is not only to reduce or alleviate the side effects of chemotherapy but also to reduce symptoms caused by ALL itself such as pain, fatigue, disturbed sleep patterns, and fever. Complementary therapy is divided into four types, namely mind-body-spirit, manipulative, biologically, and energy therapies.

#### 3.1 Mind-Body Spirit Therapies

In a holistic nursing philosophy, mind and body are added to spirit because it is not only the mind that affects the body or vice versa, but spiritual aspects also have an impact on a person. Research on complementary yoga therapy in ALL children by researcher Fukuhara et al. [9] concluded that yoga can reduce pain in ALL children. Yoga is considered feasible to be given to pediatric patients with ALL and can be applied to hospital services. Researchers Orsey et al. [10] also examined the effect of yoga interventions in improving the quality of life and physical activity in children with cancer. Some significant changes shown after giving yoga interventions to patients prove that yoga can be applied to reduce various side effects due to ALL and chemotherapy because yoga can provide happiness through peace of mind. Yoga therapy given to patients includes some movements to prevent and relieve psychological, emotional, and spiritual pain [28].

ALL pediatric patients often experience pain due to invasive actions obtained during diagnostic examinations and during chemotherapy, this can trigger anxiety in patients [12]. One type of mind-body-spirit therapy is humor therapy which can affect health status through emotional, cognitive, social, and spiritual healing. A study discussing the therapeutic effects of clowning on pain and anxiety during chemotherapy conducted by researchers Kurudirek and Arikan [11] found the effectiveness of providing humor therapy through clowning to reduce pain and anxiety in children aged 7–12 years who were receiving chemotherapy treatment. Specifically, four positive aspects can be generated through clowning therapy: cognitive, psychological, social, and emotional effects [29]. Clowning therapy can reduce iatrogenic effects such as anxiety and pain caused by medical procedures that affect behavioral problems. Research on anxiety and clowning therapy was first conducted in 2005 at a pediatric hospital in Florence, Italy. Until now, the clowning therapy intervention continues to be developed by other researchers [30].

Complementary therapy conducted by Mohammadi et al. researchers [12], namely occupation-based play therapy, has proven effective in reducing pain, anxiety, and fatigue in children with ALL. Significant changes in pain and anxiety levels were seen after the intervention. Another study explained that play therapy is effective in children because children are still in the period of cognitive development and growth so verbal and abstract abilities have not developed optimally. For children, toys are a means of communication for them, so toys can be used as a medium of distraction to overcome trauma and avoid anxiety [31]. Play therapy helps reduce anxiety levels because children become more

informed about their illness in a non-threatening way and know that the pain they feel can be controlled through nursing procedures [32].

The long treatment process causes patients who are undergoing treatment to experience stress. Stressed patient conditions will have a physiological effect on the patient's body as well, causing the patient's quality of life to decrease. A study on psychosocial interventions concluded to reduce distress in children with ALL during Bone Marrow Aspiration and Lumbar Puncture has been conducted by Hsiao et al. [5]. Psychosocial interventions in this study included preparation and cognitive behavioral intervention (CBI). The coping strategies included distraction, storytelling, breath training, and directed imagery. The psychosocial intervention process carried out in the analyzed articles used toy equipment such as dolls, and medical equipment such as plasters, gauze, and syringes.

The next complementary therapy related to mind-body-spirit is hypnotherapy. Researchers found three articles that examined hypnotherapy. Hypnotherapy has the benefits to reduce stress, sleep disorders, and anxiety, and reducing pain intensity [33]. Research on the effect of hypnotherapy and acupressure on acute nausea and vomiting studied by researchers Iriani Restu, and Vestabilivy [13] was conducted on pediatric patients who were undergoing chemotherapy. From the research, it was concluded that hypnotherapy and acupressure can reduce nausea and vomiting. The point or point used for nausea and vomiting patients is P6 (pericardium 6 or called Nei Guan) and can be combined with the ST36 point (Stomach 36 located on the knee) [34]. Hypnotherapy is a therapy that uses hypnosis. Hypnotic interventions are carried out to suppress stimuli that trigger nausea and vomiting and provide relaxation to eliminate nausea and vomiting without side effects [35].

The next research is about the effect of HypnoParenting on fatigue in ALL children due to chemotherapy. The study was conducted at Ulin Banjarmasin Hospital by researcher Anggraini [14]. From this study, it was concluded that HypnoParenting intervention was effective in reducing the effects of chemotherapy, which is fatigue. Hypno-parenting is a way to communicate with patients who are unconscious by giving positive suggestions to change patient behavior. Research on HypnoParenting and fatigue has not been widely conducted by researchers, but some HypnoParenting studies prove that HypnoParenting provides changes in children with temper tantrums [36] and increases children's appetite.

The third research article on hypnotherapy discusses the effect of hypnotherapy on the health status of ALL the researcher Yuliasri et al. Unlike the two previous studies, in this study, it was mentioned that hypnotherapy did not provide significant changes in the health status of ALL children. The parameters of health status described by the researcher in her article are the Karnofsky performance scale, hemoglobin level, and urea level. The possibility of the lack of influence in this study is due to the less intensive intensity or frequency of hypnotherapy given to patients, the age of patients who are not mentally ready to receive hypnotherapy so that communication is not formed as expected, this is mentioned in one of the studies in 2008 which states that hypnotherapy is not suitable for children under 6 years old.

Children with ALL often experience fatigue resulting in decreased physical activity. Several studies have examined the effectiveness of yoga and aerobic exercise in

pediatric patients. Researchers Fadhilah and Allenidekania [16] conducted an objective study to identify the relationship between physical activity and fatigue in children with leukemia at home. Previous studies have also mentioned that physical activity provides an improvement in cardiorespiratory function, muscle strength, and the functional ability of the body to be maximized [37]. The results of this study are in line with articles that mention the effectiveness of physical exercise to reduce fatigue in children with cancer [18].

### 3.2 Manipulative and Body-Based Therapies

The next type of complementary therapy is the manipulative and body-based therapies category. This is a more complex category of mind and body practices. Nurses will find the usefulness of these manipulative-based therapies when they have explored them further and when including them in the treatment program, nurses must be more careful because there may be some patients who are contraindicated with this therapy.

Pain and distress are side effects that can be experienced by ALL children caused by diagnostic examinations and lung cancer treatment. Researchers Marusak et al. [17] concluded that martial art therapy can reduce pain and distress among children with chronic diseases. Martial art is a technique that includes meditation, breath training, and specific movements that help children to cope with pain and stress due to their illness and the effects of the treatment process (chemotherapy). The results of this study are comparable to other studies that stated that regular practice of martial arts can increase mindfulness so that it has a positive effect on stress management and improves the quality of life and well-being [38]. Another study also showed that martial arts can reduce symptoms associated with anxiety and depression and improve factors associated with well-being [39].

Research by Baky and Elhakk [18] discussed the impact of aerobic exercise on the physical health and fatigue of ALL children. Aerobic exercise is a type of exercise that involves physical activity and energetic body movements. Exercise is also considered one of the complementary therapies that can provide a positive response to a person's physiological and psychological [34]. Research by Baky and Elhakk [18] found that aerobic exercise is effective for improving fitness in ALL children who suffer from fatigue. In this study, participants were divided into two groups, groups A and B. There were significant changes in group A before and after the intervention. Aerobic capacity analysis results in an increased percentage.

The next research article discusses massage. In this literature study, three research articles discuss massage intervention. The first study was about the therapeutic effect of massage on fatigue in children with ALL who received chemotherapy. The study was conducted by Kamal et al. [19] using a quasi-experimental research design with a convenience sampling technique. This study concluded that fatigue in children with ALL can be reduced due to the therapeutic effects of massage provided. Some massage techniques can be done by nurses through training, especially massage techniques combined with relaxation techniques [34]. The next two massage-related research articles discuss Swedish massage. Kulsum et al. [21] examined the effect of Swedish massage on the level of quality of life of school-age leukemia patients. From the study, it was written

that Swedish massage can improve the quality of life of children with leukemia. Furthermore, researchers Rajendran et al. [22] also examined the effectiveness of Swedish massage on nausea and vomiting in children who do chemotherapy. The results of this study prove that Swedish massage was effective for nausea and vomiting of children undergoing ALL chemotherapy. The success of massage in the three articles is in line with the statement that massage is a holistic intervention that uses a natural healing process by making connections between body, mind, and spirit.

The most common disorder experienced by ALL children is sleep disturbance. Therefore, fatigue, anxiety, fear, and pain can be triggering factors for sleep disturbance problems. This attracted the attention of a researcher to examine sleep hygiene and relaxation interventions in children with ALL. Researchers Zupanec et al. [20] conducted a study with a pilot randomized controlled trial design with participants who fit the inclusion of 20 children aged 4–10 years. The intervention was carried out by the patient's parents independently, the nurse asked the patient's parents to practice sleep hygiene and relaxation strategies for 4 weeks. Research on sleep hygiene to improve sleep quality in children is still limited but there is one study that proved the effect of applying sleep hygiene and sleep journals on the quality of sleep of children in their school-age with an effective result [40].

### 3.3 Biologically Based Therapies

The next complementary therapy is biologically based complementary therapy or herbal plants. The use of herbal plants can be used in various ways such as aromatherapy, herbal medicines, and dietary. Researchers Evans et al. [23] examined the use of aromatherapy to reduce nausea and vomiting in children undergoing chemotherapy. From this study, it was concluded that the effectiveness of aromatherapy to reduce nausea and vomiting has not been proven. A total of 49 participants who met the inclusion criteria were involved in this study. The age of the children in this study ranged from 7–13 years old. Another study on ginger aromatherapy mentioned that aromatherapy can reduce nausea and vomiting in cancer patients undergoing chemotherapy. The researcher in the article said that the ginger aromatherapy given was able to increase serotonin so that it caused comfort and relaxation which could reduce nausea and vomiting [41].

The next study is about ginger supplements that can reduce nausea and vomiting in patients. This study was conducted by Dmavandi et al. [24] who used a double-blinded randomized placebo-controlled trial research design. The results of the study conveyed that ginger supplements can be used and proven efficient as antiemetics in pediatric patients. The ginger supplement used was made from pure ginger. Ginger root has a variety of biologically active ingredients. Ginger and its elements make the digestive function and motility increase due to the presence of anticholinergic and antiserotonergic and ginger can accelerate gastric emptying [42]. Other studies discussing the benefits of ginger also confirm that ginger is a complementary therapy and alternative medicine beneficial to reducing nausea and vomiting in pregnant women, nausea, and vomiting due to chemotherapy, and post-operative nausea. In addition, ginger is also considered a herbal medicine safe for human consumption [43].

### 3.4 Energy Therapies

The fourth category of complementary therapies is energy therapies which include some therapies such as light therapy, touch, reiki, acupressure, and reflexology. However, researchers and the public are skeptical of the efficacy of energy therapies due to the difficulty in determining how energy works and how to measure its effects. Research on acupressure for nausea vomiting and fatigue in the management of ALL in children has been studied by Ghezlbash and Khosravi [25] showing a positive relationship that acupressure can reduce the frequency of nausea and vomiting. The next study discussed the effect of acupressure on the frequency or severity of nausea and vomiting among ALL children undergoing chemotherapy. This study conducted by researchers Mohammadi et al. [12] in the NCI pediatric oncology department concluded that it did not provide significant changes. The intervention was given at points ST36 and P6 for 3 min and at points LI12 and SI3 as false points in the placebo group. The results of the two acupressure literature reviews show differences. The results of acupressure research in the first article are in line with the results of research from [44] which states that nei guan acupressure (point P6) affects nausea and vomiting caused by chemotherapy in school-age children suffering from cancer. A statement from another study also concluded that acupressure plays an important role in reducing chemotherapy-induced nausea and vomiting among patients with cancer [45].

Reiki is one of the energy therapies that can help the patient's healing process through energy-focusing techniques [34]. A study conducted by researchers Zucchetti et al. [27] examined the power of reiki to assess the feasibility and efficacy of reducing pain in children receiving HSCT. Through this study, reiki was proven to be feasible to be given to patients. Reiki therapy is effective as an adjunctive therapy to control pain in addition to the use of opioids in post-operative pediatric patients [46]. Reiki intervention can reduce pain, anxiety, heart rate frequency, and respiration. This reiki method is recommended for pain and anxiety management in children receiving palliative care in hospitals [47].

## 4 Conclusion

The conclusion that can be drawn after analyzing the 20 articles is that there are 16 articles of complementary therapies that have successfully influenced such as reducing ALL symptoms, chemotherapy effects, diagnostic examinations, and improving quality of life. The classification of the 16 articles includes 6 mind-body-spirit therapies articles, 7 manipulative-body-based therapies articles, 1 biologically therapies article, and 2 energy therapies articles.

The effectiveness of several interventions that can reduce some of the symptoms caused by ALL is yoga which is effective for reducing pain. Complementary therapy interventions in reducing the effects of diagnostic examinations on children with ALL were identified in five articles with a variety of therapies including humor therapy, play therapy, psychosocial interventions, martial arts, and reiki. Of the five articles, two interventions were considered effective in reducing the effects of diagnostic examinations, namely humor therapy using clowns and psychosocial interventions. Most of the articles analyzed in this literature review discussed interventions given to children with ALL to reduce the effects of chemotherapy, with a total of 10 articles. 50% of the 10 articles were



considered quite effective to reduce the effects of chemotherapy such as hypnotherapy, acupressure, and Swedish massage which are effective to reduce nausea and vomiting, while HypnoParenting and massage are effective to reduce fatigue. Of the 20 articles analyzed, 2 articles are effective in improving the patient's quality of life, which are yoga and Swedish massage.

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