Napande: Jurnal Bidan
e-ISSN 2829-8365
Volume 5 Issue 1, 2026, page 42-52
DOI: 10.33860/njb.v5i1.4334
Website: https://ojs.polkespalupress.id/index.php/njb
Publisher: Poltekkes Kemenkes Palu

Original Article

The Effect of Psycho-Educational Therapy on Anxiety Levels in Children with Leukemia Undergoing Chemotherapy: A Pre-Experimental Study

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ARTICLE INFO

Article History:
Received: 2026-03-10
Accepted: 2026-03-27
Published: 2026-03-30

Keywords:

Anxiety;
Chemotherapy;
Children with cancer;
Psycho-educational therapy;

ABSTRACT

Background: Cancer remains a major global health issue, with approximately 400.000 children and adolescents diagnosed with cancer each year worldwide. Anxiety is one of the most common psychological responses experienced by children undergoing chemotherapy, which may affect treatment cooperation and quality of life. Therefore, this study aimed to analyze the effect of psycho-educational therapy on anxiety levels in children with cancer undergoing chemotherapy.
Methods: This study used a pre-experimental study one-group pretest–posttest design conducted at the YKAKI (Yayasan Kasih Anak Kanker Indonesia) in Semarang Halfway House from May to June 2023. A total of 25 children diagnosed with leukemia and undergoing chemotherapy were recruited using total sampling. Data were collected using respondent characteristic observation sheets and the Spence Children's Anxiety Scale (SCAS) to measure anxiety levels. The psycho-educational therapy consisted of four sessions, including education about cancer and chemotherapy, prevention and management of chemotherapy side effects, and stress management techniques. Data were analysed using the Wilcoxon signed-rank test. Ethical approval was obtained from the Ethics Commission of the Faculty of Medicine, Sultan Agung University.
Results: Before the intervention, the majority of respondents experienced severe anxiety (44%). After the intervention, most respondents experienced mild anxiety (72%). The mean anxiety score decreased from 2.24 ± 0.77 before the intervention to 1.32 ± 0.55 after the intervention, indicating a significant reduction of 0.92 points (41.1%) after the intervention (p = 0.001).
Conclusion: This study indicates a potential benefit of psycho-educational therapy in reducing anxiety. This intervention may be considered a supportive psychological strategy to help reduce anxiety in children undergoing chemotherapy.

INTRODUCTION

Cancer remains a significant health issue and a leading cause of death worldwide (Arbyn et al., 2020). It is a chronic disease, which is characterized by uncontrolled and abnormal cell division, invading surrounding tissues, and potentially spreading throughout the body via the bloodstream and lymphatic system. Cancer is a severe illness that not only affects adults but also many children (Lam, Howard, Bouffet, & Pritchard-Jones, 2019). Cancer in children is considered a life-threatening disease, and without proper management, it can have a poor prognosis (Pizzoli, Renzi, Arnaboldi, Russell-Edu, & Pravettoni, 2019).

The projected global cancer cases will reach 22 million by 2032 (Li et al., 2021). The number of children affected by cancer is approximately 3%-5% of all cancer cases. According to the World Health Organization (WHO), there is an annual increase in the number of children diagnosed with cancer, approximately 400,000 children and adolescents aged 0-19 years. WHO also states that every two minutes, a child is diagnosed with cancer. Indonesia ranks first in the number of cancer patients in Southeast Asia. In 2020, Indonesia recorded an additional 396,914 cases of cancer in children (Windasari, Pawenrusi, Zulkarnaen, & Maesak, 2022). One of the most common types of cancer in children is leukemia (Namayandeh, Khazaei, Najafi, Goodarzi, & Moslem, 2020). Leukemia is a condition where an excessive number of white blood cells are produced. Treatment and care for childhood leukemia require an extended period, typically ranging from 6 months to 3 years (Sahlol, Kollmannsberger, & Ewees, 2020).

Treatment and care need to be continuous, involving both inpatient and outpatient care. Chemotherapy is one of the therapies used for leukemia. Chemotherapy is a sustained intervention that can have therapeutic effects. However, chemotherapy can also lead to physical and psychological problems in children (Pelcovits & Niroula, 2020). Chemotherapy can inhibit cell growth, pain, nausea, hair loss, difficulty gaining weight, and fatigue. Among the psychological issues that often occur in children are anxiety, fear, mood disturbances, low self-esteem, treatment non-compliance, trauma, and even a refusal to undergo therapy (Hussain et al., 2021).

Previous research has shown that chemotherapy has negative impacts, such as worry, anxiety, fear, and even negative experiences during treatment (Lestari, Budiyarti, & Ilmi, 2020). Other studies have also mentioned that post-chemotherapy symptoms can trigger anxiety about future chemotherapy programs. Anxiety is the most commonly experienced response by children with leukemia undergoing chemotherapy. Anxiety is a response to specific threatening conditions (Putri, Utami, & Juniartha, 2020). Post-chemotherapy pain is one of the reasons patients experience increased anxiety. Anxiety can manifest in various ways, and it typically increases before chemotherapy sessions (Simanullang & Manullang, 2020). A preliminary study conducted at the Yayasan YKAKi Semarang halfway house found that the majority (8 out of 10) of children experience anxiety while waiting for their chemotherapy appointments. This anxiety response includes restlessness, irritability, sensitivity, and fear, and some children even refuse to undergo chemotherapy (Megasari, Wulandari, Cahyanto, Suratih, & Mulyani, 2023).

One way to address anxiety issues in children with leukemia undergoing chemotherapy is through psycho-educational therapy. Psycho-education is an atraumatic intervention provided to individuals to enhance coping mechanisms in handling problems and mental changes. Psycho-educational therapy also involves providing information to solve the issues and discussing patient needs to reduce stress, manage symptoms, develop relaxation techniques, and enhance adaptation to specific conditions. Other research has shown that implementing psycho-educational therapy can reduce anxiety and improve a person's readiness to undergo particular procedures (Tsai, Huang, Rosenheck, & Wilkinson, 2020).

Psycho-educational treatment has several benefits, including easy application, cost-effectiveness, and building a relationship between patients and nurses. Psycho-educational therapy includes several stages, such as problem identification (cancer), knowledge provision related to the

problem (cancer), and stress management (anxiety) (Sutinah, 2020). Each stage aims to maximize the impact of psycho-education, as each has different roles and functions. A study conducted by Sulistiyo (2017) among patients with coronary heart disease showed that psychoeducational intervention reduced anxiety levels, with the post-intervention mean anxiety score in the intervention group (22.46) being approximately 45.9% lower than in the control group (41.54) (Sulistiyo et al., 2017). The findings by (Sahupala & Wijayanti, 2025) revealed a significant reduction in anxiety scores from 15.60 ± 2.99 to 8.52 ± 1.88 ($p < 0.001$), representing an approximate 45.4% decrease. Cortisol levels also decreased significantly from 15.72 ± 9.10 to 10.40 ± 6.97 ($p < 0.001$), indicating a 33.8% reduction, demonstrating the effectiveness of psychoeducation in reducing both psychological and physiological stress in high-risk pregnancies.

Previous studies have largely focused on the medical management of childhood cancer, while psychological interventions addressing anxiety during chemotherapy remain limited (Coughtrey et al., 2018). In addition, many psycho-educational interventions have primarily targeted adult populations rather than pediatric cancer patients, resulting in limited evidence on interventions specifically designed to address anxiety in children (Oliveira et al., 2023). Evidence regarding psycho-educational interventions for children with cancer in developing countries, including Indonesia, is also scarce. Only a few studies have examined psycho-educational approaches to reduce anxiety during chemotherapy procedures in pediatric oncology settings (Cheng et al., 2022;Nazari et al., 2025). Furthermore, there remains a lack of simple and practical psycho-educational interventions that can be easily implemented in routine pediatric oncology care.

Based on these considerations, the researcher intends to conduct a study titled The Influence of Modality Therapy (Psycho-Education) on Anxiety in Children with Leukemia Undergoing Chemotherapy. However, studies examining psycho-educational interventions for reducing anxiety in children with leukemia undergoing chemotherapy in community-based settings such as halfway houses remain limited, particularly in Indonesia. Therefore, this study aims to analyze the influence of psycho-educational therapy on anxiety levels in children with leukemia undergoing chemotherapy.

METHODS

This study used a pre-experimental design with a one-group pretest–posttest approach to examine the effect of psycho-educational therapy on anxiety levels in children with cancer undergoing chemotherapy. This design was chosen because it allows the assessment of changes in participants' anxiety levels before and after the intervention within the same group. Anxiety levels were measured prior to the intervention (pre-test) to obtain baseline data and after the completion of the psycho-educational therapy (post-test) to evaluate its effectiveness. The pre-test and post-test scores were then compared to determine the impact of the intervention.

The study population consisted of children diagnosed with leukemia undergoing chemotherapy at the YKAKi Semarang Halfway House in May-June 2023. Written informed consent was obtained from the parents or guardians of all participants prior to the study. In this research, we used total sampling involving 25 respondents. The sample consisted of all eligible children residing in the YKAKI Semarang halfway house during the study period.

The research procedure began with measuring the respondents' anxiety levels using the Spence Children's Anxiety Scale (SCAS) as a pretest. After that, the respondents received psycho-educational therapy consisting of four sessions, including education about cancer and chemotherapy, prevention of chemotherapy side effects, management of chemotherapy side effects, and stress management techniques. The intervention was conducted before the scheduled chemotherapy sessions. After completing the intervention sessions, the respondents' anxiety levels were measured again using the same instrument as a post-test. The collected data were then analyzed using the Wilcoxon test to determine the effect of psycho-educational therapy on anxiety levels in children with leukemia undergoing chemotherapy.

The dependent variable in this study is anxiety, while the independent variable is psycho-educational therapy. The intervention was administered three times before scheduled chemotherapy sessions. The psychoeducational therapy was delivered in four sessions, each lasting approximately 15 minutes. The intervention was delivered face-to-face in a quiet room in the pediatric oncology ward. The intervention was provided by the researcher, who is a trained nurse, using a structured psychoeducational module.

The materials included simple explanations about cancer and chemotherapy procedures, introduction to medical equipment, emotional support, and relaxation techniques to reduce anxiety. Visual aids such as illustrated pictures and a booklet were used to help children better understand the information. The sessions were conducted interactively, allowing children to ask questions and express their feelings related to chemotherapy treatment.

The sessions were delivered using interactive explanations and visual educational materials adapted to the children's developmental level, as follows:

1. Session 1: (education about cancer and treatment therapy)
2. Session 2: (prevention of chemotherapy side effects)
3. Session 3: (management of chemotherapy side effects)
4. Session 4: stress management (teaching various non-pharmacological stress management techniques suitable for children).

The researcher applied univariate analysis in this study to describe each variable in frequency distribution, including age, gender, and treatment duration. Bivariate analysis was performed to determine the influence of applying psycho-educational therapy on the anxiety of children with leukemia undergoing chemotherapy.

The instruments used in this study were observation sheets for respondent characteristics and an anxiety assessment instrument. Anxiety was measured before and after the intervention using the Spence Children's Anxiety Scale (SCAS). The construct validity of the SCAS instrument was previously confirmed by Spence, Rape, Donald, and Ingram (2001), with results of r = 0.68 and r = 0.59. The reliability test for measuring anxiety levels in children was conducted by Spence (1998), Muris (2000), Muris (2002), Spence, Barrett, and Turner (2003), with coefficient alpha values ranging from 0.9 to 0.92. It indicates that the Children's Fear Scale, or SCAS, meets the reliability criteria with a coefficient alpha > 0.8.

The instrument comprises 32 questions, with a total score of 112. Anxiety levels are categorized as mild anxiety (1-38), moderate anxiety (39-76), and severe anxiety (77-112). Moreover, the researcher used the statistical test by applying the Wilcoxon test. This research has received ethical approval from the Ethics Commission of the Faculty of Medicine, Sultan Agung University, Semarang, with approval number 338/VIII/2023/Bioethics Commission..

RESULTS

This study used a pre-experimental design with a one-group pretest–posttest approach conducted at the YKAKI Semarang Halfway House, Indonesia, from May to June 2023. A total of 25 children diagnosed with leukemia and undergoing chemotherapy were enrolled using a total sampling technique. The inclusion criteria were children diagnosed with leukemia, undergoing chemotherapy, aged 0–18 years, and willing to participate in the study. The demographics of the study population included gender and age distribution. Most respondents were male, and the most common age group was five years old.

Table 1. Characteristics of Respondents

Characteristics of Respondents	n	%
Child's Gender		
Male	16	64
Female	9	36

Characteristics of Respondents	n	%
Child's Age		
4 years	1	4
5 years	5	20
6 years	2	8
7 years	3	12
10 years	2	8
11 years	2	8
12 years	1	4

Table 1 summarizes the baseline characteristics of the study participants. The majority of respondents were male (64%), while females accounted for 36% of the participants. Regarding age distribution, the most common age was five years (20%), followed by seven years (12%), while the remaining respondents were distributed across other age groups.

Primary Outcome Measures

Anxiety levels were measured using the Spence Children's Anxiety Scale (SCAS) before and after the psycho-educational therapy intervention.

Table 2. Anxiety Levels of Respondents Before and After Psycho-Education Intervention

Grade of Anxiety	Pre-test		Post-test	
	n	%	n	%
Mild	5	20	18	72
Moderate	9	36	6	24
Severe	11	44	1	4

Table 2 shows the distribution of anxiety levels before and after the intervention. Before the intervention, the majority of respondents experienced severe anxiety (44%). After receiving psycho-educational therapy, most respondents experienced mild anxiety (72%). The number of participants with severe anxiety decreased markedly from 11 children (44%) to only 1 child (4%).

To examine the effect of psycho-educational therapy on anxiety levels, a Wilcoxon signed-rank test was performed.

Table 3. The Influence of Psycho-Educational Therapy on Anxiety in Children with Leukemia Undergoing Chemotherapy

Condition	Mean ±SD	Median (Min-Max)	p-value
Pre-test	2.24 ± 0.77	2 (1-3)	0.001
Post-test	1.32 ± 0.55	1 (1-3)	

Table 3 presents the results of the statistical analysis. The mean anxiety score decreased from 2.24 ± 0.77 before the intervention to 1.32 ± 0.55 after the intervention. The mean anxiety score decreased from 2.24 ± 0.77 before the intervention to 1.32 ± 0.55 after the intervention. The Wilcoxon test showed a statistically significant difference between pre-test and post-test anxiety levels ($p = 0.001$). The intervention demonstrated a large effect size (Cohen's $d = 1.37$), indicating that psycho-educational therapy had a substantial impact on reducing anxiety among children with leukemia undergoing chemotherapy.

Secondary Outcome Measures

Figure 1. Comparison of Anxiety Levels Before and After Psycho-Educational Therapy

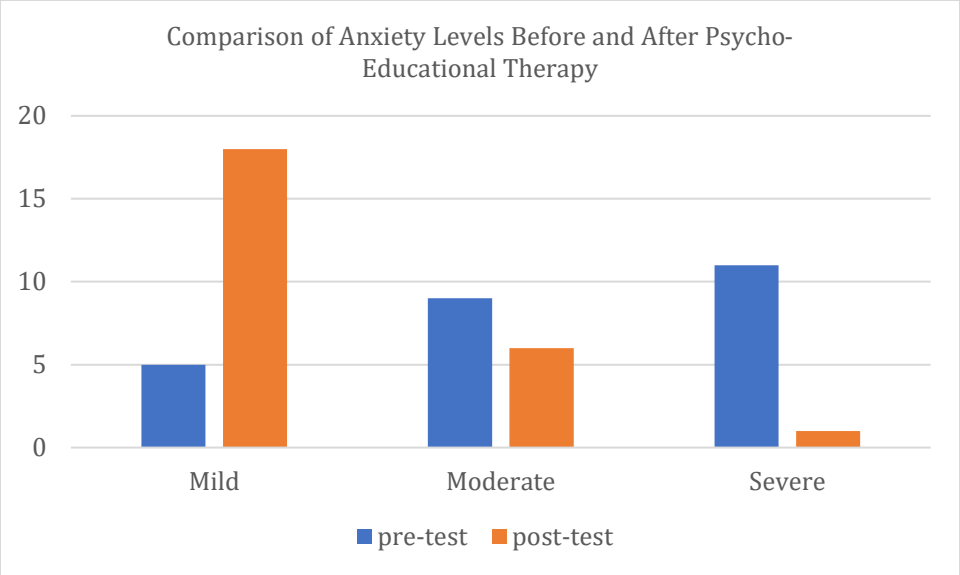

Figure 1 illustrates the comparison of anxiety levels before and after the psycho-educational therapy intervention. The number of respondents experiencing mild anxiety increased from 5 to 18 participants, while moderate anxiety decreased from 9 to 6 participants. A substantial reduction was observed in severe anxiety, which decreased from 11 participants before the intervention to only 1 participant after the intervention.

DISCUSSION

[Interpretation of Key Findings]

This study demonstrated that psycho-educational therapy was associated with a significant reduction in anxiety levels among children with leukemia undergoing chemotherapy. Rather than merely reflecting numerical changes in anxiety scores, these findings suggest that structured psychological preparation may help children better understand and emotionally cope with the challenges of chemotherapy treatment (Lamparyk et al., 2019).

Children undergoing chemotherapy often experience anxiety due to uncertainty, fear of pain, and anticipation of treatment-related side effects. In pediatric oncology settings, these emotional responses are common because children may have limited understanding of their illness and the medical procedures they undergo. Psycho-educational interventions aim to reduce uncertainty by providing age-appropriate explanations about the disease and treatment process, thereby improving children's sense of control and emotional adjustment (Morgado et al., 2022).

From a theoretical perspective, these findings can be explained through the Stress and Coping Theory, which proposes that individuals experience psychological stress when they perceive a situation as threatening and beyond their coping resources (Fathy et al., 2017). Providing clear information and coping strategies through psycho-education may reduce perceived threats and enhance children's coping capacity when facing chemotherapy procedures. As children gain a better understanding of what will happen during treatment, their perceived uncertainty and fear may decrease, leading to reduced anxiety levels.

Cancer is a disease that often causes individuals to imagine significant life changes due to the disease process and treatment they must undergo (Mattiuzzi & Lippi, 2019). Many cancer patients, especially children receiving chemotherapy, experience emotional disturbances such as anxiety and fear related to treatment procedures (Carlsson et al., 2019). From a neuropsychological perspective, anxiety is associated with dysregulation of neurochemical systems involving neurotransmitters such as gamma-aminobutyric acid (GABA), which plays a key role in regulating neuronal excitability and emotional responses (Adwas et al., 2019; Lasselin et al., 2020). When inhibitory neurotransmission

is reduced, excessive neuronal activity may trigger heightened sympathetic responses, including increased heart rate, restlessness, and emotional distress. Interventions that promote relaxation and coping strategies may help regulate these stress responses and contribute to emotional stabilization during medical treatment.

The improvement observed in this study may also be explained by the supportive environment created during the psycho-educational sessions. By combining education, relaxation techniques, and distraction strategies, the intervention may help children develop adaptive coping mechanisms and reduce anticipatory anxiety before chemotherapy procedures.

[Comparison with Previous Studies]

The results of this study are consistent with previous research indicating that psycho-educational interventions can reduce anxiety, stress, and emotional distress among patients undergoing medical treatment (Bartolo et al., 2019; Tsai et al., 2020). Psycho-educational therapy helps individuals understand their illness, anticipate treatment procedures, and develop coping strategies to manage stress. Similarly, previous studies in pediatric oncology have shown that providing information and psychological support can reduce treatment-related anxiety in children with cancer (Carlsson et al., 2019).

In this study, the psycho-educational intervention consisted of four sessions, each lasting approximately 15 minutes. The first session focused on education about cancer, particularly leukemia, and the chemotherapy treatment process. The second session provided education about chemotherapy programs and possible side effects. The third session addressed strategies for preventing and managing chemotherapy side effects. Educational materials were delivered using interactive video media to improve children's engagement and understanding, which has been shown to be effective in pediatric health education (Siregar, 2023). The fourth session focused on stress management techniques.

Stress management strategies included relaxation and distraction techniques, which are widely recognized as effective non-pharmacological approaches to reducing anxiety and pain during medical procedures (Komann et al., 2019). These techniques help children divert their attention away from stressful procedures and promote relaxation. Examples of distraction methods include video games, controlled breathing, and relaxation exercises (Rohyani & Millya, 2021). In this study, deep breathing exercises and video games were used to make the intervention more engaging and suitable for children.

[Implications for Public Health]

The findings of this study have important implications for pediatric oncology care. Psycho-educational therapy can be implemented as part of supportive nursing care to reduce anxiety in children undergoing chemotherapy. Healthcare providers, particularly nurses, play a key role in delivering psychological education and support to pediatric patients and their families. Implementing psycho-educational interventions may improve children's emotional well-being, increase treatment adherence, and reduce the risk of treatment refusal due to fear or trauma.

Additionally, psycho-education may contribute to improving other aspects of patient well-being, including sleep quality and stress management. Previous research has reported that patients undergoing chemotherapy often experience sleep disturbances, including decreased sleep duration and poor sleep quality, which may increase the risk of fatigue and depression (Dewi et al., 2023). Therefore, integrating psycho-educational therapy into pediatric cancer care may help address both psychological and behavioral challenges associated with long-term cancer treatment.

[Limitations and Cautions]

Despite the meaningful findings, several limitations should be considered when interpreting the results of this study. First, the study employed a pre-experimental one-group pretest–posttest

design without a control group. This design limits the ability to establish causal relationships between the intervention and the observed reduction in anxiety, as other factors such as natural psychological adaptation or environmental influences may also contribute to the observed changes.

Second, the relatively small sample size and recruitment from a single halfway house may limit the generalizability of the findings to broader pediatric oncology populations. Children receiving treatment in different healthcare settings or cultural contexts may experience different psychological responses to chemotherapy.

Third, several potential confounding variables were not assessed in this study, including parental anxiety, family coping mechanisms, previous hospitalization experiences, and individual psychological characteristics. These factors may influence children's anxiety levels and could affect the overall effectiveness of psycho-educational interventions.

[Recommendations for Future Research]

Future research should involve larger sample sizes and more rigorous research designs, such as randomized controlled trials, to further evaluate the effectiveness of psycho-educational therapy in reducing anxiety among children with cancer. Further studies may also examine the role of family involvement, social support, and other psychological interventions in improving emotional outcomes in pediatric oncology patients. Investigating the long-term impact of psycho-educational therapy on children's psychological well-being and treatment adherence may also provide valuable insights for improving supportive care in pediatric cancer treatment.

CONCLUSION

This study provides insights into the psychological challenges experienced by children with leukemia undergoing chemotherapy and explores the potential role of psycho-educational therapy in addressing anxiety during treatment. The findings suggest that psycho-educational therapy was associated with a reduction in anxiety levels among children undergoing chemotherapy, as indicated by the decrease in severe anxiety following the intervention. These results indicate that psycho-educational approaches may help children better understand the treatment process and develop coping strategies to manage emotional distress during chemotherapy.

The findings highlight the potential value of incorporating psycho-educational interventions into supportive care practices in pediatric oncology settings. Providing structured psychological education and coping strategies may help improve children's emotional preparedness and reduce anxiety related to chemotherapy procedures. Healthcare providers, particularly nurses, may play an important role in delivering these interventions as part of comprehensive pediatric cancer care.

However, given the pre-experimental design of this study, the findings should be interpreted with caution. The results indicate an association between psycho-educational therapy and reduced anxiety levels, but causal relationships cannot be definitively established.

Future research involving larger samples and more rigorous study designs, such as randomized controlled trials, is recommended to further evaluate the effectiveness and long-term impact of psycho-educational therapy for children with cancer undergoing chemotherapy.

Author's Contribution Statement: Anis Laela Megasari and Ika Subekti Wulandari played key roles in conceptualizing the study and designing the research methodology. They also contributed to data analysis and the preparation of the initial manuscript draft. Pramadita Elena was responsible for the final editing and revision of the manuscript prior to submission to the journal. All authors have read and agreed to the published version of the manuscript.

Conflict of Interest: This authors declare no conflict of interest related to this study.

Source of Funding Statements: This research was funded by Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Sebelas Maret.

Acknowledgments: The researcher would like to thank Lembaga Penelitian dan Pengabdian kepada Masyarakat (LPPM) Universitas Sebelas Maret with number of contract Nomor:1165.2/UN27.22/PT.01.03/2023.

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