Indonesian Journal of Global Health Research
Volume 6 Number 4, Agustus 2024
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

THE RELATIONSHIP BETWEEN FATIGUE AND QUALITY OF LIFE IN CHILDREN WITH CANCER UNDERGOING CHEMOTHERAPY

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ABSTRACT

The prevalence of cancer cases in children continues to increase, requiring appropriate and high-quality management, one of which is chemotherapy. Children undergoing chemotherapy often experience fatigue problems. Fatigue is a subjective, difficult and persistent feeling of physical, emotional and cognitive fatigue in children. This condition makes the child unable to function due to decreased energy levels that cannot be recovered by rest. so this will affect the quality of life. The aim of this study was to determine the relationship between fatigue and the quality of life of children with cancer undergoing chemotherapy at Dr M Djamil Hospital, Padang. The research uses a correlation analytical research design with a cross sectional study approach. The respondents in this study were 96 children undergoing chemotherapy. The instruments used were the Multidimensional Fatigue Scale and Pediatric Quality of Life Cancer Module 3.0 questionnaires. Internal consistency reliability results show Cronbach Alpha results of 0.912 for child reports and 0.910 for parent reports. Data were analyzed analysis using the Chi Square test and to identify confounding variables using multiple logistic regression analysis by looking at changes in the odds ratio value for each variable. In general, children in the preschool-school age stage (77.9%), male (54.2%), duration of chemotherapy treatment < 12 months (85.4%), have poor quality of life (55.2%), experienced severe fatigue (57.3%), and received supportive family support (52.1%). The results of this study show that there is a significant relationship between fatigue and the quality of life of children undergoing chemotherapy ($p < 0.001$). Based on the confounding analysis, it was found that family support is the factor that has the most influence on quality of life.

Keywords: chemotherapy; children with cancer; fatique; quality of life

First Received	Revised	Accepted
12 March 2024	19 April 2024	24 April 2024
Final Proof Received		**Published**
30 April 2024		01 August 2024

How to cite (in APA style)
Victoryna, F., Suriati, R., & Thohir, I. (2024). The Relationship Between Fatigue and Quality of Life in Children with Cancer Undergoing Chemotherapy. Indonesian Journal of Global Health Research, 6(4), 2255-2264. https://doi.org/10.37287/ijghr.v6i4.3243.

INTRODUCTION

Cancer is one of the leading causes of death from chronic diseases among children and adolescents worldwide. World Health Organisation (WHO) estimates that 1,000 children are diagnosed with cancer every day (Ryh, 2023). Every year, 400,000 children and adolescents (aged 0-19 years) develop the disease. International Agency for Research Cancer (IARC) estimates that 8,677 Indonesian children aged 0-14 years will have cancer in 2020. This number is the largest compared to other countries in Southeast Asia (Bayu, 2020). In Indonesia, based on data from the Indonesian Pediatric Centre Registry, there were 3,834 new cases of childhood cancer in 2021-2022. A total of 1,373 children with cancer are still in treatment until December 2022. Of this number, it is known that 60.67% of children died. Then, 37.8% of children were recorded as dropping out of treatment, and 10.78% of other children had completed treatment (Sadya, 2023). This number is spread across 11 hospitals in the country. Dr M Djamil Padang Hospital is one of the referral hospitals that

provide cancer services and treatment for children. from the data collected, it is known that there are 206 new cases of childhood cancer in Dr M Djamil Padang Hospital.

One of the treatments for cancer is chemotherapy (Wong, Eaton, Wilson, Winkelstein, & Schwartz, 2009). Chemotherapy is a drug used to slow or stop the rapid growth of cancer cells that is systemic. Chemotherapy treatment can improve the survival of children with cancer, but it can cause a variety of side effects and different complications/symptoms ranging from mild to severe. Some of the side effects that can appear in cancer patients with chemotherapy include fatigue, pain, nausea and vomiting (Menga, Lilianty, & Irwan, 2021).

Some studies mention the most common symptom that makes children feel depressed when undergoing chemotherapy and after undergoing chemotherapy is fatigue. fatigue is a condition of feeling that is subjective, difficult and persistent from physical, emotional and cognitive fatigue in children with cancer (Kartika, 2018). This condition makes children unable to perform functions (physical and mental work capacity) due to decreased energy levels that do not recover by resting (PPNI, 2016). This condition often does not get attention in treatment, due to the limitations of children in expressing their feelings about the side effects of treatment and inadequate perceptions from parents about the symptoms felt by children (Kartika, 2018).

Fatigue in cancer patients undergoing chemotherapy will be different from fatigue experienced by healthy individuals in everyday life. The effects of fatigue in children undergoing chemotherapy will have adverse effects and interfere physically, psychosocially, cognitively, causing mood disorders, muscle weakness, and emotional distress (Kassab, 2013). Other consequences that can arise are immunosuppression, anorexia, muscle wasting, and slowing of the physical healing process (Kartika, 2018). The overall side effects of fatigue can affect a child's quality of life. In most children, cancer fatigue can be so severe that it interferes with or limits their daily activities and significantly affects various aspects of life and can impact quality of life (Mahdizadeh, Mehraban, Faranoush, Amini, & Mehdizadeh, 2020).

Quality of life is an important indicator to evaluate function and well-being. Assessment of the quality of life of children with cancer undergoing chemotherapy can be used to assess the child's general state of health. It is useful to know how satisfied or disturbed the child is with fatigue problems and interpret these into problems that will affect the child's overall life. The quality of life of children with cancer is also determined by active support from the family. The family determines the fulfillment of the child's needs in undergoing chemotherapy treatment. This is related to the various cancer treatment management. Support received from the family will provide motivation and hope for children in living their lives (Fatmiwiryastini, Utami, & Swedarma, 2021; Utami & Puspita, 2020).

Based on the initial survey and interview results from 15 children with cancer who were undergoing chemotherapy, 9 people (60%) said they felt tired, 12 people (80%) complained that they did not sleep well or had difficulty sleeping, and 7 people (50%) had difficulty paying attention to something. These conditions that are continuously experienced will interfere with daily activities. for example, inadequate self-care so that it will affect the quality of life. However, some studies suggest that the quality of life of children with cancer is poor. This can be attributed to the state of fatigue experienced. So it can be said that fatigue is the most significant predictor of the quality of life of children with cancer undergoing chemotherapy. Therefore, it is necessary to conduct a comprehensive analysis to

see this relationship. Based on the description of the phenomenon above, researchers are interested in research to identify the relationship between fatigue and the quality of life of children with cancer undergoing chemotherapy.

METHOD

The study used a correlation analytic design with a cross-sectional study approach. Respondents were taken using a convenience sampling technique, with a total of 96 people. Respondents were selected according to the inclusion criteria, namely all children who underwent chemotherapy ≥ 3 months in the children's chemotherapy inpatient room of Dr. M Djamil Padang Hospital. The instruments used in this study were questionnaires on fatigue assessment using the Multidimensional Fatigue Scale (MFS) version 3.0. The questionnaire on quality of life assessment using the Pediatric Quality of Life cancer module version 3.0 (Wardin, 2020). Internal consistency reliability results showed Cronbach Alpha results of 0.912 (>0.7) for child reports and 0.910 (>0.7) for parent reports (Wardin, 2020). Data analysis in this study uses univariate and bivariate analysis with the Chi-Square test. To identify confounding variables, multiple logistic regression analysis was performed. The results of this analysis are used to estimate or predict the extent of the influence of confounding factors on the quality of life of children with cancer who are undergoing chemotherapy by looking at changes in the odds ratio value in each variable.

RESULTS

Table 1.
Frequency Distribution of Respondent Characteristics at Dr M Djamil Padang Hospital (n=96)

Characteristic	n (%)
Age	
Toddlers	13 (13,5 %)
Preschool - School	70 (72,9 %)
Teenager	13 (13,5 %)
Duration of chemotherapy treatment	
< 12 years old	82 (85,4 %)
13 – 36 years old	14 (14,6 %)
Gender	
Boys	52 (54,2%)
Girls	44 (45,8%)
Fatigue level	
Severe fatigue	55 (57,3%)
Moderate fatigue	8 (8,3%)
Mild fatigue	33 (34,4%)
Family support	
Supportive	50 (52,1%)
Not supportive	46 (47,9%)
Quality of life	
Good	43 (44,8%)
Poor	53 (55,2%)

A description of the characteristics of the research respondents is presented in table 1. Of the 96 respondents, it was reported that the majority were male, 52 people (54.4%) and 44 women (45.8%). Respondents in this study were dominated by preschool age children, 70 people (72.9%). The maximum duration of chemotherapy treatment was <12 months, namely 82 people (85.4%). In general, respondents who had a severe level of fatigue were 55 people (57.3%), some respondents received support, namely 50 people (52.1%) and the majority had a poor quality of life, 53 people (55.2%).

Table 2.
Analysis of the Relationship between Fatigue and the Quality of Life of Children with Cancer Undergoing Chemotherapy Based on Confounding Variables

Variable	Quality of Life				Total		*P value*	*Crude OR (95 % CI)*	*p Value*	*Adjusted OR (95 % CI)*
	Good		Poor							
	f	%	f	%	f	%				
Age Toddlers	5	5,2	8	8,3	13	13,5	*Ref*	*Ref*	*Ref*	*Ref*
Preschool – school	31	32,3	39	40,6	70	72,9	0,433	1,87 (0,39–8,89)	0,906	1,182 (0,07–18,96)
Teenager	7	7,3	6	6,3	13	13,5	0,527	1,468 (0,44-4,81)	0,923	0,894 (0,09 –8,72)
Duration of chemotherapy treatment < 12 years old	43	44,8	39	40,6	82	85,4	<0,001*	*n/a*	*n/a*	*n/a*
13-36 years old	0	0,0	14	14,6	14	14,6	*Ref*	*Ref*	*Ref*	*Ref*
Gender Boys	22	22,9	30	31,3	52	54,2	0,595	1,245 (0,55–2,79)	0,883	0,885 (0,173–4,535)
Girls	21	21,9	23	24	44	45,8	*Ref*	*Ref*	*Ref*	*Ref*
Family Support *Not supportive*	8	8,3	38	39,6	46	47,9	<0,001*	11,08 (4,18–29,33)	0,221	2,69 (0,55– 13,09)
Supportive	35	36,5	15	15,6	50	52,1	*Ref*	*Ref*	*Ref*	*Ref*
Fatigue Severe fatigue	5	5,2	50	52,1	55	57,3	<0,001*	320 (35,72 – 2866,14)	<0,001	198,469 (20,282– 194,151)
Moderate fatigue	6	6,3	2	2,1	8	8,3	0,069	10,667 (0,83– 137,14)	0,195	6,435 (0,38– 107,19)
Mild fatigue	32	33,3	1	1,0	33	34,4	*Ref*	*Ref*	*Ref*	*Ref*

Table 2 shows the results of the analysis of the relationship between the length of chemotherapy treatment with the quality of life obtained a statistically significant relationship p = 0.001 OR = n/a. The results of the analysis of the relationship between family support and quality of life found a significant relationship with a value of p = 0.001 OR = 11.08 (4.18-29.33). For the results of the analysis of the relationship between fatigue and quality of life, a significant relationship was found, p = 0.001 OR = 320 (35.72-2866.14). After multivariate analysis, it was found that family support was confounding the quality of life with a Crude OR value of p = 0.001, OR = 11.08 (4.18-29.33) after the adjusted OR became p = 0.221, OR = 2.69 (0.55-13.09).

DISCUSSION

Description of the characteristics respondents and their relationship with the quality of life of cancer children undergoing chemotherapy treatment.

Age

The average age of respondents in this study was mostly in preschool-school-age children. From several previous studies, Hendrawati, Adistie, Nur, & Maryam, (2021) ; Utami & Puspita, (2020) stated that some children who underwent chemotherapy were school and preschool-age children. However, Yeni, Izzah, & Arbi (2018) stated that the younger age in their study was 1-4 years old (toddler age stage). The age difference in younger children is most likely because cancer can occur in infancy, with the peak incidence at the age of 2-4 years, Epidemiologists argue that exposure in the prenatal and perinatal period is a contributing factor to the pathogenesis of childhood cancer, because children suffer from cancer mostly in the first year of life (Ndlovu, Hlongwa, & Ginindza, 2022).

This research was extended by analyzing the relationship between age and quality of life. Specifically, this study reported no statistically significant differences, which did not prove that age affects quality of life. Another study also found similar results (Yariş, Yavuz, Yavuz, & Ökten, 2001). The study explained that the quality of life of adolescents and adults who survived malignant disease in childhood was as good as the normal population. It was also reported that cancer survivors are not necessarily at risk of long-term emotional or social problems and are not hindered from leading active and independent lives. Another study explained by Sitaresmi, Mostert, Gundy, Sutaryo, & Veerman (2008) that there is a moderate correlation between the age of cancer patients and quality of life. It is further explained that cancer patients whose age is smaller (2-5 years) have a worse quality of life, especially in terms of procedural anxiety, treatment anxiety, and in terms of communication than the older age group (Sitaresmi et al., 2008).

In general, age is a factor that affects quality of life, as age increases, there will be differences in roles in life and a progressive decline in function in accordance with the developmental stages of age. However, in this study, there was no relationship between age and quality of life. In the researcher's opinion, the quality of life of children with cancer and its treatment cannot be determined by age, but other factors affect it. Dynamic psychological and social development in children can be disrupted due to serious life-threatening illnesses, regular hospital check-ups, invasive measures, and interference with school and social activities in the community (Yariş et al., 2001). This suggests that the impact of cancer itself is a more dominant factor affecting children's quality of life. Therefore, specialized support is needed to facilitate the child in coping with the disease and its treatment in order to improve the child's quality of life.

Gender

The majority of respondents included in this study were male. From some literature, it is explained that cancer occurs most in boys compared to girls. Utami & Puspita's research, (2020) which found that most of the children undergoing chemotherapy were male. In further analysis, there was no statistically significant difference in the relationship between gender and the quality of life of cancer children undergoing chemotherapy. Some studies also explained the same thing Yariş et al., (2001); Sitaresmi et al., (2008); Irmawati, Irwanto, & Cahyadi, (2019). Yet another study mentioned that gender was positively associated with several dimensions of quality of life 6 weeks after treatment. Girls had significantly better conditions in the area of autonomy while boys had better quality of life in the cognitive and emotional areas (Landolt, Vollrath, Niggli, Gnehm, & Sennhauser, 2006). According to the researchers' assumptions, cancer has a long-term impact on children's health conditions that can occur to anyone, be it girls or boys. The quality of life of children with cancer is not affected by gender, however, cancer treatment with chemotherapy is a stressor that affects all aspects of a child's life. A measure of health-related quality of life is to assess the impact of a disease on health status. Cancer and its treatment have an important impact on physical, mental, and social health. Yariş et al. (2001) found that all cancer children undergoing chemotherapy experienced significant deficits in almost all areas of life.

Duration of chemotherapy treatment

The length of chemotherapy treatment in this study was mostly carried out for < 12 months. In other studies that have been conducted, it is said that the average length of chemotherapy treatment undertaken by children is less than 1 year (Hendrawati et al., 2021). The correlation analysis conducted showed a significant relationship between the

length of chemotherapy treatment and quality of life. Based on theory, chemotherapy treatment has an important meaning in increasing the cure rate of childhood cancer. This anticancer drug clinically has a cytostatic effect by affecting DNA synthesis and function. Chemotherapy can cause abnormal activity of the immune system which can be toxic and cause inflammation. Chemotherapy will also cause cancer cells and some types of healthy cells that are also dividing or growing to be damaged (Wong et al., 2009).

Berg et al., (2023) showed that some effects of chemotherapy can appear in a short period of time. Three months after the start of treatment, significant physical and emotional side effects can appear. Effects during and after chemotherapy treatment are evaluated periodically with long-term follow-up of up to 5 years. Physical problems are adversely affected by chemotherapy treatment, increase acutely, and recover to levels observed at the time of diagnosis after one year. In this study, the average number of children undergoing chemotherapy treatment was less than 1 year, where the effects of chemotherapy felt during treatment were very disturbing and caused psychosocial distress from biochemical changes in the body related to hope and quality of life (Hermalinda; Novrianda, 2016). So in this study, it is mentioned that the length of chemotherapy treatment affects quality of life. But for the long-term results of treatment can be seen 1 year after treatment. 1 year after treatment, children's prognosis is better than at the beginning of treatment (Berg et al., 2023).

The length of chemotherapy treatment in this study was mostly carried out for < 12 In another study described by Yariş et al., (2001) patients with cancer in the early stages had a much better quality of life than patients with advanced disease. Patients who have undergone chemotherapy have a greater burden of morbidity than patients who have not undergone therapy, but poor quality of life at hospital admission and better after treatment. Chemotherapy treatment modalities impact performance status and quality of life (Sitaresmi et al., 2008). Therefore, it is expected that children respond well to chemotherapy treatment so that the quality of life of children can be better.

Family support

Therefore, it is expected that children respond well to chemotherapy treatment so that the quality of life of children can be better. This study also found the distribution of respondents based on family support. The results showed that most respondents received supportive family support. In the next analysis, there was a statistically significant difference between family support and the quality of life of children undergoing chemotherapy. This result is in line with previous research. During chemotherapy treatment, children have needs that must be met. Children need the presence of the closest person to accompany them. Parents are the main caregivers for children during illness, according to the concept of pediatric nursing known as Family-Centred Care. This concept explains that the family in general and parents in particular are seen as very important elements in providing support to support the process of care and treatment in children (Marpaung & Sinaga, 2019).

The quality of life of children with cancer is largely determined by active support from the family. It is the family who knows the needs of the child during chemotherapy. Because this disease is chronic and requires comprehensive treatment. This is related to the varied cancer treatment management, with various problems arising such as fatigue problems (fatique) as an effect of chemotherapy treatment. Support received from the family will provide motivation and hope for children to live their lives (Fatmiwiryastini et al., 2021; Utami & Puspita, 2020). This is by the results of this study, which found that family support and quality of life have a significant and positive relationship. because family support is considered one of the strong

confounding factors that affect quality of life. With good family support received by the child during treatment, the child's quality of life will be good, and vice versa. However, the results of this study do not explain the specific form of support obtained, therefore further research is needed to explain this finding.

Overview of fatigue levels and quality of life, and the relationship between fatigue and quality of life in cancer children undergoing chemotherapy treatment

From the results of this study, it is known that the majority of fatigue levels experienced by children are in the category of severe fatigue. Fatigue is the most common symptom that often occurs during chemotherapy. Fatigue is a subjective, difficult, and persistent feeling condition of physical, emotional, and cognitive fatigue in children with cancer (Kartika, 2018). Fatigue can be caused by many factors. Factors that contribute to fatigue in children include pain, emotional disturbance, sleep disturbance, nutritional disturbance, activity disturbance, nausea and vomiting, hypermetabolism associated with cancer cell growth, uncertainty about the future, and fear of death (Nunes, Silva, Rocha, de Lima, & Nascimento, 2014). The occurrence of fatigue is associated with dysregulation of several physiological and biochemical systems as well as peripheral and central mechanisms. Peripheral fatigue originates in the muscles and associated tissues, whereas central fatigue develops in the central nervous system and causes a progressive failure to transmit motor neuron impulses. This mechanism is also associated with cytokine dysregulation, dysregulation of the neurotransmitter 5-HT (five hydroxyl tryptophan), hypothalamic-pituitary-adrenal (HPA) axis dysfunction, circadian rhythm disturbances, adenosine triphosphate (ATP) changes, muscle metabolism, and afferent vagal activation. However, the mechanism of fatigue has not been fully confirmed (Utami, A, Chodidjah S, & Waluyanti, F, 2020).

The overall effects of fatigue will impact the child's functional ability and quality of life (Menga et al., 2021). Children's quality of life is defined as children's goals, expectations, standards, or concerns about things related to health problems (Michel, Brinkman, Wakefield, & Grootenhuis, 2020). The quality of life of children undergoing chemotherapy is influenced by the fatigue problems experienced. By the results found in this study, there is a significant relationship between fatigue and quality of life. This is in line with Ambrella's research (2021), which showed the same relationship, further explained that chemotherapy treatment undertaken by children who have fatigue problems can affect quality of life (Ambrella. F.J ; Utami. A ; Wisanti. E, 2021).

Fatigue in children with cancer undergoing chemotherapy will be different from fatigue experienced by healthy individuals in everyday life. The effects of fatigue in children undergoing chemotherapy can be physically, psychosocially, cognitively, and emotionally distressing (Kassab, 2013). In most children, fatigue due to cancer treatment can be so severe that it interferes with or limits their daily activities and significantly affects various aspects of life, and can have an impact on their quality of life (Mahdizadeh et al., 2020). This study only emphasizes the problem of fatigue. But many other factors contribute to children's quality of life. This is a limitation in this study. Not all factors that influence the quality of life were analyzed to assess their relationship. However, this study can serve as a basis for future research in developing effective intervention methods to reduce children's fatigue levels.

CONCLUSION

From the results of this study, it can be concluded that the level of fatigue felt by children with cancer undergoing chemotherapy is related to quality of life. Where family support is the most influential confounding factor.

The results of this study recommend that nurses pay attention to psychosocial aspects in providing nursing care, and provide interventions that contribute effectively related to fatigue problems that can have an impact on reducing the quality of life of children with cancer undergoing chemotherapy.

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