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WORD COUNT	2335	TIME SUBMITTED	03-OCT-2023 02:23PM
		PAPER ID	103188264

The Relationship Between Anemia and Nutritional Status with the Occurrence of Fatigue in Children with Cancer Undergoing Chemotherapy at Dharmais Cancer Hospital in Jakarta

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Abstract

Background: *Healthy children are capable of engaging in various activities, but conversely, children who are sick, especially those diagnosed with cancer by doctors and undergoing chemotherapy treatment, often complain of experiencing fatigue due to both chemotherapy and the cancer itself.*
Objective: *This research aims to determine the relationship between anemia and nutritional status with the occurrence of fatigue in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital in Jakarta.*
Method: *The research design used in this study is an analytical cross-sectional design. The research was conducted in the pediatric ward of Dharmais Cancer Hospital in August 2022. A sample of 24 children was selected using accidental sampling. The instruments used to measure the occurrence of fatigue in children under 7 years old were the Parent Fatigue Scale (PFS), while for children over 7 years old, the Child Fatigue Scale (CFS) was used. The data obtained were then analyzed univariately and bivariately using the chi-square test.*
Results: *The analysis results showed a significant relationship between anemia (p-value = 0.021) and nutritional status (p-value = 0.009) with the occurrence of fatigue in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital in Jakarta.*
Conclusion: *There is a significant relationship between anemia and nutritional status with the occurrence of fatigue in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital in Jakarta. Therefore, this should be of special concern, especially for nurses, when providing nursing care to children with cancer.*

Keywords: *children with cance; chemotherapy; fatigue*

Introduction

Healthy children can engage in various activities, and their physical and psychological well-being is crucial for their growth and development. When a child is sick, their activities such as school, learning, and play are disrupted. In the medical world, diseases are divided into two types: acute and chronic. A disease is considered acute if it is temporary and can be cured with treatment, whereas chronic diseases are long-lasting, recurrent, and require repeated treatment, such as cancer.

According to data from the World Health Organization (WHO) in 2017, the prevalence of cancer in children is approximately 4%, and 90,000 child deaths worldwide are attributed to cancer. Every year, the number of childhood cancer cases increases by about 110 to 130 cases per one million children, with 80% of diagnosed childhood cancer cases occurring in developing countries (International Agency of Research Cancer, 2017). Data from the Union for International Cancer Control (UICC) shows that every year approximately 176,000 children are diagnosed with cancer, with the majority coming from low and middle-income countries (Ministry of Health of the Republic of Indonesia, 2015).

Cancer-related fatigue has been described as the most common symptom in pediatric cancer patients, affecting between 36% and 93% of cases, with higher levels of fatigue among patients undergoing chemotherapy, affecting between 70% and 100% of cases. Children and adolescents consistently report fatigue as the most persistent, distressing, uncomfortable, and stressful symptom of cancer and its treatment (da Silva et al., 2016). Fatigue in children with cancer is a physical, mental, and emotional experience characterized by reduced energy, decreased physical activity, and increased feelings of tiredness (Hockenberry-Eaton & Hinds, 2000; Mahdizadeh et al., 2020).

Healthcare providers have traditionally regarded fatigue experienced by children as a subjective and non-life-threatening feeling (da Silva et al., 2016). Fatigue is often seen as an inevitable consequence of cancer therapy (Yÿlmaz et al., 2016). However, if not managed properly, fatigue can negatively impact the quality of life of children (Mahdizadeh et al., 2020; Nunes et al., 2017; Nurhidayah et al., 2016). The effects of fatigue on children who have recovered from cancer may include growth problems, memory loss, short-term memory difficulties (forgetfulness), learning difficulties, hormonal changes, and other complications, including the risk of secondary cancer. Fatigue can also be a mental health issue in pediatric patients.

Various factors can contribute to fatigue in children with cancer undergoing chemotherapy. According to Allenidekania et al. (2012), factors related to the occurrence of fatigue in children include cancer, sleep disturbances, and hemoglobin levels. Meanwhile, Yÿlmaz et al. (2016) explained that chemotherapy, anemia, psychological factors, nutritional problems, sleep problems, and radiotherapy contribute to the occurrence of fatigue in children with cancer. Research conducted by Utami et al. (2020) at Gatot Soebroto Army Hospital (RSPAD) found that the most significant factor contributing to fatigue in children with cancer is hemoglobin levels.

In children with cancer, one of the effects of chemotherapy is a loss of appetite. Chemotherapy leads to the release of cytokines such as TNF (tumor necrosis factor) and interleukins, which cause the hypothalamus to react by reducing hunger and reinforcing the feeling of fullness produced by melanocortins, resulting in inadequate nutrition and a lack of energy in the body. This can lead to weight loss and muscle mass reduction, ultimately contributing to fatigue (Cherwin, 2012). Schulz's research (2017) also indicated that physical condition and nutritional status are essential components in cancer patients and have a significant relationship with fatigue symptoms.

Based on the above description, the researcher is interested in investigating the relationship between anemia and nutritional status with the occurrence of fatigue in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital in Jakarta.

Methods

The research design used in this study is an analytical study with a cross-sectional design. This research was conducted in the pediatric ward of Dharmais Cancer Hospital in August 2022. The sample consisted of 24 children with cancer undergoing chemotherapy, with inclusion criteria that patients and parents were willing to be respondents, and the children had no severe comorbidities. The instrument used to measure the occurrence of fatigue in children under 7 years old was the Parent Fatigue Scale (PFS), while for children over 7 years old, the Child Fatigue Scale (CFS) was used.

Results

Univariate Analysis

Table 1. Characteristics of Children with Cancer Undergoing Chemotherapy at Dharmais Cancer Hospital Jakarta

Characteristics of Children with Cancer Undergoing Chemotherapy	Frequency (n)	Percentage (%)
Gender		
Male	17	70,8
Female	7	29,2
Age		
Toddlers	6	25,0
Children	8	33,3
Adolescents	10	41,7
Type of Cancer		
Acute Lymphoblastic Leukemia (ALL)	4	16,7
Acute Myeloid Leukemia (AML)	4	16,7
Hodgkin Lymphoma	2	8,3
Nasopharyngeal Carcinoma	2	8,3
Neuroblastoma	2	8,3
Ependymoma	2	8,3
Osteosarcoma	3	12,5
Others	5	20,8
Cancer Stage		
Stage 0	14	58,3
Stage 2	6	25,0
Stage 3	1	4,2
Stage 4	3	12,5
Duration of Treatment Since First Diagnosis		
< 1 year	9	37,5
1 year	11	45,8
2 year	3	12,5
> 2 year	1	4,2
Anemia		
Yes	13	54,2
No	11	45,8
Body Mass Index (BMI)		
Underweight	14	58,3
Normal	10	41,7
Occurrence of Fatigue		
Yes	15	62,5
No	9	37,5
Total	24	100

Source: Primary Data, 2022

Based on Table 1, the characteristics of children with cancer undergoing chemotherapy at Dharmais Cancer Hospital in Jakarta, based on gender, are predominantly male at 70.8%. Based on age, a significant proportion are adolescents at 41.7%. Regarding the type of cancer, the most common types are Acute Lymphoblastic Leukemia (ALL) and Acute Myeloid Leukemia (AML), each at 16.7%. In terms of cancer stage, the majority are at stage 0, accounting for 58.3%. Concerning the duration of treatment since the first diagnosis, a substantial portion has been undergoing treatment for 1 year at 45.8%. Regarding hemoglobin levels, a majority of the children experience anemia at 54.2%. In terms of Body Mass Index (BMI), a significant proportion is underweight at 58.3%, and concerning the occurrence of fatigue, the majority of children complain of fatigue at 62.5%.

Bivariate Analysis

Table 2. Relationship Between Anemia and Nutritional Status with the Occurrence of Fatigue in Children with Cancer Undergoing Chemotherapy at Dharmais Cancer Hospital Jakarta

	Fatigue Occurrence				Total		P *value*	OR (95% CI)
	Yes		No					
	n	%	n	%	n	%		
Anemia								
Yes	11	84,6	2	15,4	13	100,0	0,021	9,62 (1,38-67,24)
No	4	36,4	7	63,6	11	100,0		
Nutritional Status								
Underweight	12	85,7	2	14,3	14	100,0	0,009	14 (1,86-105,27)
Normal	3	30,0	7	70,0	10	100,0		

Source: Primary Data, 2022

Based on the bivariate analysis results in Table 2, it was found that in children with cancer who had anemia, 84.6% reported experiencing fatigue, while 15.4% did not. On the other hand, in children with cancer who did not have anemia, 36.4% reported experiencing fatigue, while 63.6% did not. The analysis using the chi-square test revealed a significant relationship between anemia and the occurrence of fatigue in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital Jakarta (p-value = 0.021). The analysis also found an odds ratio (OR) of 9.62, meaning that children with cancer undergoing chemotherapy with anemia are 9.62 times more likely to experience fatigue compared to children with cancer undergoing chemotherapy without anemia.

Based on the bivariate analysis results in Table 2, it was found that in children with cancer who were underweight, 85.7% reported experiencing fatigue, while 14.3% did not. In contrast, in children with cancer with normal nutritional status, 30.0% reported experiencing fatigue, while 70.0% did not. The analysis using the chi-square test revealed a significant relationship between nutritional status and the occurrence of fatigue in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital Jakarta (p-value = 0.009). The analysis also found an odds ratio (OR) of 14, meaning that children with cancer undergoing chemotherapy who are underweight are 14 times more likely to experience fatigue compared to children with cancer undergoing chemotherapy with normal nutritional status.

Discussions

The Relationship Between Anemia and the Occurrence of Fatigue in Children with Cancer Undergoing Chemotherapy

Based on the research findings, there is a significant relationship between anemia and the occurrence of fatigue in children with cancer undergoing chemotherapy. Fatigue occurs in both children currently receiving treatment and those who have completed their treatment. This fatigue can be directly related to cancer or its treatment and may persist in the years following the completion of treatment (Hockenberry et al., 2017). One of the contributing factors to fatigue in children with cancer undergoing chemotherapy is anemia (Chiang et al., 2009). Uzun and Kucuk (2019) stated that chemotherapy treatment can disrupt the bone marrow's ability to produce blood cells, including red blood cells. Chemotherapy drugs also work by damaging rapidly dividing cells, including blood cells. The research conducted by Hendrawati et al. (2021) found that almost all children with cancer undergoing chemotherapy reported experiencing fatigue.

In addition to being a side effect of treatment, anemia can also be caused by cancer cells that have metastasized to the bone marrow (Rouli & Amalia, 2005). Research conducted by Utami et al. (2020) at Gatot Soebroto Army Hospital (RSPAD) found that the most significant factor contributing to fatigue in children with cancer is the level of hemoglobin.

A decrease in hemoglobin levels, whether caused by the side effects of treatment or by the cancer cells themselves, is associated with the occurrence of fatigue in children with cancer undergoing chemotherapy. This is often underestimated by some parents and healthcare providers. They believe that fatigue is a common experience for children with cancer. Fatigue itself can be highly disruptive, especially in adolescents, so it requires prompt and appropriate management to ensure that it does not significantly impact the quality of life of these children.

The Relationship Between Nutritional Status and the Occurrence of Fatigue in Children with Cancer Undergoing Chemotherapy

Based on the research findings, there is a significant relationship between nutritional status and the occurrence of fatigue in children with cancer undergoing chemotherapy. These research results align with a study conducted by Yasih et al. (2021), which stated that there is a significant relationship between body mass index and fatigue experienced by children with cancer. After chemotherapy, within 2 weeks to 6 months, there is weight loss and changes in the body's metabolic balance, which is one of the contributing factors to fatigue. This is because the body is unable to process sufficient nutrition and energy compared to before.

The research by Hendrawati et al. (2019) showed that one of the side effects of chemotherapy is lip and mouth injuries or mucositis. Ismuhu et al. (2020) also indicated that nausea and vomiting are side effects of chemotherapy. Both of these factors significantly affect a child's ability to meet their nutritional needs.

Another study conducted by Maulvi (2008) stated that cancer patients after chemotherapy often exhibit poor nutritional status or low BMI due to cancer-related complications, leading to decreased energy and protein intake. This is caused by tumor-induced hypermetabolism and an increased tumor burden, which can lower the patient's quality of life (Astriani, 2019).

Cancer can have detrimental effects on nutritional status, including increased body hypermetabolism, decreased protein synthesis leading to weight loss, and consequently, poor nutrition or malnutrition (Astriani, 2019). Research by Fernandes (2020) showed that the fatigue experienced by children with cancer is due to the abnormal division of cancer cells, leading to an increased energy demand for cell division. This results in children having reduced energy, leading to fatigue.

Limitations of The Study

The sample size in this study is still very small because the researchers were limited in collecting data and had to rely on nurses working in the pediatric ward of Dharmais Cancer Hospital. Additionally, this study should not only assess fatigue on a scale but should also be supported by objective data explaining fatigue complaints in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital Jakarta.

Conclusions

There is a significant relationship between anemia and nutritional status with the occurrence of fatigue in children with cancer undergoing chemotherapy at Dharmais Cancer Hospital Jakarta. Therefore, this should be a special concern, especially for nurses, in providing nursing care for children with cancer.

Acknowledgement (if any)
The researcher would like to thank all parties who have helped with this research.

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