

Characteristics of Leukemia Pediatric Patients with Oral Manifestations at Abdoel Wahab Sjahranie Hospital Samarinda

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ABSTRACT

Background: Leukemia is a common malignancy in children and occurs when changes in normal cell regulatory processes lead to proliferation of hematopoietic stem cells. Leukemic patients have a higher susceptibility to dental and oral diseases such as mucositis and xerostomia due to damage by chemotherapeutic agents to oral mucosal cells which have a high mitotic index. **Objective:** To determine the characteristics of leukemia in children with oral manifestations at the Abdoel Wahab Sjahranie Hospital Samarinda which is the main referral hospital in the province of East Kalimantan. **Materials and Methods:** This research is descriptive with cross-sectional method using medical record data as the subject based on the specified criteria. Data were grouped by type of leukemia, age, gender, nutritional status and oral manifestations. **Results:** A total of 1,330 cases of Leukemia in 2017-2021 with 12 suitable respondents. There were cases with male gender (58.3%) and 0-5 years of age which were comparable to those of 6-18 years (50%). The type of acute lymphoblastic leukemia was the most common in this study with a frequency of 83.3%. Mucositis (58.3%) was the most common manifestation of people with normal nutritional status (41.7%) and laboratory results stated the average of leukocytes was 45,700/uL, hemoglobin was 10.4 g/dl, and platelets was 117,600/mm³. A total of 66.6% of respondents had received chemotherapy. **Conclusion:** Oral manifestations can occur due to leukemia or side effects of chemotherapy, the importance of multidisciplinary and comprehensive treatment between pediatricians and pediatric dentists in managing the dental health of leukemia patients.

Keywords: Leukemia, Oral Manifestations, Mucositis

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INTRODUCTION

Leukemia is a common malignancy in children that occurs when normal cell regulatory processes changes leading to the proliferation of hematopoietic stem cells in the bone marrow.¹ Leukemia is also referred to as a disease that is associated with mutations in genes that control the growth of blood cells². The main cause of this leukemia has not been ascertained. Some of the possible risk factors include lifestyle such as smoking, alcohol consumption, and obesity. Environmental factors that also play a role in the risk of leukemia are chemotherapy, radiation exposure, Human T-cell leukemia virus-1, and some jobs that involve chemicals. Family history and age also play a role in a person's risk of developing leukemia^{3,2}. Patients often complain of easy bruising and bleeding. The patient looks pale and tired and has fever, local infection, and dyspnea^{4,5}. Bleeding is one of the clinical manifestations of leukemia. The most common locations for bleeding are the skin, eyes, mucous membranes of the nose, gastrointestinal tract, and gingiva⁶.

Leukemia and its respective therapies can have an impact on oral health⁷. Diseases of the oral cavity are a reflection of systemic status where oral symptoms or manifestations can be a danger sign of a systemic manifestation such as leukemia⁸. The most common oral manifestations are mucositis, opportunistic infections, gingival inflammation, gingival bleeding, xerostomia, and carious lesions. Mucositis is the most debilitating oral manifestation in children receiving cancer therapy and is common in leukemia patients receiving chemotherapy due to the direct effects of chemotherapeutic agents that destroy oral mucosal cells⁹. Leukemic patients have a higher susceptibility to dental and oral diseases such as mucositis and xerostomia due to damage by chemotherapeutic agents to oral mucosal cells which have a high mitotic index¹⁰. From the explanation above, the researcher is interested conducting a descriptive study on the

characteristics of leukemia in children with oral manifestations at the Abdoel Wahab Sjahranie Hospital Samarinda, which is the main referral hospital in the province of East Kalimantan.

MATERIALS AND METHODS

This type of research is a descriptive study with a cross-sectional method using a retrospective approach aimed at knowing the description of oral manifestations in pediatric leukemia patients at Abdoel Wahab Sjahranie Hospital, Samarinda. The population of this study were all pediatric patients (0-18 years old) who were diagnosed with leukemia and have signs of manifestation of the oral cavity based on clinical and laboratory results by Pediatrician and Pediatric Dentist at Abdoel Wahab Sjahranie Hospital Samarinda. Abdoel Wahab Sjahranie is government-owned hospital in Samarinda, East Kalimantan. Currently, Abdoele Wahab Sjahranie hospital is a Class A Teaching Hospital with plenary accreditation from the Hospital Accreditation Commission (KARS). The research sample was obtained through purposive sampling technique, namely all pediatric patients (0-18 years) who were diagnosed with leukemia and have signs of manifestation of the oral cavity based on clinical and laboratory results by Pediatrician and Pediatric Dentist at Abdoel Wahab Sjahranie Hospital Samarinda who underwent hospitalization during 2017 - 2021 and meet the inclusion and exclusion criteria set by the researcher. This research was conducted from August to October 2021.

The research work procedure was carried out by collecting secondary data obtained from the medical records of the Abdoel Wahab Sjahranie Hospital, Samarinda. The data obtained were grouped by type of leukemia, age, gender, nutritional status, and oral manifestations. The data obtained will be analyzed by Univariate Analysis to analyze each variable from the research results to produce the frequency distribution and percentage of each

table. All data will be obtained using Microsoft Word and Microsoft Excel and then presented in the form of tables and narratives.

RESULTS

Based on the research that has been done, there are 1,330 cases of Leukemia in 2017-2021 with the total number of respondents obtained based on the inclusion and exclusion criteria totaling 12 respondents.

Table 1. Distribution of respondent characteristics by gender and age

Characteristics	Quantity (n=12)	Percentage
Gender		
Male	7	58.3%
Female	5	41.7%
Age (years)		
0-5 years	6	50%
6-18 years	6	50%

Table 1 shows the frequency of respondent's gender, as many as 7 male respondents (58.3%). Then the frequency of the age of the respondents is the same, namely 6 respondents in the 0-5 year age group (50%) and 6 respondents in the 6-18 year age group (50%).

Table 2. Distribution of respondents by type of leukemia

Characteristics	Quantity (n=12)	Percentage
Acute Lymphoblastic	10	83.3%
Acute meiloblastic leukemia	2	16.7%
Chronic myeloblastic leukemia	0	0%

Table 3. Distribution of respondents based on oral manifestations

Characteristics	Quantity (n=12)	Percentage
Mucositis	7	58.3%
Pulp necrosis	1	8.3%
Gingivitis	1	8.3%
Gangren radix	1	8.3%
Dental caries, pulpitis	1	8.3%
Acute periodontitis, multiple pulp gangrene	1	8.3%

Table 2 shows the frequency of respondents with acute lymphoblastic leukemia type more than acute myeloblastic leukemia as many as 10 respondents (83.3%). Table 3 shows the frequency of oral manifestations experienced by the most respondents was mucositis, namely 7 respondents (58.3%), followed by pulp necrosis, gingivitis, gangrene radix, dental caries and pulpitis, acute periodontitis and multiple gangrene of the pulp with 1 respondent each (8.3%).

Table 4. Distribution of respondents based on nutritional status

Characteristics	Quantity (n=12)	Percentage
Obesity	0	0%
Over nutrition	1	8.3%
Normal	5	41.7%
Malnutrition	4	33.3%
Poor nutrition	2	16.7%

Table 4 shows the frequency of nutritional status experienced by most respondents, namely normal nutrition, namely 5 respondents (41.7%), followed by malnutrition by 4 respondents (33.3%), poor nutrition by 2 respondents (16.7%), and over nutrition by 1 respondent (8.3%).

Tabel 5. Distribution of respondents based on laboratory result

Characteristics	Quantity (n=12)	Percentage
Leukocytes	45.7	91.09
Hemoglobin	10.4	2.10
Platelets	117.6	137.93

Table 6. Distribution of respondents based on chemotherapy

Characteristics	Quantity (n=12)	Percentage
Haven't received chemotherapy	4	33.3%
Have received chemotherapy	8	66.6%

Table 5 shows the mean value of leukocytes was 45,700/uL, hemoglobin was 10.4 g/dl, and platelets was 117,600/mm³. Table 6 shows the number of leukemia patients who have received chemotherapy as many as 8 respondents (66.6%) and 4 respondents who haven't received chemotherapy (33.3%).

DISCUSSION

Oral manifestations in leukemia patients can occur as a result of the disease process or the therapy being undertaken¹¹. Oral manifestations that occur in patients receiving chemotherapy are influenced by various factors such as therapeutic content, therapeutic dose, duration of therapy, such as patient age, oral hygiene, history of periodontal disease. These factors will affect the incidence of mucositis, reduced salivary flow (which will lead to xerostomia), pain (due to neurotoxicity), opportunistic infections (such as oral candidiasis), and bleeding gums¹². In this study, most of the leukemia patients were male, namely 58.3%. In line with a study in Indonesia¹³ which stated the same thing that the incidence of leukemia in children was mostly boys as much as 58.8%. The characteristics of the subjects of this study based on age were the same, namely

5 years as much as 50% and > 5 years as much as 50%. A similar study conducted in Brazil showed pediatric leukemia patients with oral manifestations at the age of 9 years as many as 55.5%, 10-15 years as many as 44.4% and stated that the younger the patient, the greater the vulnerability of the oral mucosa to the effects of chemotherapy where more than 90% of children under 12 years with leukemia have oral complications¹². This study also shows that the nutritional status of most pediatric leukemia patients is normal as much as 41.7%, followed by malnutrition 33.3%, and malnutrition 16.7%. This is contrary to previous research which stated that the nutritional status of pediatric leukemia patients with the most oral manifestations was normal nutrition 52.9% followed by over nutrition as much as 23.5%¹³.

This study showed the most types of leukemia experienced by patients were ALL as much as 83.3% and AML as much as 16.7%. Agreed with previous studies that most leukemia in pediatric patients <15 years is ALL 80% compared to AML 17% and CGL (Chronic Granulocytic Leukemia) 3%¹³.

Oral manifestations that occurred in patients who had not received chemotherapy were 33.3% and 66.6% in patients who had received chemotherapy. There are several approaches to classifying oral manifestations in leukemia patients, the most widely used classification is the division of oral manifestations which are called primary complications, secondary complications, and tertiary complications. Primary complications occur as a result of the disease process resulting from infiltration of oral structures such as the gingiva and bone¹⁴. Oral lesions are the most common manifestation or first symptom of leukemia that makes patients come to health facilities¹⁵. Secondary complications are related to the direct effects of radiation or chemotherapy, such as thrombocytopenia, anemia, and granulocytopenia leading to a tendency to bleed, more susceptible to infection, and ulceration. Tertiary complications are side

effects of the given therapy and systemic conditions after therapy, for example, ulceration, mucositis, taste changes, candidiasis, bleeding gums, xerostomia, dysphasia, trismus, etc¹⁴. Oral mucosal ulcers are the most common manifestation patients with leukemia patients and usually result from the direct effect of chemotherapeutic agents on oral mucosal cells. Bacterial invasion followed by severe neutropenia plays an important role in the development of oral ulcers. Characteristics of ulcers are large, irregular, smelly, and surrounded by pale mucosa due to anemia and lack of inflammatory response. Prolonged bleeding in leukemia patients may result from chemotherapy-induced myelosuppression, drugs, and thrombocytopenia. Thrombocytopenia $<20,000/\text{mm}^3$ can cause spontaneous gum bleeding¹⁶.

This study showed that the most common oral manifestation was mucositis as much as 58.3%. Mucositis is the oral manifestation with the highest prevalence regardless of the chemotherapy phase. This is similar to the study conducted by 12, which found mucositis as the most common manifestation of 26.5%, followed by gum bleeding 23.4%, and pale mucous membranes 14.7%. A higher prevalence of caries, opportunistic infections of herpes and candidiasis, temporomandibular joint arthritis, and osteolytic lesions of the mandible may occur⁸. Suggest oral manifestations in leukemia patients based on the type of leukemia. In patients with ALL, oral manifestations may include pallor of the mucosa, bleeding gums, ecomosses, and colli lymphadenopathy. Whereas in AML patients, the most common oral manifestations were gum bleeding, oral ulceration, and gingival hyperplasia¹⁶.

In patients receiving chemotherapy, the incidence and severity of oral manifestations depend on the therapy received, where drugs that affect DNA synthesis, such as methotrexate and cytabirine, will be more likely to trigger oral manifestations. The frequency of oral

manifestations is more common in the first week after receiving antineoplastic therapy⁷.

Oral management in pediatric patients with leukemia consists of pre-therapy, during therapy, and post-therapy. Pediatric leukemia patients are recommended to undergo orofacial examination when the diagnosis is first made, to eliminate potential infection and prevent the risk of dental and oral disease associated with systemic complications. Furthermore, the pediatric dentist team and the pediatric oncology team can communicate with each other for a treatment plan. Pre-therapy that can be done is preventive such as advising to maintain oral hygiene by brushing teeth 2 times a day and using dental floss. The type of toothbrush used depends on the patient's platelets, if the platelets are $>50,000/\text{mm}^3$ use a soft-bristled toothbrush, $20,000-50,000/\text{mm}^3$ use an extra soft bristle toothbrush, and $<20,000/\text{mm}^3$ use a sponge tooth or moist gauze. Food-related education is also necessary, patients with leukemia need to avoid sticky food, contain sucrose, and can irritate the oral mucosa. The use of sodium bicarbonate or saline mouthwash should be considered to reduce the incidence of oral mucositis in leukemia patients⁷.

Oral manifestations that can occur when patients receive chemotherapy are gingival bleeding, xerostomia, candidiasis and bacterial or viral infections, which can make brushing teeth almost impossible. Oral management that can be given during therapy is to replace the toothbrush with pads that have been moistened with water, sodium bicarbonate or chlorhexidine. Patients should rinse with cold water as often as possible to keep the mouth clean and reduce the risk of opportunistic infections. The use of lip balm can also be given. Vomiting as a side effect of chemotherapy can cause decalcification of the enamel and irritation of the oral tissues, so it is necessary to educate the oral cavity with water. Mucositis as the most common oral manifestation can be treated by maintaining oral hygiene every 2-4 hours with gauze moistened with water. Rinsing the oral cavity with 0.9%

saline solution or sodium bicarbonate can increase the comfort of the patient's oral cavity⁷.

After the patient completes chemotherapy, in addition to a check-up with a pediatrician, a check-up with a pediatric dentist is required every 3-6 months. Oral management and routine control can play a role in preventing relapse⁷. In addition, disorders of odontogenesis have relevant psychological effects and can interfere with children's quality of life, especially considering the orofacial abnormalities that can occur in pediatric leukemia patients, namely enamel hypoplasia, stunted tooth growth, abnormal tooth/root formation, and disturbances in jaw growth^{7,8}.

Based on the results of the research and discussion that has been described, it can be suggested that it is necessary to collect more complete medical record data so that it can minimize the occurrence of data errors during research. As a writer who is also a clinician, believe that the number of patients with oral manifestations at the Abdoel Wahab Sjahranie Hospital Samarinda is more, but because of the system in collecting medical records, the number of samples that the author gets is not following the field and the need for education and socialization by relevant agencies and health workers to the community about the importance of maintaining oral and dental health in leukemia patients, so that mothers and families of patients can play an active role in maintaining and caring for children's health. Further studies with more sample sizes and analytical studies related to oral manifestations in leukemia patients need to be done.

CONCLUSION

Oral health of leukemia patients is a reflection of systemic status. Oral manifestations can occur due to leukemia or side effects of chemotherapy. In this study, the characteristics of leukemia patients with the most oral manifestations were male, with leukemia type ALL, normal nutritional status, had received

chemotherapy, and the most oral manifestations experienced by patients was mucositis. Oral management should start when the patient is diagnosed with leukemia by a pediatrician. The importance of multidisciplinary and comprehensive treatment between pediatricians and pediatric dentists in managing the dental health of leukemia patients starting from before therapy, during therapy, and after therapy.

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