Original Article

Febrile Neutropenia in Children with Acute Leukemia

The Frequency of Febrile Neutropenia in Children with Acute Leukemia admitted at Khyber Teaching Hospital, Peshawar

Jan Muhammad Afridi, Ayisha Aman and Yasir Rehman

ABSTRACT

Objective: To determine the frequency of febrile neutropenia in children with leukemia admitted in the department of child health KTH Peshawar.

Study Design: Descriptive / cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of pediatrics, Khyber teaching hospital, Peshawar from March 2016 to September 2017.

Materials and Methods: 50 patients of acute leukemia (subtypes of ALL and AML) were selected through non randomized convenient sampling. Before enrolling the patient informed consent was taken from the attendant. Detailed history and examination was performed and full blood count was sent to Khyber Teaching Hospital laboratory. Common clinical features were noted along with hematological parameters. Standardized management protocols were applied to these patients.

Results: Out of 50 patients 31 were male and 15 were female that presented with acute lymphoblastic leukaemia and 4 patients were of acute myeloid leukaemia with two patients male and 2 female. Out of 50 patients 17 cases presented with febrile neutropenia, out of these 12 patients were male and 5 patients were female. 16 patients with febrile neutropenia were Acute lymphoblastic leukemia while 1 patient had Acute myeloid leukemia. 9 patients were between age range of 1-5 years, 7 were between 5-10 years, 1 patient was over 10 years age and no patient less than 1 year presented with febrile neutropenia. Pallor and fever were the most common presenting complaints followed by organomegaly. Other clinical features which were present were lymphadenopathy bruises and patechia, bone pain and tenderness abdominal pain and vomiting.

Conclusion: In our study out of 50 patients 31 were male and 15 were female that presented with acute lymphoblastic leukemia and 4 patients were of acute myeloid leukemia with two patients male and 2 female. 17 cases presented with febrile neutropenia, out of these 12 patients were male and 5 patients were female. 16 patients with febrile neutropenia were Acute lymphoblastic leukemia while 1 patient had Acute myeloid leukemia. 9 patients were between age range of 1-5 years, 7 were between 5-10 years, 1 patient was over 10 years age and no patient less than 1 year presented with febrile neutropenia. Fever was presenting complaint in all the patients comprising 100% patients, followed by pallor, hepatomegaly and splenomegaly.

Key Words: Febrile Neutropenia, Acute leukemia, Acute lymphoblastic (ALL) and Mylogenous leukemia (AML).

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INTRODUCTION

Leukemia is the most common malignancy of children with a prevalence of 129 in one million, and the second cause of death among children aged 5 to 14 years. Most of the children have chance to develop neutropenia during their treatment period.[1]

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Acute leukemia represent neoplasm of the hematopoietic cell precursors manifested as clonal expansion of myeloid and lymphoid hematopoiesis[2]. Acute lymphoblastic leukemia (ALL) is the most common malignancy diagnosed in patients younger than 15 years, accounting for 26% of all cancers and 78% of leukemia in this age group, and for approximately 20% of adult acute leukaemias.[3] Overall survival in ALL ranged from 45% to 81% (commonly >60%) and event-free survival ranged from 41% to 70% (commonly >50%). [4]

Acute myeloid leukemia (AML) of childhood and adolescence accounts for 20 % of pediatric leukemia. Cure rates are lower in comparison to those in acute lymphoblastic leukemia.[5] Below 15 years age Acute myeloid leukemia comprises only 15% to 20% of cases.[6] Factors associated with development of leukemia are hereditary disorders with susceptibility to chromosomal breakage due to exposure to radiation[7,8.]

Child with leukemia has very varied and nonspecific presentation causing delay in diagnosis.[9] Infections and febrile neutropenia are leading causes of treatment related morbidity and mortality in pediatric and AYA (adolescent and young adult) patients in developing countries. Socio-economic and cultural factors continue to play a big role in treatment decision process.[10] Treatment of febrile neutropenia which is an oncological emergency with early and efficient therapy decreases morbidity and mortality significantly.[11] Intensive chemotherapy directed against acute myeloid leukemia of childhood is followed by profound neutropenia and high risk for bacterial and fungal infections.[12] The frequency of febrile neutropenia increased in years with the increase in the intensity of treatment. Febrile neutropenia developed more commonly in patients with high risk and thus received more intensive treatment and patients who were not in remission.[13] The frequency of febrile neutropenia in children with Leukemia is reported around 34 %.[14]

The majority of episodes will not have an identifiable causative organism. Gram-positive bacteria and Gram-negative bacteria were the most common causative pathogens identified. With appropriate antimicrobial therapy and supportive management, the overall risk of mortality from febrile neutropenia is extremely low.[15]

Local data regarding incidence of febrile neutropenia in children suffering from leukemia is limited and there is a need of further research work in this regard. Owing to increasing resistance and the limited arsenal of new antibiotics, especially against Gram-negative pathogens, carefully designed antibiotic regimens are obligatory for febrile neutropenic patients, along with effective infection control Proper and vigilant management for patients with febrile neutropenia can prove significant. Therefore in my study I would like to identify patients admitted in Khyber teaching hospital with febrile neutropenia as it would help measure the burden it lays as well as dire need for proper patient education regarding febrile events during their course of chemotherapy.

MATERIALS AND METHODS

This study was conducted at Department of pediatrics, Khyber teaching hospital, Peshawar from March 2016 to September 2017. A cross-sectional descriptive study design was used and 50 patients of acute leukemia (subtypes of ALL and AML) were selected through non randomized convenient sampling. Before enrolling the patient informed consent was taken from the attendant. Detailed history and examination was performed and full blood count was sent to Khyber Teaching Hospital laboratory.

Common clinical features were noted along with hematological parameters. Standardized management protocols were applied to these patients.

Inclusion criteria: patients less than 15 years diagnosed cases of Leukemia.

All patients irrespective of treatment stage.

Exclusion criteria: patients more than 15 years.

RESULTS

Out of 50 patients 31 were male and 15 were female that presented with acute lymphoblastic leukaemia and 4 patients were of acute myeloid leukaemia with two patients male and 2 female.

Out of 50 patients 17 cases presented with febrile neutropenia, out of these 12 patients were male and 5 patients were female. 16 patients with febrile neutropenia were Acute lymphoblastic leukemia while 1 patient had Acute myeloid leukemia. 9 patients were between age range of 1-5 years, 7 were between 5-10 years, 1 patient was over 10 years age and no patient less than 1 year presented with febrile neutropenia.

Pallor and fever were the most common presenting complaints followed by organomegaly. Other clinical features which were present were lymphadenopathy bruises and patechia, bone pain and tenderness abdominal pain and vomiting.

Statistics:

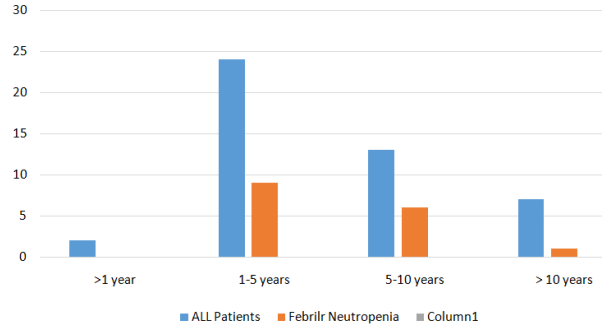
	ALL	AML
Mean	8.6	4.3
Median	2.5	2.5
Mode	2.5	2.5

Pie chart/ Table 1 shows age wise frequency of Febrile neutropenia in ALL.

Pie chart/ Table 2 shows age wise frequency of Febrile neutropenia in AML.

Bar Graph/Table 3 shows gender wise frequency of febrile neutropenia in Acute leukemia (ALL/AML).

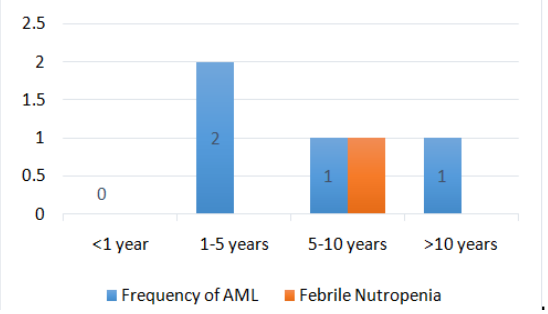
Bar chart/ Table 4 shows frequency of presenting complaints in children with ALL and AML



Pie Chart No.1: Age wise frequency of Febrile neutropenia in ALL.

Table No.1: Age wise frequency of Febrile neutropenia in ALL.

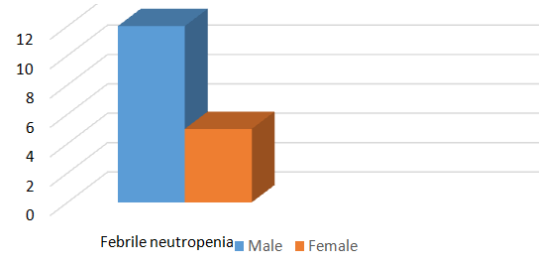
Age	Frequency of ALL	Frequency of Febrile Neutropenia
<1 year	2	0
1-5 years	24	9
5-10 years	13	6
>10	7	1



Pie Chart No.2: Age wise frequency of AML.

Table No.2: Age wise frequency of AML.

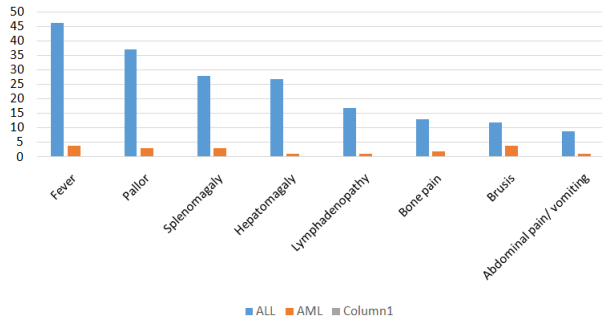
Age	Frequency of AML	Frequency of Febrile Neutropenia0
<1 year	0	0
1-5 years	2	0
5-10 years	1	1
>10	1	0



Pie Chart No.3: Gender wise frequency of ALL and AML

Table No.3: Gender wise frequency of ALL and AML

	Male	Female
Febrile Neutropenia	12	5



Pie Chart No.4: Frequency of presenting complaints in children with ALL and AML.

Table No.4: Frequency of presenting complaints in children with ALL and AML.

Clinical features	ALL	AML
Fever	46	4
Pallor	37	3
Splenomegaly	28	3
Hepatomegaly	27	1
Lymphadenopathy	17	1
Bone pain/ tenderness	13	2
Bruises/ Patehia	12	4
Abdominal pain/ vomiting	9	1

DISCUSSION

There is very little information available from developing Asian countries including Pakistan about the incidence of febrile neutropenia in children with leukemia. Hospitalization for febrile neutropenia in leukemia patients is associated with considerable morbidity, mortality, and cost we undertook this study to find out incidence of febrile neutropenia in children with leukemia admitted at Khyber teaching hospital Peshawar.

In our study 46 (92%) patients were suffering from ALL and 4 (8%) were diagnosed as AML. In contrast S Zaki et al[16] reported 8.1% of all the patients diagnosed with leukemia having AML while 91.9% had Acute lymphoblastic leukemia. Another study by Jawaid[17] A et al reported 14.7 % of patients having AML and 85.3% cases of ALL.

We found that 34% patients of leukemia presented to us with febrile neutropenia, which correlates to another study by E Castagnolaet al.[14]Out of 17 patients with febrile neutropenia 16 patients had Acute lymphoblastic leukemia while 1 patient had Acute myeloid leukemia. 9 patients were between age range of 1-5 years, 7 were between 5-10 years, 1 patient was over 10 years age and no patient less than 1 year presented with febrile neutropenia.

In our study fever is the most common finding in all the patients. This was also found to be similar in different national and international studies. National studies by Fadoo z et al[18] and Faseeh Shahab et al[2] where fever was first presenting complaint approximately 88.7% and 77% respectively. Bone marrow failure due to marrow infiltrates or chemotherapy leads to pallor (anaemia) bleeding (thrombocytopenia) and susceptibility to infection (neutropenia)[19]. In our study 80% of patients presented with Pallor. Whereas Faseeh et al reported the same about 33% of patients presented with Pallor[2].

This is consistent with several other studies Zaki et al[16] reported fever, bleeding and Pallor as the main presenting complaints. Another local study by Mushtaq N et al[20] also reported fever, bruises and pallor as the commonest presenting complaints.

In our study enlargement of liver, spleen and lymph nodes are more common in acute leukaemia. Hepatomegaly was seen in 56% of patients, splenomagaly in 62% and lymphadenopathy in 36% of patients. Similar findings were reported by Faseeh etal[2] with hepatomegaly in 71% patients splenomegaly 66% lymphadenopathy in 71% of patients.

CONCLUSION

In our study out of 50 patients 31 were male and 15 were female that presented with acute lymphoblastic leukemia and 4 patients were of acute myeloid leukemia with two patients male and 2 female.

Out of 50 patients 17 cases presented with febrile neutropenia, out of these 12 patients were male and 5 patients were female. 16 patients with febrile

neutropenia were Acute lymphoblastic leukemia while 1 patient had Acute myeloid leukemia. 9 patients were between age range of 1-5 years, 7 were between 5-10 years, 1 patient was over 10 years age and no patient less than 1 year presented with febrile neutropenia.
Fever was presenting complaint in all the patients comprising 100% patients, followed by pallor, hepatomegaly and splenomegaly.

Recommendations: Febrile neutropenia is a serious complication of leukemia and its treatment. Patients with leukemia presenting with high grade fever should be screened for febrile neutropenia and to be managed accordingly.

Author's Contribution:

Concept & Design of Study:	Jan Muhammad Afridi
Drafting:	Ayisha Aman
Data Analysis:	Yasir Rehman
Revisiting Critically:	Jan Muhammad Afridi, Ayisha Aman
Final Approval of version:	Jan Muhammad Afridi

Conflict of Interest: The study has no conflict of interest to declare by any author.

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