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ETIOLOGICAL PROFILE OF PANCYTOPENIA IN CHILDREN: A CROSS-SECTIONAL STUDY AT WOMEN AND CHILDREN HOSPITAL KARAK CITY

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Abstract

Background: *Pancytopenia is a blood disorder in which blood cells become abnormal. So identification of the proper reason will aid in therapy.*

Objective: *The objective of this study was to determine the etiological profile of pancytopenia in children at women and children hospital Karak city*

Material and method: *The current cross-sectional study was carried out at women and children hospital Karak city over a period of 6 months from August 2023 to January 2024 after taking approval from the ethical board of the institute. Sample was collected through consecutive sampling technique and sample size was determined using WHO calculator. The sample size was 108 in our study. Bone marrow biopsy was performed in selected cases in accordance with provisional diagnosis. All the collected data was analyzed using SPSS version 23. Variables such as age, hemoglobin, TLC, and platelets were characterized as mean ± standard deviation. Categorical variables, such as gender and age, were presented in frequency and percentages.*

Results*: A total of 108 individuals of both gender and different age groups (3 months -15 years) were enrolled in this study, out of which male were 68(62.9%) and females were 38(35.1%). 08.174 +3.3701 years was the mean age. The most prevalent age group in the study participants was 1- 5 years 37(34.2%), followed by age group 6 to 10 years 36(33.3%),11-15 age group 27(25%) and 1-12 months 8(7.4%) respectively. Pancytopenia was most commonly caused by acute lymphoblastic leukemia, accounting for 53 (49%) cases. Aplastic anemia was seen in 22 instances (20%), followed by hypoplasia in 13 (12%).*

Conclusion: *The current concluded that the most common cause of pancytopenia was acute lymphoblastic leukemia followed by aplastic anemia and bone marrow hypoplasia.*

INTRODUCTION

Pancytopenia is a condition when all three constituents of blood cells (RBCs, WBCs, and Platelets) have lower numbers than normal. This is not a particular disorder, but rather an array of findings. This condition affects bone marrow and causes hematological derangements, including

pancytopenia in peripheral blood smears. Its etiology, clinical pattern, treatment options, and outcomes vary between studies.[1]it can be defined as hemoglobin less than 12 gm%, WBC count < 4 × 109/L, & the count of platelets below 100 × 109/L.[2] Anemia is classified as mild (hemoglobin 9-12 gm%), medium (hemoglobin 5-9 gm%), and serious (Hb count below 5 gm.%).Leucopenia is classified as mild (WBCs above 3,000/mm3), moderate (WBCs 1,000-3,000/mm3), and severe (WBCs below 1,000/mm3).The classification of thrombocytopenia is mild (platelet number >50,000/mm3), moderate (platelet level 20,000-50,000/mm3), and severe (platelet count below 20,000/mm3)[2] Pancytopenia usually develops gradually over time. Symptoms often include anemia and thrombocytopenia, with leukopenia being a rare cause of first presentation. Various studies show that pancytopenia is caused by a combination of regional variation and genetic abnormalities.[3] Bone marrow biopsy is important for determining the cause of pancytopenia. In some circumstances, radiological, biochemical, and microbiological tests are beneficial. Management and prognosis for pancytopenia depend on its severity and underlying cause. Thus, identification of the proper reason will aid in therapy.[4,5] Its Common causes in children include aplastic anemia, megaloblastic anemia, infections such as malaria, enteric fever, leishmaniasis, Fanconi anemia, acute lymphoblastic leukemia, and myelodysplastic syndrome.[6] The prognosis depends on the severity of the underlying disease and pancytopenia. Understanding the root reason allows for more effective treatment. It's important to consider the various clinical trends, treatment options, and outcomes when managing this condition.[7] According to a research from the United States, infection is the most prevalent cause.[8] Leishmaniasis was the primary cause of febrile pancytopenia in an endemic location .[9] A research found that megaloblastic anemia is the major cause of pancytopenia in developing countries like Pakistan. Water treatment, such as filtration and chlorination, can help lower its prevalence.[10] so the current study was carried out to determine the etiological profile of pancytopenia in children at women and children hospital Karak city.

Material and method

The current cross-sectional study was carried out at women and children hospital Karak city over a period of 6 months from August 2023 to January 2024 after taking approval from the ethical board of the institute. Sample was collected through consecutive sampling technique and sample size was determined using WHO calculator. The sample size was 108.Participants aged 3 months to 15 years with pancytopenia, and those admitted to the pediatrics department through OPD and Accident & Emergency department were included in this study while individuals who already received therapy for leukemia and a plastic anemia were excluded. A detailed history and examination were conducted, and hematological parameters were entered on a form by the trainee herself. All the assessment were done in the hospital lab. Bone marrow biopsy was performed in selected cases in accordance with provisional diagnosis. Informed consent was obtained from parents or guardians. All the collected data was analyzed using SPSS version 23. Variables such as age, hemoglobin, TLC, and platelets were characterized as mean ± standard deviation. Categorical variables, such as gender and age, were presented in frequency and percentages.

Results

A total of 108 individuals of both gender and different age groups (3 months -15 years) were enrolled in this study out of which male were 68(62.9%) and females were 38(35.1%). 08.174 +3.3701 years was the mean age. The most prevalent age group in the study participants was 1- 5 years 37(34.2%), followed by age group 6 to 10 years 36(33.3%),11-15 age group 27(25%) and 1-12 months 8(7.4%) respectively as presented in **table 1**.The platelet count ranged from 4x103/µl to 89.750x103/µl, with a mean of 57.750 (SD + 40.776.646) x103. The total leucocytes count ranged from 210 to 3870/µl, with a mean of 2570.21 (SD + 1300.452)/µl (S.D). Hemoglobin levels ranged from 2.6gm% to 8.9gm%, with an average level of 6.631 (SD +2.0273) as presented in **table 2**. Pancytopenia was most commonly caused by acute lymphoblastic leukemia, accounting for 53 (49%) cases. Aplastic anemia was seen in 22 instances (20%), followed by hypoplasia in 13 (12%).Together, these three factors

accounted for 81% of instances, with hemolytic anemia, Gaucher's, peripheral destruction, and megaloblastic anemia accounting for the remaining 19%.

Demographic features of the study participants n= 108	
Sex	N (%)
Male	68(62.9%)
Female	38(35.1%).
Age	
1 to 12 months	8(7.4%)
1 to 5 years	37(34.2%)
6 to 10 years	36(33.3%)
11 to 15 years	27(25%)

Table 2.Hemotological lab results of the study participants				
Variables	Mean	SDT	Minimum	Maximum
HB level in gm	6.631	2.0273	2.6	8.9
TLC count per mm3	2570.21	1300.452	210	3870
Platelets count (x103/µl	57.750	40.776	4.00	89.75

Table 3.Etiological profile of pancytopenia in the study population	
Etiology	N (%)
Hemolytic anemia	1(0.9%)
Gaucher disease	3(2.7%)
Peripheral destruction	6 (5.5%)
Megaloblastic anemia	10 (9.2%
Hypoplasia	13(12.0%)
Aplastic anemia	22 20%)
Acute lymphoblastic leukemia	53 (49%)

Discussion

There are several disorders, both hematological and non-hematological, that may provoke childhood pancytopenia. A significant diagnostic problem arises when pathophysiology and phenotype overlap. However, medical treatment, surveillance, and counselling regarding genetics all depend on a quick and accurate diagnosis. In order to diagnose cytopenias effecting one or more lineages, bone marrow analysis is required.[11] this study male were 62.9% and females were 35.1%. There is also evidence of male preponderance in other studies carried out in Yamen and South Asian nations.[12] Probably social and cultural taboos cause families to give preference to health treatment for male children over female children, which could explain the male majority. The most prevalent age group in this study participants was 1- 5 years 37(34.2%), followed by age group 6 to 10 years 36(33.3%),11-15 age group 27(25%) and 1-12 months 8(7.4%). Other regional studies also shown the same findings.[13] These results reveal that the age range of 1 to 5 years is the most susceptible to pancytopenia. Our findings explored that platelet count ranged from 4x103/µl to 89.750x103/µl, with a mean of 57.750 (SD + 40.776.646) x103. The total leucocytes count ranged from 210 to 3870/µl, with a mean of 2570.21 (SD + 1300.452)/µl (S.D). Hemoglobin levels ranged from 2.6gm% to 8.9gm%, with an average level of 6.631 (SD +2.0273). A research with similar findings showed that the mean hemoglobin were 6.87 ± 2.00 g/dL, the platelet count was 68.75 ± 20.01/µ, and the TLC was 0.85 ± 0.31 x 103.[14] There have been reports of variations in the etiology of pancytopenia from both different countries and within one country. Megaloblastic anemia has also been identified by certain other

regional studies as the most frequent cause of pancytopenia. [15] Pancytopenia was most commonly caused by acute lymphoblastic leukemia, accounting for 53 (49%) cases. Aplastic anemia was seen in 22 instances (20%), followed by hypoplasia in 13 (12%).Together, these three factors accounted for 81% of instances, with hemolytic anemia, Gaucher's, peripheral destruction, and megaloblastic anemia accounting for the remaining 19%. our study findings are similar to a study conducted by Mansoor et al. [16] To determine the etiology of pancytopenia, a thorough clinical, hematological, and bone marrow examination of an individual is beneficial.

Conclusion

The current concluded that In our setup the most common cause of pancytopenia was acute lymphoblastic leukemia followed by aplastic anemia and bone marrow hypoplasia.

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