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ORIGINAL ARTICLE

Frequency of causes of Pancytopenia based on bone Marrow Smear Results in patients 1 year to 12 years age

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ABSTRACT

Objective: To evaluate the frequency of causes of pancytopenia based on bone marrow smear examination in children aged 1 to 12 years.

Design: Descriptive, cross sectional study.

Place and duration of study: Hematology outpatients department, children hospital complex, Multan from June 2019 to December 2019.

Patients and methods: All patients aged 1-15 years were included who presented with pancytopenia. Already diagnosed cases, cases who had received blood transfusion, cases with inherited or congenital pancytopenia were excluded. History, physical examination and hematological profile were recorded at presentation which included Hb, white blood cells count, platelets count, peripheral morpholgy and bone marrow smear.

Results: During research, 139 patients with pancytopenia on the basis of peripheral blood morphology were added. Causes of pancytopenia based on bone marrow smear results were identified in 118 (84.8%) cases while in 21 cases no cause was identified. Among those, most frequent was aplastic anemia (43.8%), megaloblastic anemia (33.8%), acute lymphoblastic leukemia (5%) and myelodysplastic syndrome. Common clinical findings were pallor, fever, generalized weakness and bleeding manifestations.

Conclusion: Pancytopenia is a usual findings in patients presenting to hematology department. Though aplastic anemia is frequently found, megaloblastic anemia can be treated easily. Acute lymphoblastic leukemia is rate.

INTRODUCTION

Pancytopenia can be described as decrease in number of all blood components below normal levels: red blood cells, white blood cells and platelets.[1] It must be considered on clinical basis when patient presents with fever, pallor, bleeding manifestations (petechiae, bruises), generalized weakness and increased propensity to infections.[2,3]

The principle processes involved are reduction or damage to the hematopoietic cells, marrow replaced by malignant cells, defects in differentiation and maturation of hematopoietic stem cells in bone marrow, ineffective hematopoiesis, abnormal humoral or cellular control of hematopoiesis, immunologic suppression of hematopoiesis, genetic mutations causing inherited or congenital pancytopenia.[4] The causes of pancytopenia are variable in children ranging from temporary bone marrow failure to marrow invasion by tumor cells.6 Bone marrow smear is an accepted testing modality in the evaluation of pancytopenia which helps in specific treatment and prognosis.[5-7]

MATERIAL AND METHODS

It was a cross sectional, descriptive research the results of which were collected in six months. (June 2019 to December 2019) in the department of Hematology, Children Hospital Complex, Multan. Patients with pancytopenia who had Hb less than 10mg/dl, white blood cell count < 4000/mm^3 and platelet count < 100,000/mm^3 were added. Already diagnosed cases, cases who had received blood transfusion, cases with suspicion of congenital or inherited pancytopenia were excluded. Detailed history was taken regarding onset, duration of illness, diet, drug intake, radiation exposure, worm infestation, blood loss. All the patients fulfilling the criteria were admitted in Hematology ward and their complete blood counts and peripheral blood morphology were obtained. Patient's parents were informed about the procedure. Bone marrow smear was taken from all the patients using 15 gauge bone marrow aspiration needle at posterior superior iliac supine with aseptic measures. BMA smears were examined using Hematoxylin and Eosin Stain for microscopy. Data were analyzed using computer software SPSS version 20. Confounding variables like age and gender were controlled by stratification.

RESULTS

In six months duration, 139 patients with pancytopenia who met the criteria were added. Ten already diagnosed and on treatment patients were excluded. 91 (65.4%) patients belonged to male gender and 48 (34.5%) patients belonged to female gender. Mostly patients were found in 5-10 years (63.3%) age, followed by >10 years (20%) and <5 years (16.5%).

In 139 patients with pancytopenia, aplastic anemia was most frequently found (43.8%), then megaloblastic anemia (33.8%), acute lymphoblastic leukemia (5%) and myelodysplastic syndrome (2.11%). Twenty one cases of pancytopenia remained undiagnosed (15.1%).

Table 1: Division of patients in different age groups:

Age	N	%
<5 years	23	16.5%
5-10 years	88	63.3%
>10 years	28	20%

Table 2: Distribution of patients according to gender

Gender	N	%
Male	91	65.4%
Female	48	34.5%

Table 3: Clinical features at presentation.

Clinical features	N	%
Pallor	139	100%
Fever	75	53.9%
Generalized weakness	95	68.3%
Bleeding manifestation	37	26.6%
Hepatomegaly	16	11.5%
Splenomegaly	24	17.2%
Lymphadenopathy	11	7.9%

Table 4: Bone marrow smear findings

Diagnosis	N	%
Aplastic anemia	61	43.8%
Megaloblastic anemia	47	33.8%
Acute lymphoblastic leukemia	7	5%
Myelodysplastic syndrome	3	2.1%
Undiagnosed	21	15.11%

DISCUSSION

Pancytopenia can be described as reduction below normal levels of all blood components: red blood cells, white blood cells and platelets. It is a frequent hematological problem seen in pediatric patients. It can be considered if a patient comes with pallor, fever or bleeding manifestations (petechiae, bruises). In our research, increased number of patients belonged to male group, male: female ratio was 2:1, other researches also had similar results. A research from Peshawar by Anwar Zeb Jan10 showed the male: female ratio of 1.8:1. Another research from Khyber teaching hospital Peshawar by Tariq M. Khan2 reported it to be 1.7:1. In my patients, aplastic anemia has been found most frequently (43.8%), the megaloblastic anemia is the second most common cause (33.8%). In other studies, the frequency of aplastic anemia varies from 36.2% to 28.3%10. In another study frequency of megaloblastic anemia varies from as low as 13.04%.11 to as high as 68%12. Megaloblastic anemia is another frequent cause of pancytopenia. Recurrent intestinal infections, vitamin B12 and folate deficiency are associated with megaloblastic anemia.[13]

Though I could not diagnose the reason behind megaloblastic anemia, but in another study folate deficiency was commonly observed in children, while B12 deficiency was observed in adults.[14]

In my research, hematological malignancies have been observed, common among them is acute lymphoblastic leukemia (5%) while in other studies its frequency varies from 8.69%11 to 12%.2 The second most common cause is myelodysplastic syndrome (2%), compared to other study conducted in Peshawar where its incidence was 14%.2

Approximately 2000 cases of leukemias are diagnosed in the united sates in a year. 80% being diagnosed as acute lymphoblastic leukemia, followed by acute myeloid leukemia (AML) and chronic myeloid leukemia (CML).[15]

The incidence of ALL in Pakistani patients is low and can be compared with other developing countries like India and China.[16-17] More research is required to know the exact cause, frequency and risk factors of hematological malignancies in pediatric population in Pakistan.

CONCLUSION

Pancytopenia is a frequent diagnosis in children presenting to Hematology Department. Though, aplastic anemia has been turned out to be most frequent reason behind pancytopenia, megaloblastic anemia can be treated and reversed easily. Acute leukemia is rare in our pediatric population.

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