

A Spectrum of Hematological Disorders in Children in a Tertiary Care Hospital

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Conflict of interest: Nil

Abstract:

Background: This study was conducted at the department of pediatrics and the department of Pathology of G S Medical Hospital Pilkhuwa. The study period was from January 2023 to August 2023.**Methods:** A retrospective analysis of those patients who underwent bone marrow examination (aspiration/trephine) was made. Charts were analyzed in detail regarding history, examination and investigations.**Results:** A total of 60 patient's case histories including bone marrow examination results were analyzed. Nutritional anemias contributed 38(63.33%) cases amongst the non-hematological group. Out of nutritional anemias, megaloblastic anemia was the most common i.e. 30(50%) cases and Iron deficiency anemia was the least common i.e. 8(13.33%) cases amongst the non-malignant hematological disorder. Other non-malignant hematological disorders in descending order of frequency were aplastic anemia 7(11.66%) cases, hemolytic anemia 3(5%), idiopathic thrombocytopenic purpura ITP 2(3.33%) cases and visceral Leishmaniasis 1(1.66%) cases. Amongst the malignant hematological disorders, acute lymphoblastic leukemia accounted for 4(6.66%) cases and was found to be the most common disorder, followed by acute myeloid leukemia 2 (3.33%), lymphomas 2(3.33%) and 1(1.66%) chronic myeloid leukemia.**Conclusion:** Nutritional anemias as a group was the most common hematological disorder found on bone marrow examination in our patients. Megaloblastic anemia was the most common while iron deficiency anemia was the least common in the nutritional anemia group. Acute lymphoblastic leukemia was the most common amongst the malignant hematological disorders followed by acute myeloid leukemia.**Keywords:** Hematological Disorder, Bone Marrow Aspiration/Biopsy, Anemia, Leukemia and Lymphoma.

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Introduction

Hematological disorders are quite frequent in pediatric population. Unlike adults the spectrum of hematological disorders in children is very wide, ranging from very common condition like iron deficiency anemia to relatively rare congenital disorders like Blackfan Diamond syndrome and Fanconi's anemias.

Similarly, the spectrum of hematological disorders is relatively different in the developing world than the developed countries [1]. Most of the time the diagnosis can be arrived at by detail clinical examination and few simple investigations. However, without bone marrow examination the diagnosis is usually not a confirmatory one.

Bone marrow examination is one of the most frequent and relatively very safe invasive procedures done routinely in pediatric units. Though an invasive, procedure, it can be easily performed even in the presence of severe

thrombocytopenia with little or no risk of bleeding. Commonly it is done for the evaluation of unexplained cytopenia's and malignant conditions like leukemias [2-6]. Bone marrow examination is done for the diagnosis or staging of a neoplasm and storage disorders. Trephine biopsy is usually performed when there is hypoplasia or aplasia on aspiration [7-8].

At time it is also done in cases of lymphomas, granulomatous conditions and osteoporosis. So there are wide variety of disorders in children where bone marrow examination provides diagnostically important information, which otherwise would not be possible in our hospital.

This study was undertaken with the view to study the etiological spectrum of disorders as diagnosed on bone marrow examination [9].

Material and Methods:

All children who underwent bone marrow aspiration or trephine biopsy during the study period between January 2023 to August, 2023 were included in this study. Every patient history sheet was examined in detail and findings were recorded on a standard proforma including demographic data, symptoms and signs and all the relevant investigations. Particular note was made up of any drugs taken in the past. Bone marrow aspiration or trephine biopsy results were also recorded. Data was analyzed to know the relative frequencies of different hematological disorders in our pediatric patients.

Results:

A total of 60 patient's case histories were studied. Ages of the patients ranged from 2 months to 15 years. Males were 42(70%) and females were 18(30%).

Non-malignant hematological disorders were seen

in 51(85%) patients (Table-I) and malignant hematological disorders were seen in 09(15%) patients (Table-II). Nutritional anemias i.e. megaloblastic, mixed deficiency (microcytic and macrocytic) and iron deficiency together accounted for 38(63.33%) cases amongst the non-hematological group. Of the nutritional anemias, megaloblastic anemia was the most common non-malignant hematological disorder i.e. 30(50%). Iron deficiency anemia was the least common i.e. 8(13.33%) cases. Other non-malignant hematological disorders in descending order of frequency were aplastic anemia 7(11.66%) cases, hemolytic anemia 3(5%), idiopathic thrombocytopenic purpura 2(3.33%) and visceral Leishmaniasis 1(1.66%) cases.

Amongst the malignant hematological disorders, acute lymphoblastic leukemia was the most common i.e. 4(6.66%) cases, followed by acute myeloid leukemia 2(3.33%) cases, lymphomas 2(3.33%), chronic myeloid leukemia 1(1.66%) (Table-II).

Table 1: Spectrum of Non-malignant hematological disorders

Disease	No. of cases	Percentage
Megaloblastic anemia	30	50%
Aplastic anemia	07	11.66%
Immune thrombocytopenic purpura	02	3.33%
Visceral Leishmaniasis	01	1.66%
Iron deficiency anemia	08	13.3%
Hemolytic anemia	03	5%
Total	51	85%

Table 2: Spectrum of Malignant hematological disorders

Disease	No. of cases	Percentage
Acute lymphoblastic leukemia	4	6.66%
Acute myeloid leukemia	2	3.33%
Lymphoma	2	3.33%
Chronic myeloid leukemia	1	1.66%
Total	9	15%

Discussion:

The spectrum of hematological disorders in children is very wide. Bone marrow examination is a useful test in reaching the final diagnosis. It is one of the most common and safe procedures done on children in medical practice. Rarely infection, excessive bleeding or embolism has been reported after bone marrow biopsy [10].

This study shows that amongst the micronutrient deficiency anemias, megaloblastic anemia is the most common non-malignant disorder in our patients. In other similar studies (both national and international) its frequency ranges from as low as 24% 11 to as higher as 68% [12]. In almost all these studies pancytopenia was the main presentation and so was the case in our study. Rarely megaloblastic anemia may present with

thrombocytopenia only [13]. Though we were unable to determine the underlying cause of megaloblastic anemia, but folate deficiency is more common in children, while B12 deficiency is more common in adults [14]. The usual presenting feature of megaloblastic anemia in our patient was anemia and varying degree of skin and mucosal bleeding (which is usually alarming to the parents and the clinician but bone marrow examination settles the issue). It is a common problem in the developing countries. The usual presenting age in the developed world is infancy. But in developing countries like ours it can occur at any age which is an irony as Pakistan is an agricultural country and folate and B12 are abundant in the food especially green leafy vegetables. A possible explanation of folates deficiency in older children in our country could be the various chronic inflammatory

disorders of the gut like chronic diarrheas and malabsorptive states apart from poor nutrition. Amongst other micronutrient anemias, mixed deficiency anemia (microcytic & macrocytic) was 15% and iron deficiency (microcytic) was 5% only. This percentage is much lower than expected as an estimated 60 to 80% of the world population is affected by iron deficiency anemia and is the most common preventable nutritional deficiency in the world [15-17]. The possible explanation is that majority of the cases of iron deficiency anemia and mixed anemias are diagnosed on smear examination and are treated as outpatients. Aplastic anemia was the second most common and most lethal non-malignant disorder found in our patients (11.66%). Epidemiologically, aplastic anemia has a pattern of geographic variation opposite to that of leukemias, with higher frequency in the developing world than in the industrialized West [1,17]. Although not a common disease worldwide, aplastic anemia has a social impact disproportionate to its incidence [18]. Large prospective studies indicate an annual incidence of two new cases per million populations in Europe and Israel [19]. Its exact incidence in Pakistan is unknown due to lack of reliable population-based studies. The rate is much higher in the developing world, where aplastic anemia may rival acute myelogenous leukemia in frequency of diagnosis in hematology clinics. This has been shown from the studies in Thailand [20] and China [21], where the incidence has been determined to be about three-fold that in the West. Idiopathic thrombocytopenia was the third most common hematological disorder found on bone marrow examination in our patients. It is the most common cause of mucocutaneous bleeding in children. Its frequency on bone marrow examination varies between 32% to 48% [12-13]. In this study 9 cases (15%) of leukemias were noted with acute lymphoblastic leukemia as the commonest malignancy in our patients (6.66%). Approximately 2500 cases per annum are diagnosed in the United States, accounting for about One third of all the cases of childhood cancers. Eighty percent of these are acute lymphoblastic leukemia (ALL), 17% are acute myeloid leukemia (AML) and the rest are cases of chronic myeloid leukemias [22]. Little is known regarding the epidemiology, etiology and incidence of childhood cancer in developing countries [23,24].

Conclusions:

Amongst the non-malignant hematological disorders, nutritional anemias as a group were the most common disorder found on bone marrow examination in this study. Megaloblastic anemia was the most common and iron deficiency anemia was the least common in the nutritional anemia group. Aplastic anemia was the second common and most

serious non-malignant disorder found in this study. Acute lymphoblastic leukemia was the most common amongst the malignant hematological disorders followed by acute myeloid leukemia.

Ethical Clearance: Taken from ethical committee of G S medical college.

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