

## Original Research

### Investigation of hematological illnesses identified by bone marrow analysis in a tertiary care hospital

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#### ABSTRACT:

**Aim:** Investigation of hematological illnesses identified by bone marrow analysis in a tertiary care hospital. **Material and methods:** It was a prospective study performed at the Department of Pathology. 100 patients were selected for this study based on the following inclusion criteria- age  $\geq 2$  years and  $\leq 80$  years. A detailed clinical history, general and systemic examination were performed. Every case was investigated with complete blood count, peripheral blood smear with haematological parameters like bleeding time (BT), clotting time (CT), reticulocyte count prior to bone marrow examination. A written informed consent was taken from all cases. Bone marrow aspiration was done using bone marrow aspiration needle under all aseptic precautions after giving local anaesthesia by 2% lidocaine hydrochloride. **Results:** On bone marrow examination, hematological malignancies were found in 32(32%) cases, non-malignant haematological disorders were found in 55(55%) cases and normal marrow were in 13 cases (13%). Acute leukaemia (ALL, AML) were the most common malignant conditions, 14(14%) & 11(11%) respectively. The next common malignancies in this study were Chronic myelogenous leukaemia (CML) (4%) followed by myelodysplastic syndrome (3%) and Plasma cell dyscrasia (PCD) (2%). In present study out of 55 cases of non-malignant haematological disorders, maximum number of cases were of nutritional anemia, out of which 14 patients had Dual Deficiency Anemia (DDA), 13 cases had Iron Deficiency Anemia (IDA), and 10 Megaloblastic anemia. Aplastic anemia in 14% cases and HLH in 4% cases. **Conclusion:** The evaluation of bone marrow is crucial in the diagnosis of many hematologic diseases. The current investigation revealed that nonmalignant hematological disorders were more prevalent than hematologic malignancies throughout the spectrum of these diseases. Within the category of nonmalignant hematologic illnesses, the prevailing condition was Aplastic anemia and mixed nutritional deficiency anemia, which was then followed by Iron deficiency anemia, normal marrow, and megaloblastic anemia. Acute leukemias were more prevalent than chronic leukemias, with multiple myeloma being the next most frequent hematological malignancy.

**Keywords:** Hematological illnesses, Bone marrow, Anemia

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#### INTRODUCTION

Anemia is a hematological disorder which may occur in any age group. It occurs worldwide and particularly in developing countries [1,2]. Etiology of Hematological disorders vary in the developing and developed countries [3]. There are many hematological disorders which are not diagnosed by routine hematologic examination of blood samples. Therefore, bone marrow examination (BME), is most important procedure in the evaluation of hematological disorders. Bone marrow picture along with peripheral blood smear and clinical history can help in arriving at a conclusive diagnosis. It gives an assessment of hematopoietic activity along with excellent morphology of cells, differential count and myeloid to

erythroid ratio [4]. Bone marrow examination is required for the differential diagnosis of various myeloid and lymphoproliferative disorders; their prognosis and assessment of pre and post therapy, storage disorders staging of lymphomas and marrow infiltration by foreign cells [5-7]. It also gives an assessment about presence or absence of iron stores as evaluated by perls prussian blue staining and details about parasites or cell inclusions [4].

#### MATERIAL AND METHODS

It was a prospective study performed at the Department of Pathology. 100 patients were selected for this study based on the following inclusion criteria - age  $\geq 2$  years and  $\leq 80$  years. A detailed clinical

history, general and systemic examination were performed. Every case was investigated with complete blood count, peripheral blood smear with haematological parameters like bleeding time (BT), clotting time (CT), reticulocyte count prior to bone marrow examination. A written informed consent was taken from all cases.

Bone marrow aspiration was done using bone marrow aspiration needle under all aseptic precautions after giving local anaesthesia by 2% lidocaine hydrochloride. Bone marrow aspiration was taken from the upper end of tibia in children less than 2 years, Posterior superior iliac crest was used in older children and adults. An aspirate smear was made and stained with Romanowsky's stain. Bone marrow trephine biopsy was performed when the bone marrow aspiration yielded a bloody tap or dry tap and stained with hematoxylin and eosin stain. Prussian blue stain was used for iron staining. The slides were observed under the microscope and findings noted.

**RESULTS**

Among 100 patients, aged between 4 to 76 years

evaluated, majority were males 64 (64%) with M:F ratio of 1.77:1 (Table 1). In this present study, the age group of the patients was from 4 to 76 years. The maximum number of the cases (34%) were in the age group of 10-20 years. In total cases 61% patients were under 30 years of age (Table 2). On bone marrow examination, hematological malignancies were found in 32(32%) cases, non-malignant haematological disorders were found in 55(55%) cases and normal marrow were in 13 cases (13%).

Acute leukaemia (ALL, AML) were the most common malignant conditions, 14(14%) & 11(11%) respectively. The next common malignancies in this study were Chronic myelogenous leukaemia (CML) (4%) followed by myelodysplastic syndrome (3%) and Plasma cell dyscrasia (PCD) (2%). In present study out of 55 cases of non-malignant haematological disorders, maximum number of cases were of nutritional anemia, out of which 14 patients had Dual Deficiency Anemia (DDA), 13 cases had Iron Deficiency Anemia (IDA), and 10 Megaloblastic anemia. Aplastic anemia in 14% cases and HLH in 4% cases. (Table 3).

**Table 1: Sex distribution in the present study**

Sex	Number of patients	Percentage
Male	64	64
Female	36	36
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 2: Age distribution of the patients**

Age group (years)	No. of patients	Percentage (%)
≤10 Years	17	17
10-20	34	34
20-30	10	10
30-40	7	7
40-50	19	19
50-60	10	10
60-70	2	2
70-80	1	1
<b>Total</b>	<b>100</b>	<b>100</b>

**Table: 3 Distribution of Hematological disorders on bone marrow**

Diagnosis	No of cases (n)	% of cases
Acute lymphoid leukaemia	14	14
Acute myeloid leukaemia	11	11
Chronic myeloid leukaemia (CML)	4	4
MDS	3	3
Multiple Myeloma	2	2
Aplastic anemia	14	14
Iron deficiency anemia	13	13
Megaloblastic anemia	10	10
Mixed nutritional deficiency anemia	14	14
Normal marrow	11	11
Hemophagocytic lymphohistocytosis (HLH)	4	4
<b>Total</b>	<b>100</b>	<b>100</b>

## DISCUSSION

Bone marrow aspiration is a most important adjunct and a diagnostic tool for evaluation of various hematological disorders. It is one of the most widely distributed organs of the body and is principle site of haematopoiesis. Bone marrow examination is a safe invasive procedure that can be done to arrive at a final diagnosis in certain haematological disorders. A combination of clinical history of patient, examination of patient and different staining preparation on bone marrow aspiration studies aids to arrive at a correct diagnosis. It helps to evaluate cytopenias, anemia, thrombocytosis, leukocytosis and iron status.

In the present study, out of 100 cases there were 64(64%) males and 36(36%) females. Male: Female was 1.77:1. Similar result were found in various studies [1,4,8,9-11-13]. In present study commonest group of patients were (10-20) years (34%), while in other studies commonest age group above 30 years (between 31-50) [1,9,14]. In our study most common finding of BM examination were Acute Lymphoid leukemia, Aplastic anemia and Mixed nutritional deficiency anemia (14%) each, followed by Acute myeloid leukaemia 14% and Normal marrow each with (11%). Megaloblastic anemia was in 10%. This is also similar studies done by Gayathri BN et al [14], Jha A et al [15] and Pudasaini S [16]. However Nutritional anemia was the commonest etiology followed by Aplastic marrow in the study done by Shastry et al [17]. In our studies CML and HLH comprised approximately 4% of each, MDS 3% and Multiple myeloma comprised 2%.

## CONCLUSION

The evaluation of bone marrow is crucial in the diagnosis of many hematologic diseases. The current investigation revealed that nonmalignant hematological disorders were more prevalent than hematologic malignancies throughout the spectrum of these diseases. Within the category of nonmalignant hematologic illnesses, the prevailing condition was Aplastic anemia and mixed nutritional deficiency anemia, which was then followed by Iron deficiency anemia, normal marrow, and megaloblastic anemia. Acute leukemias were more prevalent than chronic leukemias, with multiple myeloma being the next most frequent hematological malignancy.

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