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### PATTERN OF HEMATOLOGICAL DISORDERS DIAGNOSED THROUGH BONE MARROW EXAMINATION

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#### Abstract

**Introduction:** Blood disorders are very common among different age groups. They usually range from anemias to advanced hematological malignancies.

**Material and Methods:** The present observational study was conducted in the Department of Pathology, M.L.B. Medical College, Jhansi to find out the incidence of different hematological disorders. marrow examination was done. SPSS software was used for data analysis.

**Results:** Hematological disorders were more common among males (63.55%) and among those aged Bone between 21-30 yrs (27.1%). Anemia was the most common diagnosis in 49 cases (41.52%) followed by leukemia in 16 cases (13.56%). Thirteen cases (11.02%) were diagnosed as malarial parasite positive in bone marrow examination.

**Conclusion:** Bone marrow examination is a useful test in reaching the final diagnosis.

**Key words:** Hematological disorders, Bone marrow examination

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#### INTRODUCTION

Hematological diseases affecting primarily the bone marrow causing an increase or decrease of any of the cellular blood elements are among the most common indications for a bone marrow study. The conditions typically include anemias, erythrocytosis, polycythemia, pancytopenia, leukemia, leucopenia and unexplained leukocytosis. The pattern of Hematological disorders is quite different in developing countries than from developed countries.<sup>1,2</sup> In most cases, a diagnosis can be made by a detailed history, physical examination and some basic blood tests. But in certain cases bone marrow examination is required for the confirmation of diagnosis.<sup>2</sup> Although bone marrow aspiration & trephine biopsy are important armamentariums in hematological diagnosis, they were neglected in the Bundelkhand region therefore this study was undertaken among patients with different

hematological disorders attending M.L.B. Medical College, Jhansi to find out the incidence of different hematological disorders.

#### MATERIAL & METHODS

The present observational eighteen months study was undertaken in the Department of Pathology, on patients with different hematological disorders attending the outdoor and indoor patient department of Medicine and Pediatrics at M.L.B. Medical College, Jhansi after taking permission from the institutional ethical committee. Informed consent from all the patients was obtained. A short clinical history of patient was taken with brief physical examination. Bone marrow examination was done. Bone marrow was withdrawn in 114 cases by posterior iliac spine approach while 4 cases were approached by sternal puncture. SPSS software was used for data analysis.

## RESULTS

Out of 118 cases on which this diagnosis procedure was carried out 75 (63.55%) were males and 43 (36.45%) were females. The highest numbers of cases were in the younger age groups maximum being 21 to 30 yrs age group (27.11%) followed by 11-20 yrs (19.49%) while the least in 61-70 yrs (5.93%). (Table 1)

**Table 1: Age wise distribution of cases**

Age in years	No. of Cases	Percentage
1-10	18	15.25%
11-20	23	19.49%
21-30	32	27.11%
31-40	19	16.10%
41-50	10	8.47%
51-60	9	7.62%
61-70	7	5.3%
<b>Total</b>	<b>118</b>	<b>100%</b>

**Table 2: Cases as per bone marrow diagnosis**

Diagnosis	No. of Cases	Percentage
Anemia	49	41.52%
No Abnormal finding Detected	33	27.96%
Leukemia	16	13.56%
Positive for Malarial Parasite	13	11.02%
Granuloma	02	1.69%
Lympholeukemia	01	0.85%
Idiopathic Thrombocytopenic Purpura	01	0.85%
Multiple Myeloma	01	0.85%
Myelodysplastic Syndrome	01	0.85%
Leukemoid Reaction	01	0.85%
<b>Total</b>	<b>118</b>	<b>100%</b>

There were 15.25% malignant disorders while 84.75% were non-malignant. Anemia was the most common diagnosis found in 49 cases (41.52%) followed by leukemia 16 cases (13.56%). Thirteen cases (11.02%) were diagnosed as malarial parasite positive in bone marrow examination. Out of a total of 49 cases of anemia a maximum number of 32 cases (65.31%) were reported as megaloblastic anemia, 09 cases (18.37%) iron deficiency anemia and 8 cases (16.32%) were reported aplastic anemia. Out of 16 cases of leukemia 12 cases (75%) were of acute variety (9 AML and 3 ALL) while 4 cases (25%) were that of chronic leukemia (2 CML+ 1 CLL+ 1 JCLL). (Table 2)

## DISCUSSION

The bone marrow is one of the body's largest organs. The hematopoietic bone marrow is organized around the vasculature of the bone cavity. The bone marrow can be sampled relatively easily using either a needle aspirate or needle biopsy technique. Hematologic diseases affecting primarily the bone marrow causing an increase or decrease of any of the cellular blood elements are among the most common indications for a bone marrow study. The posterior iliac spinous area is the thickest and largest marrow containing area in the children and adults. It is easily accessible and large amounts of red marrow can be obtained. The site is also distant from any important structures; complications are rare and as the patient cannot see the procedure, the anxiety associated with sternal puncture is avoided. We performed 118 bone marrow aspirations in 114 cases by posterior iliac spine approach while 4 cases were approached by sternal puncture. Cellularity was good in aspiration via sternal approach but the quantity was not as good as in the post. superior iliac approach. For example, in our study in one case acute lymphoblastic leukemia with clinical evidence of replaced bone marrow aspirate sample from one site was normal while aspiration from another site yielded unsatisfactory specimen. The present study confirms and shows that an important limitation of marrow examination obtained by aspirate is the admixing of marrow cellularity. The use of the biopsy needle of Jamshidi and Swaim allows adequate marrow specimens with well-preserved architecture, permitting better evaluation of cellularity. This evaluation is of particular importance in the hypercellular marrow which yields a "dry tap" or only dilutes sinus blood as quale. In the present study, males were affected more than the females. Similar findings have been reported by Rahim et al<sup>2</sup> and Anjum et al<sup>3</sup>. In our study male cases were more than female because of low socioeconomic status females tend to ignore their health problems and very few cases reach tertiary health center for their treatment. Age wise distribution revealed, out of 118 cases the highest number of cases were in the young age groups i.e. 21-30 yrs (27.11%). Similar findings were reported by Shastri et al<sup>4</sup>. In our study also

the most common pathological diagnosis was anemia (67%). Shastry et al (2012)<sup>4</sup> also concluded that the nutritional anemia is most common variety in hematological disorders. This study showed that maximum number of cases (65.31%) was reported as megaloblastic anemia followed by (18.37%) iron deficiency anemia and (16.32%) aplastic anemia. Anjum et al<sup>3</sup> also showed that megaloblastic anemia and iron deficiency anemia were more frequent in Pakistan. Out of 16 cases of leukemia 12 cases (75%) were of acute variety while 4 cases (25%) were that of chronic leukemia. Rahim et al<sup>2</sup> also showed that megaloblastic anemia was more frequent but in their study they have shown that iron deficiency anemia is least frequent. This could be due to the fact that mostly iron deficiency anemia is treated on outpatient basis and bone marrow examination is not routinely done to confirm its diagnosis. In our study leukemia was the second most common disorder found (13.56%). Majority (75%) were of acute variety while 25% were that of chronic leukemia. Anjum et al<sup>3</sup> also reported that acute leukemia was the most common hematological malignancy in their patients. In a study in Kohat<sup>5</sup>, out of 148 malignant cases, maximum (23.6%) were leukemias. In our study a higher proportion of cases were of AML followed by ALL and CML. This is similar to the studies conducted by Shastry(2012)<sup>4</sup> and Kibria et al (2010)<sup>6</sup>, where maximum cases reported were of AML. However ALL was the commonest malignancy reported in children by Rahim et al<sup>2</sup>.

Thirteen cases (11.02%) were diagnosed as malarial parasite positive in bone marrow examination in this study. Malarial infection was seen in 5.33% cases in a study by Parajuli S<sup>7</sup>.

In 33 cases (37.9%) no-abnormal finding was detected in our study. It may be due to, either patient didn't have hematological disorder or require further hematological investigations like Serum Electrophoresis, immunological investigation or PCR, which could not be performed simultaneously because of poor socio-economic status of the patients.

In inconclusive cases the examination & interpretation of bone marrow aspiration should be accompanied by other highly specific tests

including Trepine Biopsy. Kaur et al<sup>8</sup> showed that BMA and BMB are easy, rapid, cost-effective and more or less are of equal value in various hematological and non-hematological disorders of bone marrow. These observations go a long way in underlining the crucial important of BMA in hematological disorders.

## CONCLUSION

Bone marrow examination is a useful test in reaching the final diagnosis in hematological disorders.

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