

# FREQUENCY OF HEMATOLOGICAL DISORDERS BASED ON REVIEW OF BONE MARROW ASPIRATION AND TREPHINE BIOPSY FINDINGS

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## Abstract

**Objective:** To determine the frequency of various hematological disorders by using bone marrow aspirate and biopsy in a tertiary care hospital.

**Materials & Methods:** This is a cross sectional descriptive study, conducted in Pathology Department of Khyber Medical College and Khyber Teaching Hospital, Peshawar. Duration of the study is one year i.e from January 2017 to December 2017. All the patients referred to the pathology department for bone marrow aspiration were included in the study. The diagnoses were noted and results were drawn accordingly.

**Results:** Out of 300 patients, about 105 (35%) cases were diagnosed as having leukemias. This was followed by megaloblastic anemia which was seen in 75 (25%) cases, Idiopathic Thrombocytopenic purpura which was seen in about 51 patients (17%) cases. Metastatic infiltration and leishmaniasis were seen in 3(1%) case each.

**Conclusion:** Leukemia was the commonest malignant hematological disorder in this study, followed by megaloblastic anemia, which was the commonest non malignant disorder.

**Key Words:** Leukemia, Hemolytic anemia, megaloblastic anemia, Primary myelofibrosis.

## INTRODUCTION

There is a wide variety of haematological disorders ranging from benign disorders to malignant disorders<sup>1,2,3,4,5</sup>. The hematological disorders may be as simple as iron deficiency anemia, or may be as severe as leukemias<sup>5</sup>. In certain cases, it is not uncommon that the underlying hematological disorder presents with variety of symptoms<sup>5</sup>. Bone marrow examination is a very useful investigation in such cases to reach to the final diagnosis<sup>6,7</sup>. In certain

cases where bone marrow aspiration does not yield any information, the trephine biopsy proves helpful to reach to the definitive diagnosis<sup>5</sup>.

The most frequently encountered hematological disorders include leukemias, megaloblastic anemia, Idiopathic thrombocytopenia purpura, aplastic anemia, and leukemias<sup>1</sup>. All these cases can be diagnosed by review of the bone marrow aspiration and biopsy<sup>1</sup>. Leukemia is defined as malignancy of hematopoietic cells in the bone marrow<sup>5,8,9</sup>. It is diagnosed by documenting more than 20% blast cells in the bone marrow<sup>10,11</sup>. Megaloblastic anemia is caused due to deficiency of vitamin B 12 in the body<sup>7</sup>. The usual findings in megaloblastic anemia are a low hemoglobin and high mean cell volume<sup>1</sup>.

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Immune thrombocytopenia purpura is autoimmune destruction of platelets following viral infections of certain drugs<sup>12</sup>. It is diagnosed by documenting low platelet count in the peripheral blood and an increased megakaryocyte number in the bone marrow aspirate and trephine biopsy<sup>12</sup>.

The frequency of different hematological diseases varies from region to region. Therefore, the present study was done with a rationale to determine the frequency of various haematological disorders through bone marrow aspirate and trephine biopsy examination in our region.

**MATERIALS AND METHODS**

This is a cross sectional descriptive study. It was performed in the Pathology Department, Khyber Teaching Hospital, Peshawar. The study duration was one year i.e from January 2017 to December 2017. The sampling was done through non probability purposive sampling. Cases referred from OPD and wards to the pathology department for bone marrow aspirate and trephine biopsy based on their clinical features were included in the study. Patients of all age groups and both the genders were included in the study .Patients whose bone marrow aspirate and trephine samples were inadequate to make final diagnoses were excluded from the study .Patients with known hematological disorders or receiving treatment for any hematological disorder were also excluded from the study. Slides were stained with Leishman,s stain and special stains were used where required. Data regarding age, gender and final diagnosis made by bone marrow aspiration and biopsy was recorded in a proforma. Results were analyzed using SPSS version 18. Mean and standard deviation were calculated for quantitative variables e.g. age. Frequencies and percentages were calculated for qualitative variables like diagnosis and gender.

**RESULTS**

A total of 306 cases were referred for bone marrow examination during the study period out of which about 6 cases were excluded due to inadequacy of their aspirate sample. The remaining 300 cases were included in the study.

Age of the study sample ranged from 1 year to 70 years with mean of 45 ± 20 years. About 204 (68%) were males and 96 (32%) were female.

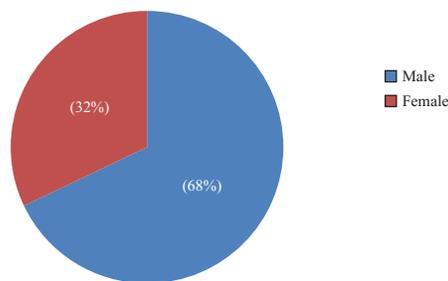


Figure 1:

Table 1: Frequency of hematological disorders in study population (n=300)

Bone Marrow Findings	Frequency (n)	Percentage (%)
Leukaemias	95	31.7
Megaloblastic anemia	65	21.7
Immune thrombocytopenic purpura	20	6.6
Hypersplenism/Excessive peripheral destruction	20	6.6
IDA	30	10
Hemolytic anemia/erythroid hyperplasia	21	7
Aplastic anemia	13	4.4
ACD	9	3
PNH	3	1
Malaria	9	3
Tuberculous lesion	6	2
Metastatic infiltration	3	1
Visceral leishmaniasis	3	1
Primary Myelofibrosis	3	1

IDA:iron deficiency anemia , ACD:anemia of chronic disorder

**DISCUSSION**

Haematological disorders are very common in the general population<sup>5</sup>. These disorders present in a number of ways with a wide variety of signs and symptoms<sup>5</sup>. It is not uncommon that sometimes the clinical signs and symptoms are unable to make the physician reach to the final diagnosis<sup>5</sup>. In such cases , clinician has to rely on bone marrow aspiration and biopsy examination . Bone marrow examination proves to be very useful in making the final diagnoses of hematological disorders<sup>6,7</sup>. If the bone marrow aspiration can not reach to final diagnosis, , then in such cases bone marrow trephine biopsy is used to

reach to the final diagnosis of the hematological disorder<sup>5</sup>.

In our study, the commonest hematological disorder leukemia, followed by megaloblastic anemia. In a study done by Khan MI in Peshawar, megaloblastic anemia was the commonest disease in study population, while leukemia was third in order seen in 22% cases<sup>8</sup>. In one study, ALL was present in 11.3% of the cases<sup>5</sup>. Similar data is reported by Khan A and Shiddappa<sup>5,9</sup>. Similar results are reported in another studies<sup>4,12</sup>.

Hypersplenism or excessive peripheral destruction was seen in 6.6% cases in our study. In a study done by Khan MI, excessive peripheral destruction was reported in about 9.4% cases<sup>1</sup>. In another study done in Saudi Arabia, a figure of 4.4% is reported for excessive peripheral destruction<sup>10</sup>.

In our study, immune thrombocytopenic purpura (ITP) was observed in 6.6% cases. In ITP, the platelet count in peripheral blood is low but the megakaryocytes in the bone marrow aspirate are increased<sup>11,12</sup>. In a study done in Peshawar by Khan MI showed that ITP was seen in 3.6% of cases<sup>1</sup>. Similar data is reported by other local and international studies done so far<sup>2,5,13</sup>.

In the present study, iron deficiency anemia was seen in 10% cases. In a study done in Peshawar, about 3.3% cases had iron deficiency anemia<sup>1</sup>. In another study conducted by Khan A, it was proposed that about 7.6% patients had iron deficiency Anemia<sup>5</sup>. Ikram N from Islamabad represented the same data<sup>14</sup>.

In our study, it was shown that myelofibrosis and visceral leishmaniasis were seen in 1% cases each. Similar pattern was reported by Khan MI and Niazi M in their studies from Peshawar<sup>1,15</sup>. Similar finding is reported from Ghana<sup>16</sup>.

In our study, tuberculous lesion was seen in 2% cases. In a study done by Wang Y et al in 2018, it was seen that tuberculous lesion was seen in 1.65% cases. This shows that tuberculous lesion is common in our region as compared to the West.

## CONCLUSION

Leukemia is the commonest hematological disorder in our region, followed by megaloblastic anemia. Myelofibrosis is the rarest disorder. Bone

marrow aspiration and biopsy can successfully make the final diagnosis of hematological diseases. Therefore, it is an important diagnostic tool in hematological workup.

## RECOMMENDATIONS

Due to high incidence of leukemia and megaloblastic anemia in our region, it is recommended that public should be made aware about causes, prevention and treatment of these diseases. It will improve the health of the community.

Further studies should be done including large number of participants to generate bigger data which can be more representative of the actual population.

## REFERENCES

1. Khan MI, Ahmad N, Fatima SH. Haematological disorders; analysis of hematological disorders through bone marrow biopsy examination. *Professional Med J* 2018; 25(6):828-834.
2. Padasaini S, Parsad KBR, Rauniyar SK, Shrestha R, Gautam K, Pathak R, et al. Interpretation of bone marrow aspiration in hematological disorders. *J Pathol Nepal* 2012; 2: 309-12.
3. Syed NN, Moiz B, Adil SN, khurshid M. Diagnostic importance of bone marrow examination in non hematological disorders. *J Pak Med Assoc* 2007; 57:123-5
4. Stiffer S, Babarovic E, Valkovic T, Seili-Bekafigo I, Stem-berger C, Nacinovic A, et al. Combined evaluation of bone marrow aspirate and biopsy is superior in the prognosis of multiple myeloma. *Diagn Pathol* 2010;5:30.
5. Khan A, Aqeel M, Khan TA, Munir A. Pattern of hematological diseases in hospitalized paediatric patients based on bone marrow examination. *JPMI*. 2008. 22(3); 196-200.
6. Bain BJ. Bone marrow aspiration. *J Clin Pathol* 2001;54:657-63.
7. Jauhar S, Balckett A, Srireddy P, Mckenna P. Pernicious anemia presenting as catatonic without signs of anemia or macrocytosis. *Br J Psychiatry* 2010; 197:244-5.
8. Shinwari N, Raziq F, Khan K, Uppal FT, Khan H. Pancytopenia: experience in a tertiary care hospital of Peshawar, Pakistan. *Rawal Med J* 2012; 37:370-3.
9. Shiddappa G, Mantri N, Antin SS, Dhananjaya. Megaloblastic Anemia secondary to Vit B-12 and folate deficiency presenting as acute febrile illness and P.U.O: A prospective study from tertiary care hospital. *Sch J App Med Sci* 2014; 2:422-5.
10. Bashawri LA. Bone marrow examination, indication

- and diagnostic value. Saudi Med J 2002; 23:191-6.
11. Hamayan M, Khan SA, Muhammad W. Investigation on the prevalence of Leukemia in NWFP of Pakistan. Turk J Cancer 2005; 35: 119-22.
  12. Muhury M, Mathai AM, Rai S, Naik R, Muktha R, Sinha R. Megakaryocytes Alteration in thrombocytopenia: Bone marrow aspiration study. Indian J Pathol Microbiol 2009; 52: 490-4.
  13. Jubelirer SJ, Harpold R. The role of bone marrow examination in the diagnosis of ITP: case series and literature review. Clin Appl Thromb Hemost 2002; 8:73-6.
  14. Ikram N, Hassan K, Bukhari K. Spectrum of hematologic lesions amongst children, observed in 963 consecutive Bone Marrow biopsies. J Pak Inst Med Sci 2002; 13: 686-90.
  15. Niazi M, Raziq F. The incidence of underlying pathology in pancytopenia - An experience of 89 cases. J Postgrad Med Inst 2004; 18:76-9.
  16. Addo GB, Amoako YA, Bates I. The role of bone marrow aspirate and trephine samples in haematological diagnoses in patients referred to a teaching hospital in Ghana. Ghana Med J. 2013; 47(2):74-8.
  17. Wang Y, Tang XY, Yuan J, Wu S Q, Chen G, Zhang MM et al. Bone marrow granulomas in a high tuberculosis prevalence setting A clinicopathological study of 110 cases. Medicine (Baltimore). 2018 ; 97(4): e9726