

# Pattern of Hematological Disorders in Abbottabad

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## ABSTRACT

**Objective:** To study the pattern of distribution of different hematological disorders in Abbottabad based on bone marrow examination results.

**Study Design:** Retrospective study.

**Place and Duration of Study:** This study was conducted at the Aksa Laboratory, Abbottabad from January 2011 to December 2013.

**Materials and Methods:** 143 patients, who presented to Aksa laboratory for bone marrow aspiration, were selected. Complete details of history, examination, blood tests were recorded. Bone marrow aspiration was performed using aseptic technique and bone marrow aspirate samples were prepared.

**Results:** Bone marrow aspirate results of 143 patients were studied. There were 104 cases (72.72%) of non-malignant hematological disorders while 39 (27.27%) of hematological malignancies. Among non-malignant hematological disorders, megaloblastic anemia was the most common disease affecting 31 patients (29.80%), followed by iron deficiency anemia in 20 patients (19.23%). There were 39 cases (27.27%) of hematological malignancies. Out of these, 23 cases (58.97%) were of acute leukemia followed in descending order by 5 cases (12.82%) of multiple myeloma and 4 cases (10.25%) of chronic myeloid leukemia.

**Conclusion:** Megaloblastic anemia was the most common disease followed by iron deficiency anemia among non-malignant hematological disorders. Acute leukemias were most common among malignant hematological disorders. Bone marrow aspiration was very useful in making a correct diagnosis and determining the cause of disease.

**Key Words:** Anemia, leukemia, malignant hematological disorders, non-malignant hematological disorders, bone marrow aspiration.

## INTRODUCTION

Blood disorders are very common ranging from anemias to the advanced hematological malignancies. They could be nutritional anemias like megaloblastic or iron deficiency anemia or they may include hematological malignancies e.g. leukemias and lymphomas. However, the pattern of these disorders is different in different geographical areas. This variation in frequency of these disorders also exists in developing and developed countries.<sup>1,2</sup>

Diseases can affect hematological system either directly or indirectly when they affect other organ systems but lead to hematological abnormalities at the same time, for example, storage diseases, cancers or hemoparasites.<sup>3,4</sup> This may be due to reduced or ineffective hemopoiesis in bone marrow, bone marrow involvement by abnormal cells, abnormal cell formation with their removal from the circulation, immune destruction, or their entrapment in overactive reticuloendothelial system.<sup>5,6</sup>

Bone marrow examination is quite a useful test which has become very important these days for the diagnosis of hematological disorder.<sup>7,8</sup> Bone marrow aspiration provides detailed information about bone marrow cellularity, its architecture and the stage of maturation of different blood cells.<sup>9</sup> It helps in the diagnosis and staging of hematological malignancies.<sup>2,10-14</sup> Therefore, it is an important diagnostic tool for hematological

disorders. It is a non-invasive procedure. The risk of complications associated with this procedure is 0.08%.<sup>15</sup> Common complications are infection, bleeding and pain at the site of biopsy.<sup>4,11,16</sup>

In this study, we have studied the frequency of different hematological disorders in Abbottabad based on bone marrow aspiration results.

## MATERIALS AND METHODS

The study was conducted from January 2011 to December 2013 at Aksa laboratory, Abbottabad. All the patients who were referred to this laboratory for bone marrow aspiration were selected. Complete history was taken and detailed physical examination was done, to look specifically for the presence of pallor, lymphadenopathy and hepatosplenomegaly. The complete blood count including hemoglobin, total and differential leucocyte count, total platelet count, reticulocyte count and blood indices were performed using haematology analyzer (Erma Ink, PLC 210). Peripheral blood smear examination was done after Leishman staining.

For bone marrow aspiration, standard protocol was followed.<sup>14,17,18</sup> The procedure was performed following aseptic technique. Iliac crest was the most common site used for this procedure. However, sternum was used for aspiration in obese patients. Patients were observed after the procedure to make sure that their vitals remained stable.

Sterile test tubes, containing anticoagulant (Ethylenediaminetetraacetic acid, EDTA), were used to collect bone marrow aspirate. The bone marrow aspirate was stained with Giemsa and Leishman stain and then examined for the presence of cellularity, megakaryocytes, immature cells, hemoparasites and the presence or absence of the iron stores (after Periodic acid-Schiff (PAS) staining).<sup>14</sup>

## RESULTS

There were total 168 patients. Out of these 168 patients, 25 cases were not included in the study because either the bone marrow aspiration was unsuccessful or complete details of patient's record were not available. Rest of 143 patients were included in this study. Out of these 143 patients, 79 (55.24%) were males and 64 (44.76%) were females as shown in Table 1. The male to female ratio was 1.2:1.

**Table No.1: Gender distribution of study population**

| Gender | No of patients | Percentage |
|--------|----------------|------------|
| Male   | 79             | 55.24%     |
| Female | 64             | 44.76%     |
| Total  | 143            | 100%       |

Frequency of different diseases as diagnosed on the basis of bone marrow aspiration examination results were shown in Table 2, 3, & 4. There were 104 cases (72.72%) of non-malignant hematological disorders while 39 (27.27%) of hematological malignancies.

**Table No.2: Malignant & non-malignant hematological disorders on the basis of bone marrow aspiration examination**

| Disease Type                      | No of patients | Percentage |
|-----------------------------------|----------------|------------|
| Non-Malignant Hematological Cases | 104            | 72.72%     |
| Malignant Hematological Cases     | 39             | 27.27%     |
| Total                             | 143            | 100%       |

Among non-malignant hematological disorders, megaloblastic anemia was the most common disease affecting 31 patients (29.80%), followed in descending order by iron deficiency anemia in 20 patients (19.23%), mixed deficiency in 9 cases (8.65%) and hemolytic anemia in 5 cases (4.80%) as shown in Table 3. There were 3 cases (2.88%) each of pancytopenia, aplastic anemia and lipid storage disorders. Among hemoparasites, there were 4 (3.84%) cases of visceral leishmaniasis.

Hematological malignancies accounted for about 39 cases (27.27%). Out of these, 23 cases (58.97%) were of acute leukemia including both acute myeloid and acute lymphocytic leukemia; 09 cases (23.07%) were of acute leukemia while 8 cases (20.15%) of acute myeloid and 06 cases (15.38%) of acute lymphoblastic

leukemia, followed by 5 cases (12.82%) of multiple myeloma and 4 cases (10.25%) of chronic myeloid leukemia as shown in Table 4.

**Table No.3: Spectrum of Non-malignant hematological disorders**

| Disease                             | No of patients | Percentage |
|-------------------------------------|----------------|------------|
| Megaloblastic Anemia                | 31             | 29.80%     |
| Iron Deficiency Anemia              | 20             | 19.23%     |
| Mixed Deficiency Anemia             | 09             | 8.65%      |
| Normal Active Marrow                | 13             | 12.5%      |
| Reactive Marrow                     | 6              | 5.76%      |
| Hemolytic Anemia                    | 5              | 4.80%      |
| Visceral Leishmaniasis              | 4              | 3.84%      |
| Pancytopenia                        | 3              | 2.88%      |
| Aplastic Anemia                     | 3              | 2.88%      |
| Storage Disease                     | 3              | 2.88%      |
| Idiopathic Thrombocytopenic Purpura | 2              | 1.92%      |
| Hypoplastic Marrow                  | 2              | 1.92%      |
| Depressed Erythropoiesis            | 2              | 1.92%      |
| Myeloid Hyperplastic Marrow         | 1              | 1%         |
| Total                               | 104            | 72.72%     |

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**Table No.4. Spectrum of malignant hematological disorders**

| Disease                          | No. of patients | Percentage |
|----------------------------------|-----------------|------------|
| Acute Leukemia (Uncharacterized) | 9               | 23.07%     |
| Acute Lymphoblastic Leukemia     | 8               | 20.15%     |
| Acute Myeloid Leukemia           | 6               | 15.38%     |
| Multiple Myeloma                 | 5               | 12.82%     |
| Chronic Myeloid Leukemia         | 4               | 10.25%     |
| Chronic Lymphocytic Leukemia     | 2               | 05.12%     |
| Lymphoproliferative Disorder     | 4               | 10.25%     |
| Lymphoma                         | 1               | 02.56%     |
| Total                            | 39              | 27.27%     |

## DISCUSSION

There is a broad range of hematological disorders including diseases ranging from nutritional anemias to

hematological malignancies. Spectrum of these diseases is different among different geographical areas.

Our study showed that nutritional deficiency anemias were very common (57.69%) non-malignant hematological disorders. Among these, megaloblastic anemia has the highest incidence. This has also been shown by other studies.<sup>2,19</sup> But, Rahim et al have shown in their study that iron deficiency anemia is least prevalent type of nutritional anemia.<sup>2</sup> Contrary to this, our study has shown that iron deficiency anemia was the second most common type of anemia followed by mixed deficiency anemia. This is in line with other studies which had shown iron deficiency to be the common nutritional anemia in the world<sup>20,21</sup>.

In this study, 39 (27.27%) cases of hematological malignancies were found in our study group. Out of these cases, 23 (58.97%) were of acute leukemia. This shows that acute leukemia is the most common hematological malignancy in our patients. There were 8 (34.78%) cases of acute lymphoblastic leukemia while 6 (26.08%) were acute myeloid leukemia. This is in consistent with the study done by Shazia et al where acute lymphoblastic leukemia was the commonest hematological malignancy followed by acute myeloid leukemia.<sup>22</sup> In our study, about 9 cases (39.13%) were of acute leukemia but these were difficult to characterize into any of the groups. These cases require further advanced investigations. Other malignancies in this study were multiple myeloma (12.82%) and chronic myeloid leukemia (10.25%).

There were 4 (3.84%) cases of visceral leishmaniasis. Visceral leishmaniasis can lead to hematological abnormalities e.g. pancytopenia, myelofibrosis and myelodysplasia.<sup>23</sup> The incidence of visceral leishmaniasis is low as shown in our study which corroborates the results obtained in earlier studies.<sup>2, 4, 24</sup> Hemoparasites can be a cause of hematological abnormality and they should be an important part of work-up of any patient with advanced hematological disorder.<sup>4, 23</sup>

There were 3 cases (2.88%) of lipid storage disorders. These disorders frequently involves bone marrow and can manifest as hematological abnormalities e.g. anemia, leucopenia & thrombocytopenia<sup>3, 25-27</sup>. Bone marrow aspiration is quite useful in diagnosing these disorders.

Idiopathic Thrombocytopenic Purpura (ITP) is a common hematological disorder. In our study, there were two cases (1.92%) of ITP. This incidence is quite low as compared to other studies. The frequency of ITP was 9.43% and 7.8% in studies conducted by Rahim et al and Zeb jan et al respectively.<sup>2, 22</sup>

## CONCLUSION

Our study has shown that the megaloblastic anemia was the most common diagnosis in patients with non-malignant hematological disorders while acute

leukemias were the most common in the group of malignant ones. Many diseases e.g. visceral leishmaniasis & storage disorders, can present in the form of hematological abnormalities. Hence, they should be considered as a part of work up of any patient presenting with blood disorders.

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