Study of Liver and Kidney Biochemical Variations in Patients with Various Morphological Types of Leukemia at a Tertiary Healthcare Hospital

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Abstract

Leukemias are malignant neoplasm of the haematopoietic stem cells, arising in the bone marrow that flood the circulating blood or other organs. The objective of this study was to find out the effect of leukemia on liver and renal function of the patients at our institute. Present study is a prospective study which includes the findings and observations of 25 patients diagnosed with leukemia of various types such as acute lymphoblastic leukemia, acute myeloid leukemia, chronic myeloid leukemia and chronic lymphocytic leukemia. Diagnosis of the patients were made by their peripheral smear examination and various parameters counted by automated haematology analyzer and their confirmation was made by using special stains and bone marrow examination. Liver and renal function tests were performed in the patients and results were observed. In acute myeloid leukemia liver function tests were found altered with mainly rise in serum alkaline and alanine transferase, in acute lymphoblastic leukemia, there was marked increase in alkaline phosphatase with normal or decreased SGOT and SGPT value, in chronic myeloid leukemia increase in uric acid was observed with slight fluctuating values in SGOT/SGPT but no significant changes were seen in patients with chronic lymphocytic leukemia.

Keywords: Leukemia, Acute Myeloid Leukemia, Acute Lymphoblastic Leukemia, Chronic Myeloid Leukemia, Chronic Lymphocytic Leukemia.

Introduction

Leukemia is white blood cells cancer, which is characterized with production of immature blood cells. Overcrowding of bone marrow with this abnormal immature cells, which interference with normal blood cells production, this may be lead to hyperleukocytosis, cytopenias, liver and kidney failure they are classified on the basis of the cell type involved (myeloid vs lymphoid) and the state of maturity of leukemia cells. Acute leukemias are characterized by the presence of immature cells called blasts and by rapidly fatal course in untreated patients; chronic leukemias are associated at least initially, with well
differentiated (mature) leukocytes and a relative indolent course. It is common to find malignant infiltration of the liver in hematogenous malignancies such as acute leukemia. Hepatic involvement is usually mild and clinically silent at the time of diagnosis. Acute leukemia patients, Acute Lymphoblastic Leukemia (ALL) and Acute Myeloid Leukemia (AML), the clinical features are very vague and variable. However, certain patients with acute leukemia present with hyperleukocytosis and cytopenias. B-Cell chronic lymphocytic leukemia (CLL) is a usually indolent disease that may infiltrate the liver, but based on a review of the literature, has never been reported to induce acute liver failure. Most of acute leukemia patients have organs enlargement as splenomegaly and hepatomegaly, this might be caused by infiltration of leukemic cells, which are seen in some cases of leukemia. Acute liver failure considers as the initial manifestation of acute leukemia, also it is extremely rare, it is difficult to diagnose due to the rapid progression. It has been described in acute lymphoblastic leukemia far more than in acute myeloid leukemia because of blasts infiltration in ALL more than in AML.

In addition, acute renal failure has been reported as complicated feature in many of leukemia cases. Multiplication and overgrowth of malignant cells increase rate of turn over nucleic acid and this can cause acute renal failure due to the release of urate salts, which may deposited in renal tubule and cause blocking it. Also, high cell turnover may be causes elevated lactate dehydrogenase. However, leukemia patients characterized with infection and inflammation this may be reason for elevated the rate of erythrocyte sedimentation.

**Aim And Objective**

To study the effect of leukemia on liver and renal function of different leukemic patients in central India.

**Type of study-** Prospective

**Materials and Methods**

**Sample size-** 25 cases diagnosed with leukemia. In the present study patients diagnosed with leukemia were selected to perform liver and renal function tests and then observed for results. Diagnosis of the patients were made by their peripheral smear examination, special stains and bone marrow examination were required and various parameters counted by automated haematology analyser. On admission, patients were subjected to physical examination for fever, cervical lymphadenopathy, hepatomegaly, splenomegaly and cachexia. Consent, complete clinical and past history was taken from the patients for evaluation.

**Results**

The results were recorded and tabulated for further analysis. Table no. 1, 2, 3 and 4 shows the various observed parameters in the patients.

| S.NO | AGE/SEX | DIAGNOSIS | SGOT | SGPT | URIC ACID | ALK PHOSPHATASE |
|------|---------|-----------|------|------|-----------|----------------|
| 1    | 45/M    | AML       | 247  | 71   | 10.4      | 215            |
| 2    | 25/F    | AML       | 115  | 61   | 12        | 88             |
| 3    | 25/M    | AML       | 90   | 70   | 6.2       | 60             |
| 4    | 28/F    | AML       | 64   | 45   | 4.8       | 67             |
| 5    | 50Y/M   | CML       | 52   | 62   | 8.7       | 84             |
| 6    | 18Y/M   | AML       | 34   | 58   | 2.8       | 50             |
| 7    | 7/M     | ALL       | 26   | 12   | 6.2       | 82             |
| 8    | 60/M    | AML       | 25   | 16   | 4.1       | 92             |
| 9    | 40/F    | AML       | 23   | 21   | 3.5       | 128            |
| 10   | 3/M     | ALL       | 18   | 16   | 5.4       | 111            |
Discussion
Acute leukemia is a heterogeneous disease with distinct manifestations and disturbance in different metabolic processes occurring in acute leukemia patients[7]. At the cellular level, acute leukemia’s are rapidly progressing diseases, which characterized with over growth of immature malignant cell and this lead to decrease synthesis of mature normal blood cell due to suppression of hematopoiesis and this lead to anemia, thrombocytopenia, and hyperleukocytosis, all of this lead to fever, fatigue, infection, and bleeding [8]. Continously divided and overproduced of immature cells in the bone marrow caused damage in some organs due to spreading (infiltrating) of blasts cells to other organs [9].

In the present study, all cases were subjected to hematological and clinical studies. Increase in leucocyte count was observed in all leukemias. In AML, most of studies have found that hyperleukocytosis is unfavourable prognostic factor[1]. AML patients with hyperleukocytosis have demonstrated low rate of complete remission, low disease free survival and overall survival as well as high rates of early mortality. In ALL, there are consistent data regarding the poor prognosis of hyperleukocytosis, so hyperleukocytosis correlated with high rate of death as compare to patients with low or normal white blood count.

In acute myeloid leukemia liver function tests were found altered with rise in serum aspartate and alanine aminotransferase. The maximum

Table No.2 Characterization of Leukemia in the Study

| S.No | Diagnosis | No. Of Cases | Percentage |
|------|-----------|--------------|------------|
| 1    | AML       | 13           | 52         |
| 2    | ALL       | 06           | 24         |
| 3    | CML       | 04           | 16         |
| 4    | CLL       | 02           | 08         |

Table No.3- Clinical Symptoms Observed

| S.No | Symptoms     | No. Of Cases | Percentage |
|------|--------------|--------------|------------|
| 1    | Fever        | 22           | 88         |
| 2    | Cachexia     | 08           | 32         |
| 3    | Splenomegaly | 10           | 40         |
| 4    | Hepatomegaly | 13           | 52         |
| 5    | Lymphadenopathy | 19       | 76         |

Table No.4- Male and Female Preponderance

| S.No | Sex  | No. Of Cases | Percentage |
|------|------|--------------|------------|
| 1    | Male | 19           | 76         |
| 2    | Female | 06          | 24         |
Liver failure caused by infiltration of leukemia is uncommon and usually associated with a poor prognosis. Acute leukemias, and transformation of chronic leukemias to acute stages have all been associated with sporadic cases of acute liver failure.

Based on a review of the current literature, only three cases of liver failure have so far been associated with CLL. Greer et al. described a case of acute liver failure attributable to organ infiltration by a T-cell CLL.

Conclusion
In conclusion, leukemia is a heterogeneous malignant disease in which different clinical manifestation are shown. Complete blood count and peripheral smear examinations along with bone marrow examination flow cytometry are helpful in arriving at diagnosis of acute and chronic leukemia. Any disturbance in liver function tests or kidney function test may act as prognostic alarm for the presence of organ damage and repetitive analysis is important to observe the course of the disease at various age groups.

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