To Study the Spectrum of Leukemia and Lymphoma with LDH and Sodium Levels with Pre- and Post-Chemotherapy

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ABSTRACT

BACKGROUND
The term lymphoma identifies two distinct groups of neoplasms namely non-Hodgkin’s Lymphoma and Hodgkin’s disease. Leukaemias are malignant disorders of the hematopoietic tissues. We wanted to study the spectrum of leukaemias and lymphomas with regard to LDH and sodium levels pre and post chemotherapy.

METHODS
The study was conducted among 46 patients for a period of 2 years in LTBRKM Hospital, Jagdalpur, Chhattisgarh. Patients between the age of 17 years and 75 years were included in this study. Patients were assessed based on a diagnosis of leukemia and lymphoma. Permission from institutional ethics committee was obtained. All patients with a confirmed diagnosis of leukemia or lymphoma were included in the study. Patients less than 14 years of age and above 75 years of age were excluded from the study.

RESULTS
Number of persons was more in the age group 31-40 years and less in the age group 51-60 years. Out of 46 patients, 24 were of post sodium leukemia and 22 were of lymphoma. The mean value was 141 and standard deviation was 6.31 for post sodium leukemia, and the mean value was 139 and standard deviation was 73 when lymphoma. Out of 46 patients, 24 were of pre sodium leukemia and 22 were of lymphoma. The mean value was 135.79 and standard deviation was 6.43 for pre sodium leukemia, and the mean value was 137.09 and standard deviation was 7.1 was lymphoma.

CONCLUSIONS
LDH levels prior to treatment are known to predict the development of azotaemia and high levels of uric acid in the chemotherapy period. Measurement of LDH values is important in both leukaemias and lymphomas.

KEYWORDS
Leukemia, Lymphoma, Sodium Levels, Lactose Dehydrogenase, Pre- and Post-Chemotherapy
BACKGROUND

Increased cellular LDH activity reflects a shift towards anaerobic metabolism of malignant cells accompanied by a high turnover rate. In hematopoietic tissues erythrocytes contain mainly LDH -1-3 while LDH -5 is the predominant isoenzyme in proerythroblasts and early normoblasts. Serum calcium abnormalities are a frequent and well recognized complication of many malignancies a few cases have been reported in association with haematological malignancies, reviewed sixty-one cases of hypercalcemia in neoplastic disease, which included one case of acute leukemia. 100 cases of hypercalcemia and malignancy included one case of acute leukemia and hypercalcemia; in that case the serum phosphorous concentration was low.

The occurrence of hypercalcemia in the malignant lymphomas has been reported by Moses and Spencer. Hypercalcemia in malignant lymphoma may occur by different mechanism. In the setting of extensive bone or marrow involvement. E.g. in retro virus-related adult T cell lymphoma, strong evidence points to the production of local factors leading to osteoclast activation and resulting in bone resorption. Multiple leucocyte products have now been identified which have potent bone resorbing properties in vitro. In the absence of demonstrable bone or bone marrow involvement, hypercalcemia in lymphoma has been described to a humoral factor. Recent attention has focused on calcitriol, the 1, 25 hydroxyl derivative of vit D3.

METHODS

The study was conducted on 46 patients in LTBRKM Hospital Jagdalpur Chhattisgarh. All patients with a diagnosis of Leukemia and lymphoma were assessed. Only those who fully satisfied both the inclusion and exclusion criteria were included in the study. Permission from institutional ethics committee was obtained. Patients included in the present study were patients above the age 17 years and below the age 75 years. All patients were subjected to complete blood examination, chemistries of blood, and urine abdominal ultra-sonography and chest radiography. Treatment included chemotherapy and supportive measures. Instituted a uniform protocol of investigations and management of the patients with Leukemia or lymphoma. Supportive treatment included allopurinol (5 to 10 mg/kg/day) which was commenced in all patients shortly after diagnosis confirmed. For the average sized adult patient the upper limit of normal creatinine was set at 1.3 mg/dl.

All patients in whom a diagnosis of leukemia or lymphoma was confirmed were included in the study. Patients less than 14 years of age, more than 8 years of age And patients not willing for chemotherapy were excluded from the study.

RESULTS

Statistical Analysis

The data was analysed as follows. The descriptive statistics were computed. These included the range, mean and standard deviation for quantitative variables and category frequency counts for qualitative variables. For statistical analysis t test was used.

Table 1. Age Distribution of Persons with Leukemia or Lymphoma

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of Persons With Leukemia or Lymphoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 20 Years</td>
<td>6</td>
</tr>
<tr>
<td>21 - 30 Years</td>
<td>10</td>
</tr>
<tr>
<td>31 - 40 Years</td>
<td>11</td>
</tr>
<tr>
<td>41 - 50 Years</td>
<td>8</td>
</tr>
<tr>
<td>51 - 60 Years</td>
<td>4</td>
</tr>
<tr>
<td>61 - 75 Years</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
</tr>
</tbody>
</table>

Table 2. Serum LDH Levels in Patient with Leukemia or Lymphoma Pre-Chemotherapy and Post-Chemotherapy

<table>
<thead>
<tr>
<th>Group Statistics Diagnosis</th>
<th>No. of Persons</th>
<th>Mean S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre LDH leukemia</td>
<td>24</td>
<td>706.42</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>22</td>
<td>501.92</td>
</tr>
<tr>
<td>Post LDH leukemia</td>
<td>24</td>
<td>371.92</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>22</td>
<td>303.23</td>
</tr>
</tbody>
</table>

Table 3. Serum Sodium Levels in Patients with Leukemia or Lymphoma Pre-Chemotherapy and Post-Chemotherapy

<table>
<thead>
<tr>
<th>Group Statistics Diagnosis</th>
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<tr>
<td>Pre Sodium leukemia</td>
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<td>135.79</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>22</td>
<td>137.09</td>
</tr>
<tr>
<td>Post Sodium Leukemia</td>
<td>24</td>
<td>141.13</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>22</td>
<td>139.00</td>
</tr>
</tbody>
</table>
was 135.79 and standard deviation was 6.43 for pre sodium leukemia, and the mean value was 137.09 and standard deviation was 7.1 was lymphoma. Out of 46 persons 24 were of post sodium leukemia and 22 were of lymphoma. And the mean value was 141 and standard deviation was 6.31 for post sodium leukemia, and the mean value was 139 and standard deviation was 733 was lymphoma.

**DISCUSSION**

Zusman J. et al reported in the “tumour lysis syndrome” the hypocalcaemia may be due to the release of cellular phosphate or to renal tubular damage and hypoparathyroidism secondary to cell lysis and release of toxic tumour products. Aderka D et al reported the occurrence of renal failure with hyperphosphatemia had hypocalcaemia in leukemic patients after chemotherapy is a possible complication of drug therapy. In “tumour lysis syndrome”, the hypocalcaemia may be due to the release of cellular phosphate or to renal tubular damage and hypoparathyroidism secondary to cell lysis and release of toxic tumour products. Patients with neoplastic disease can also develop hypophosphatemia, either through renal tubular wasting or through uptake of phosphate by the tumour.

Stamp TCB et al reported recent chemotherapeutic advances have made it possible to achieve an initial bone marrow remission in over 80% of patients with ALL since the organic and inorganic phosphorous content of lymphoblasts is greater than that of normal cells, the rapid destruction of these immature cells during the imitation of chemotherapy results in the release of a phosphorous load that in turn causes hypocalcaemia.

Irvin H et al reported that renal insufficiency develops when urine becomes supersaturated with urate and crystals of uric acid form in the renal tubules and distal collecting system. The disorder occurs most often with haematoLOGY malignancies, particularly with leukaemias, high grade lymphomas and myeloproliferative diseases. Patients with these complications are managed with hydration, alkalinisation, diuretics and the reduction of uric acid levels using allopurinol or urate oxidase. Allopurinol xanthine oxidase, an enzyme that catalyses the conversion of hypoxanthine and xanthine to uric acid.

Patients with malignancies highly responsive to chemotherapy have been reported to be prone to severe metabolic derangement during remission induction. The prototype among these malignancies is lymphoma, which is rapidly growing within a short period following chemotherapy, the clinically apparent tumour regress. Although certain components such as potassium and phosphorous are potentially re-utilizable, their quantity and rate of release require efficient, elimination in order to avoid toxic accumulation. Certain nucleic acid constituents which cannot be re-utilized must be regulated by allopurinol therapy to avoid accumulation of poorly soluble metabolites.

Hypocalcaemia is occasionally seen in patients with hematologic malignancies and appear to be multifactorial in origin. Brindlay et al reported the LDH exists in many different cell systems, and subsequent to tissue or cell damage, serum LDH levels may be elevated. A relationship between neoplasia and increased levels of LDH has been reported by many workers in both human and animal tumours. According to Mahmoud et al tumour lysis syndrome is a metabolic derangement consists of hyperuricemia, hyperphosphatemia, hyperkalaemia and hypocalcaemia. The nature and severity of the metabolic alterations are variable. Major complications are oliguric acute renal failure and delays in initiating chemotherapy.

Perry et al reported the elevated serum and urinary muramidase lysozyme level with the leukemic subtype and the development of hypokalaemia and the renal tubular defect have produced conflicting results.

**CONCLUSIONS**

LDH levels prior to treatment are known to predict the development of azotaemia and high levels of uric acid in the chemotherapy period. Measurement of LDH values is important in both leukaemias and lymphomas.

**REFERENCES**


