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Research Article

**IMPORTANCE OF SERUM LACTATE DEHYDROGENASE 2
ISOENZYME AS AN INDICATOR OF BONE MARROW
INFILTRATION IN NON-HODGKIN LYMPHOMA**¹Hafsah Mansoor Khan, ²Hamza Mansoor Khan¹Quaid E Azam Medical College Bahawalpur²Sharif Medical and Dental College Lahore

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Abstract:

Aim: To assess serum lactate dehydrogenase 2 (LD2) levels in patients with NHL with and without bone marrow penetration.

Introduction: Lactate dehydrogenase (LDH) is significantly increased in patients with haemopoietic cancer and has been shown to have prognostic value, especially in patients with non-Hodgkin's lymphoma. Serum LD2 is determined in 60 patients who have previously been diagnosed with NHL.

Place and Duration: In the Oncology Department of Allied Hospital Faisalabad for one-year duration from March 2019 to February 2020.

Goals and Objectives: Patients were separated into 2 groups with 30 bone marrow infiltrates (group B) and were left without infiltration (group C). The values were equated with 20 healthy persons in terms of sex and age (group-A). Estimates were made before the chemotherapy initiation.

Results: LD2 levels in NHL patients increased significantly compared to controls. There was also a substantial difference among the values of NHL patients with & without bone-marrow infiltration. The levels showed a positive correlation with the spread of the disease.

Conclusion: We find that the above-mentioned non-invasive parameter is a useful indicator of the extent of the disease.

Key words: Hodgkin's disease, non-Hodgkin's lymphoma, lymphatic lymph tissue, lactate dehydrogenase.

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INTRODUCTION:

Lymphomas are malignant tumors of the lymphatic system. Lymphoma occurs when lymphocytes become malignant, they double and accumulate faster than normal or may last longer than normal lymphocytes. In malignant lymphomas, most cells freeze in one phase of normal difference¹⁻³. 2 common types of lymphoma are called Hodgkin's disease and non-Hodgkin's lymphoma.

In NHL, the primary manifestation of the disease is in normal lymphoma, lymph node, spleen, MALT region (lymphoid tissue associated with mucosa), or anywhere except in the bone marrow⁴. The lymph node and lymphomas outside the spleen are called extra-node lymphomas. When the disease affects the bone marrow in NHL, IV disease⁵⁻⁶. It is said that he goes on stage.

In patients with NHL, patients may have general and localized peripheral lymphadenopathy, which is clinically indistinguishable from Hodgkin's disease, but important constitutional symptoms such as fever, night sweats or weight loss in NHL, EH. In addition to a handful of macrophage cancers, NHL creates a frightening and comprehensive family of lymphoid cancers, including various malignant B cell lymph node malignant tumors and several less common T cell proliferations⁷⁻⁸. Determining the severity after histological diagnosis of malignant lymphoma determines the extent and location of the disease that determines the treatment protocol. Patients who do not respond to conventional therapy can benefit from research methods⁹. Among biological markers, lactate dehydrogenase is the most important, which reflects the proliferative activity and invasive potential of lymphoma¹⁰⁻¹⁴. Lactate dehydrogenase (LDH) has a molecular weight of 135,000 daltons. It is a zinc comprising

enzyme. LDH catalyzes the reversible oxidation of lactate to pyruvate. It is stated at advanced levels when lymphocytes divide or cells are exchanged or damaged¹⁵⁻¹⁷. Increased LDH is an indicator of disease progression. May show rapid growth transformation. There are five iso-enzymes whose structure is slightly different from LDH. LDH2 is concentrated in lymphocytes.

MATERIAL AND METHODS:

This study is a cross-sectional study conducted regardless of age and gender and has been divided into the following groups in the Allied Hospital Faisalabad for one-year duration from March 2019 to February 2020.

Group A: normal healthy controls (n = 20)

Group B: NHL patients with-out bone-marrow penetration (n = 30)

Group C: NHL patients with-bone-marrow penetration (n = 30)

Recently diagnosed NHL cases were examined by lymph node biopsy in front of the chemotherapy center. Patients with renal failure, myocardial infarction, skeletal muscle disease, liver failure, malignancies, and hemolytic anemia due to any other intestinal infarction, systemic stroke and infectious mononucleosis were excluded.

Serum lactate dehydrogenase 2 levels (LDH2) were measured by agarose gel electrophoresis at the Lahore Excellace Molecular Biology Center (CEMB). The outcomes were examined using the Student's t test.

RESULTS:

The mean serum LD2 level was $29.1 \pm 4.08\%$ in the control group and $39.83 \pm 2.09\%$ in the B group, while it was $52.53 \pm 4.47\%$ in the C group.

Table I: LD2 Levels in Controls and NHL

Parameter	Controls (n = 20)	Non-penetration (n = 30)	P-value
LD2(%age)	29.1 ± 4.08	39.83 ± 2.09	< 0.001*

The difference between the average levels of control and NHL patients with and with-out bone marrow penetration was quite significant ($P < 0.00$) (Tables I, II, III and Figures I, II, III). In 6 (20%) cases with leukocytosis, LD2 values were 54–60% and the average value was $57.5 \pm 2.07\%$.

The highest values (60% and 59%) were observed in 2 (7%) cases with peripheral exudate. The cut-off limit for serum LD2 concentration between groups B and C based on the data is 45%. Infiltration cases showed values above this cut limit.

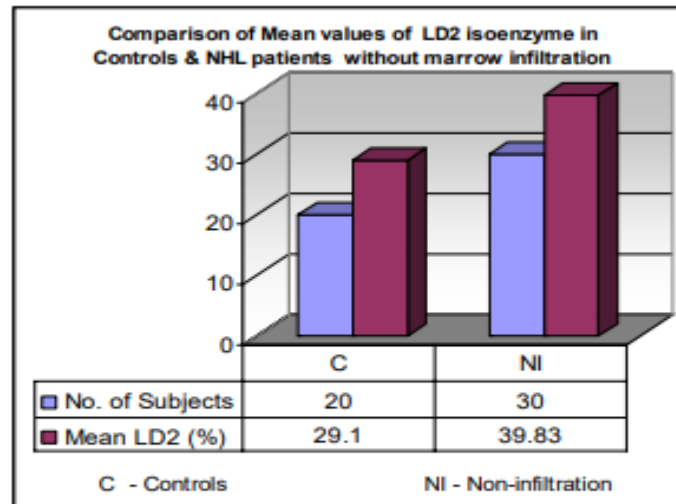


Figure I: Comparison of mean values of LD2 isoenzyme in controls and NHL patients without marrow infiltration.

Table II: LD2 Levels in Controls and NHL Patients with Bone-Marrow Penetration

Parameter	Controls (n = 20)	penetration (n = 30)	P-value
LD2(%age)	29.1 ± 4.08	52.53 ± 4.47	<0.001*

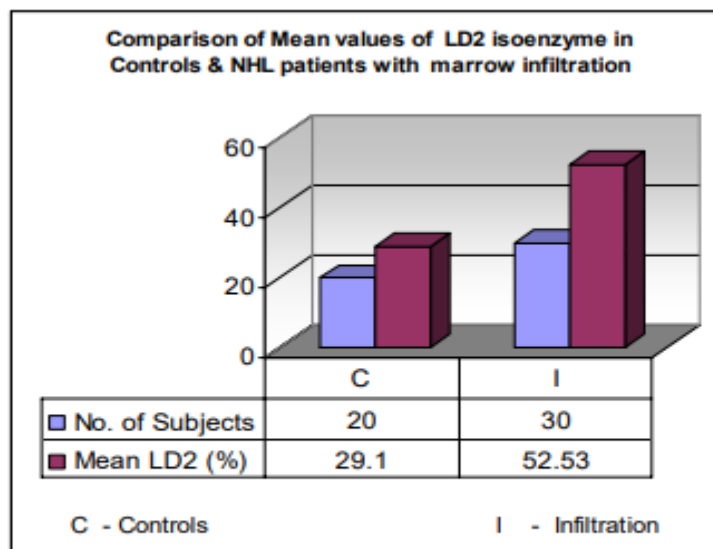


Figure II: Comparison of mean values of LD2 in controls and NHL patients with marrow infiltration

Table III: Comparison of LDH2 In Patients of Non-Hodgkin's Lymphoma

Parameter	Non-penetration (n = 30)	penetration (n = 30)	P-value
LD2(%age)	38.83 ± 2.52	52.53 ± 4.47	<0.001*

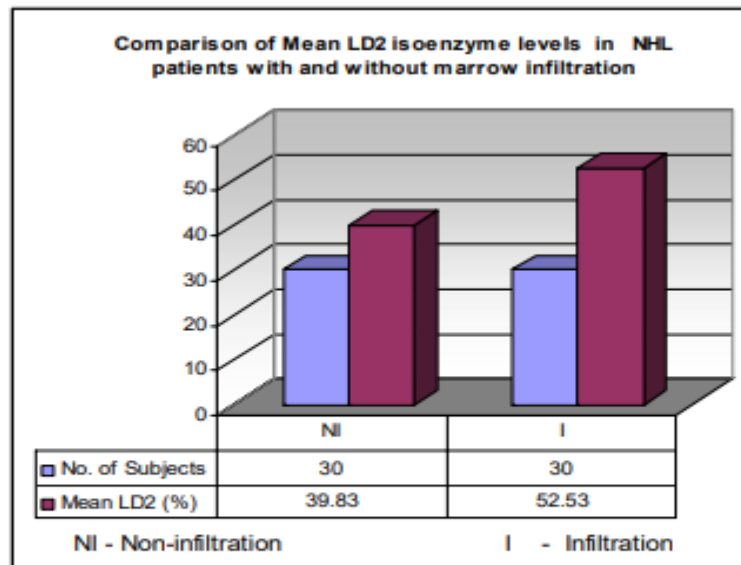


Figure III: Comparison of mean LD2 isoenzyme levels in controls and NHL patients with and without marrow infiltration

DISCUSSION:

In this study, the average LD2 level in the controls was $1.51 \pm 0.43\%$. The average level in NHL patients without bone marrow infiltration was $2.41 \pm 0.48\%$. It was $3.9 \pm 0.7\%$ in patients with NHL with bone marrow penetration. The average LD2 level in NHL patients with and without bone marrow penetration increased significantly compared to controls ($p < 0.001$)¹⁸. Similar observations were reported by Csako 1982, Rotenberg 1983, Paule 1984, Maruyam 1994, Dumontet 1999, Boufia 2004. Csako 1982 stated that the highest activity of LD2 isoenzyme is useful in assessing tumor burden and prognosis in patients with NHL. According to Rotenberg 1983, high serum

LD levels, mainly with LD2, may be early and may be the only symptom of latent malignant lymphoma.

Dumontet 1999 said that there are some characteristic profiles of serum LD isoenzymes in patients with NHL, and some of these specific changes may help correct the prognostic value of total serum LDH. Boufia 2004 said LD2 is a biochemical marker of cancer and cell differentiation¹⁹. The increase in LD2 was a sign of evolution towards a more aggressive stage of the disease. There are characteristic changes in serum LD2 levels in NHL patients²⁰.

Boufia 2004 also reported that 49% of 160 patients had an increase in serum LDH. Analysis of LD isoenzyme profiles in all patients showed a higher percentage of isoenzyme 2 in patients with NHL (both diagnosis and relapse), and total LDH showed

superiority in LD2 isoenzymes. It also indicates that the first is a more reliable indicator of malicious potential in NHL.

CONCLUSION:

In the light of the above observations, it was found that 58% of NHL patients had elevated LD2 isoenzyme and a significant increase in patients with bone marrow infiltration. Therefore, LD2 may be an indicator of the extent of the disease.

As a non-invasive parameter, it can be used to assess the proliferative activity and invasive potential of lymphoma.

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