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SERUM LACTATE DEHYDROGENASE 2 ISOENZYME AS BONE MARROW INFILTRATION MARKER IN PATIENTS WITH NON-HODGKIN LYMPHOMA

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Abstract:

Objectives: *To assess the level of serum lactate dehydrogenase 2 (LD2) in patients with NHL with and without bone marrow infiltration.*

Place and Duration: *In the Oncology department of Mayo Hospital, Lahore for one-year duration from September 2019 to September 2020.*

Introduction: *Lactate dehydrogenase (LDH) is often elevated in patients with hematopoietic tumors and has been shown to be prognostic, especially in patients with non-Hodgkin's lymphoma (NHL). The level of the LD2 isoenzyme in the serum was determined in 60 already diagnosed patients with NHL.*

Aims and Objectives*: The patients were divided into two groups, 30 patients with bone marrow infiltration (group B) and the rest without infiltration (group C). The values were compared with 20 healthy controls matched for age and sex (Group A). Estimates were made before starting chemotherapy.*

Results: *LD2 level was significantly increased in NHL patients compared to the control group. There was also a significant difference when the values were compared between NHL patients with and without bone marrow infiltration. The levels showed a positive correlation with the extent of the disease.*

Conclusion: *We conclude that the above-mentioned non-invasive parameter is a useful indicator of the severity of the disease.*

Keywords: *non-Hodgkin's lymphoma, mucosa-associated lymphoid tissue, Hodgkin's disease, lactate dehydrogenase.*

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INTRODUCTION:

Lymphomas are malignant tumors of the lymph-reticular system. Lymphoma occurs when lymphocytes become malignant and accumulate through duplication faster than normal, or can live longer than normal lymphocytes. In malignant lymphomas, most cells are frozen in one step of normal differentiation. The two broad types of lymphoma are called Hodgkin's disease (HD) and non-Hodgkin's lymphoma (NHL). In NHL, the primary symptoms of the disease appear outside the bone marrow at the site of the normal homing lymph node, the spleen, MALT (mucosa-associated lymphoid tissue), or anywhere else. Lymphomas outside the lymph nodes and the spleen are referred to as extra-nodal lymphomas. In NHL, when the disease involves the bone marrow, it is said to have advanced to stage IV. Patients with NHL may develop local and systemic peripheral lymphadenopathy, clinically indistinguishable from Hodgkin's disease, but major systemic symptoms such as fever, night sweats or weight loss are less common in NHL than in HD. NHL is an intimidating and extended family of lymphoid neoplasms, including various Bcell lymphoid tumors and several less common T cell proliferations, as well as several malignant macrophage tumors. After the histological diagnosis of malignant lymphoma, the staging assessment determines the extent and location of the disease, on which the treatment protocol depends. Patients who do not respond to conventional therapy may benefit from research approaches. Among the biological markers, lactate dehydrogenase is the most important, reflecting the proliferative activity and invasive potential of lymphoma. Lactate dehydrogenase (LDH) has a molecular weight of 135,000 Dalton's. It is a zinc-containing enzyme. LDH catalyzes the reversible oxidation of lactate to pyruvate. It is expressed at higher levels when lymphocytes divide or when cells are destroyed or damaged. Elevated LDH levels indicate disease progression. A sharp increase may indicate transformation. LDH has five isoenzymes that differ slightly in structure. LDH2 is concentrated in lymphocytes.

MATERIALS AND METHODS:

It was a cross-sectional study held in the Oncology department of Mayo Hospital, Lahore for one-year duration from September 2019 to September 2020 among 80 people, regardless of age and gender, divided into the following groups. Group A: Normal healthy controls (n = 20) Group B: NHL patients without bone marrow infiltration (n = 30) Group C: NHL patients with bone marrow infiltration (n = 30). Newly diagnosed NHL cases were selected based on a biopsy of lymph nodes prior to the introduction of chemotherapy. Patients with myocardial infarction, renal failure, hepatic impairment, skeletal muscle disease, hemolytic anemia, malignancies of other cerebrovascular system, infectious mononucleosis and intestinal infarction were excluded. Serum lactate dehydrogenase 2 (LDH2) isoenzyme levels were measured by agarose gel electrophoresis at the Center of Excellence in Molecular Biology (CEMB), Lahore. The results were analyzed using the Student's "t" test.

RESULTS:

In the control group, the mean concentration of LD2 in the serum was 29.1 ± 4.08%, in group B 39.83 ± 2.09%, and in group C 52.53 ± 4.47%. The difference between the mean levels in the control group and patients, as well as between NHL patients with and without bone marrow infiltration, was highly significant (P <0.00) (Tables I, II, III and Figures I, II, III).

Table I: LD2 Levels In Controls and NHL

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

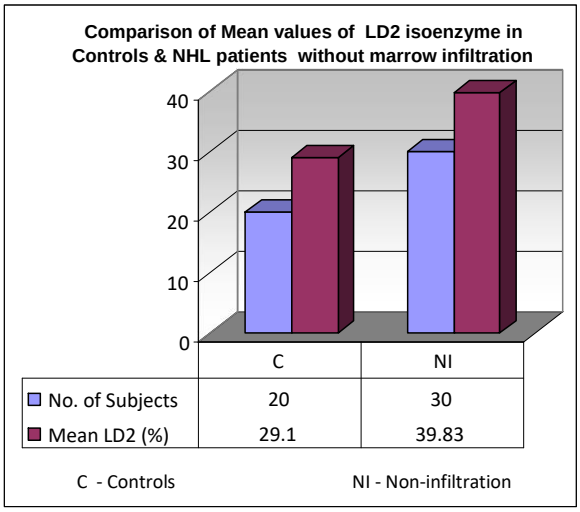

Figure I: Comparison of mean values of LD2 isoenzyme in controls and NHL patients without marrow infiltration.

Table II: LD2 Levels In Controls And NHL Patients With Bone Marrow Infiltration

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

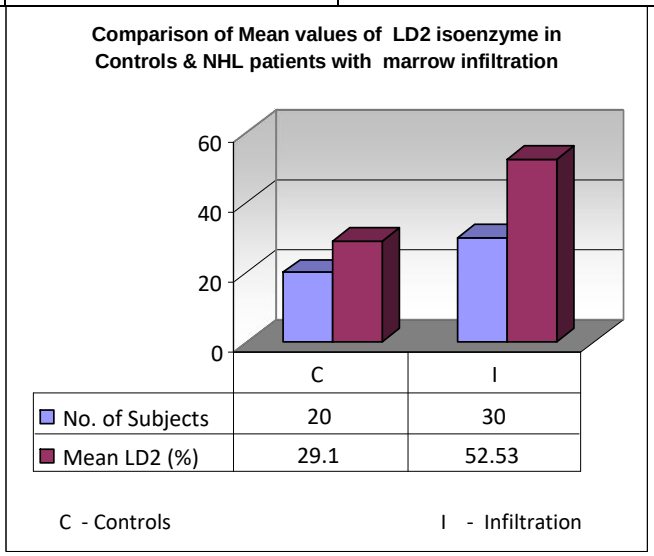

Figure II: Comparison of mean values of LD2 in controls and NHL patients with marrow infiltration

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

Parameter	Non infiltration (n = 30)	Infiltration (n = 30)	P Value
LD2 (%)	38.83 ± 2.52	52.53 ± 4.47	<0.001*

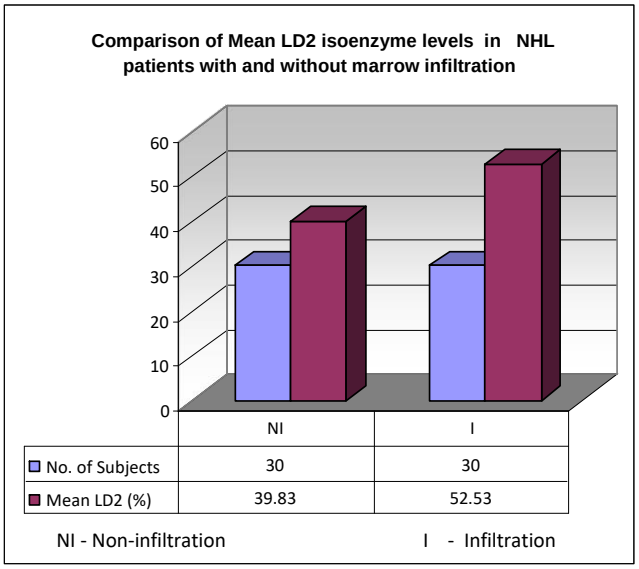

Figure III: Comparison of mean LD2 isoenzyme levels in controls and NHL patients with and without marrow infiltration

In 6 (20%) cases with leukocytosis, LD2 values ranged from 54-60% with an average value of 57.5 ± 2.07%. The highest values (60 and 59%) were recorded in 2 (7%) cases with peripheral spillage. The borderline LD2 in serum in groups B and C obtained from the data was 45%. Infiltration cases showed values above this limit.

DISCUSSION:

ls was 1.51 ± 0.43%. In NHL patients without bone marrow infiltration, the mean level was 2.41 ± 0.48%. In contrast, in NHL patients with bone marrow infiltration, it was 3.9 ± 0.7%. The mean level of LD2 was significantly increased in NHL patients with and without bone marrow infiltration compared to the control group (p0.001). Similar observations were made by Csako1982, Rotenberg 1983. Paule 1984, Maruyam 1994, Dumontet 1999, Boufia 2004. Csako 1982 found that the highest activity of the LD2 isoenzyme is helpful in assessing tumor weight and prognosis in NHL patients. According to Rotenberg 1983, elevated serum LD levels with a predominance of LD2 may be an early and only sign of latent malignant lymphoma. Dumontet 1999 commented that there are some distinctive serum LD isoenzyme profiles in NHL patients and that some of these specific changes may help refine the prognostic value of total serum LDH. Boufia 2004 said that LD2 appears to be a biochemical marker of neoplastic and cell differentiation. The increase in LD2 was a sign of an evolution towards a more aggressive phase of the disease. There are changes in the characteristics of serum LD2 levels in NHL patients. Boufia 2004 also reported that among 160 patients, 49% had elevated serum LDH. Analysis of the LD isoenzyme profiles in all patients showed an increased percentage of isoenzyme 2 in patients with NHL (both at diagnosis and at relapse), which indicates the superiority of LD2 isoenzyme assessment over total LDH. It also shows that the former is a more reliable indicator of NHL malignancy.

CONCLUSIONS:

Based on the above observations, it was found that the level of the LD2 isoenzyme was elevated in 58% of NHL patients, with a significant increase in patients with bone marrow infiltration. Thus, the LD2 isoenzyme may serve as an indicator of the severity of the disease. Being a non-invasive parameter, it can be used to assess the proliferative activity and invasive potential of lymphoma.

REFERENCES:

1. Boyé, Pierre, François Serres, Franck Floch, Corinne Fournel-Fleury, and Dominique Tierny. "Prognostic value of pretreatment plasma D-dimer level in dogs with intermediate to high-grade non-Hodgkin lymphoma." *Veterinary and Comparative Oncology* (2020).
2. Jiang, Huiwen, Yu Hu, and Heng Mei. "Consolidative allogeneic hematopoietic stem cell transplantation after chimeric antigen receptor T-cell therapy for relapsed/refractory B-cell acute lymphoblastic leukemia: who? When? Why?." *Biomarker Research* 8, no. 1 (2020): 1-12.

3. Padala, Sandeep A., and Avyakta Kallam. "Cancer, Diffuse Large B Cell Lymphoma." In *StatPearls [Internet]*. StatPearls Publishing, 2020.
4. Xu, X., L. Zheng, B. Xue, M. Yao, and Y. Xu. "Primary Burkitt lymphoma presenting as ovarian tumor rupture: a case report and literature review." *European Journal of Gynaecological Oncology* 40, no. 5 (2019): 862-866.
5. Naraki, Karim, Ramin Rezaee, Habibeh Mashayekhi-Sardoo, A. Wallace Hayes, and Gholamreza Karimi. "Mangiferin offers protection against deleterious effects of pharmaceuticals, heavy metals, and environmental chemicals." *Phytotherapy Research* (2020).
6. Mendes, Cindy, and Jacinta Serpa. "Revisiting lactate dynamics in cancer—a metabolic expertise or an alternative attempt to survive?." *Journal of Molecular Medicine* (2020): 1-18.
7. Jin, Ming-Zhu, and Wei-Lin Jin. "The updated landscape of tumor microenvironment and drug repurposing." *Signal Transduction and Targeted Therapy* 5, no. 1 (2020): 1-16.
8. McNaught, Katie Anne. "Investigation of serum clusterin as a suitable biomarker for canine multicentric lymphoma." PhD diss., University of Glasgow, 2020.
9. Neitzel, Carina, Philipp Demuth, Simon Wittmann, and Jörg Fahrer. "Targeting altered energy metabolism in colorectal cancer: oncogenic reprogramming, the central role of the TCA cycle and therapeutic opportunities." *Cancers* 12, no. 7 (2020): 1731.
10. Michaeloudes, Charalambos, Pankaj K. Bhavsar, Sharon Mumby, Bingling Xu, Christopher Kim Ming Hui, Kian Fan Chung, and Ian M. Adcock. "Role of metabolic reprogramming in pulmonary innate immunity and its impact on lung diseases." *Journal of Innate Immunity* 12, no. 1 (2020): 1-16.
11. Saha, Ashis Kumar. *Fatty Liver Disease, a Silent Killer of Human Beings*. Cambridge Scholars Publishing, 2019.
12. Iqubal, Ashif, Mohammad Kashif Iqubal, Sumit Sharma, Mohd Asif Ansari, Abul Kalam Najmi, Syed Mansoor Ali, Javed Ali, and Syed Ehtaishamul Haque. "Molecular mechanism involved in cyclophosphamide-induced cardiotoxicity: old drug with a new vision." *Life sciences* 218 (2019): 112-131.
13. Yu, Runhong, Jingyu Zhang, Yuzhu Zang, Li Zeng, Wenli Zuo, Yanliang Bai, Yanhui Liu, Kai Sun, and Yufeng Liu. "iTRAQ-based quantitative protein expression profiling of biomarkers in childhood B-cell and T-cell acute lymphoblastic leukemia." *Cancer Management and Research* 11 (2019): 7047.
14. Li, Xiaojiaoyang, Rong Sun, and Runping Liu. "Natural products in licorice for the therapy of liver diseases: Progress and future opportunities." *Pharmacological research* 144 (2019): 210-226.
15. Hussen, May Mohammed Ali. "Association of Cytochrome P450 2 E1 (C1053T) and NADPH Quinone Oxide Reducatase 1 (C609T)(C 465T) Genes Polymorphism with Acute Lymphoblastic Leukemia in Sudanese Patients." PhD diss., Sudan University of Science & Technology, 2019.