

CASE REPORT

# Serum Lactate Dehydrogenase in Non-Hodgkin's Lymphoma: A Prognostic Indicator

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**Abstract** Non-Hodgkin's lymphoma constitutes a group of disorders originating from the malignant transformation of lymphocytes and involving either the lymph nodes or extranodal sites. NHL commonly presents in the sixth to seventh decade of life with a male preponderance (50–75 %). Recent studies have shown importance of serum LDH in prognosis of NHL. Authors report a case of a 63 year old male presenting with complaints of fever and backache for past 4 months. General and systemic examination revealed bilateral axillary lymphadenopathy and splenomegaly respectively. Serum LDH level was highly elevated (3441 U/l). Excisional axillary and bone marrow biopsy were done before oncology referral. Complete workup revealed diffuse Non-Hodgkin's lymphoma with bone marrow infiltration. Patient died because of acute renal failure due to NHL and DM 2 (Type 2 diabetes mellitus).

**Keywords** Lactate dehydrogenase (LDH) · Non-Hodgkin's lymphoma (NHL)

## Introduction

NHL constitutes a group of disorders originating from the malignant transformation of lymphocytes and involving either the lymph nodes or extranodal sites. Extranodal

lymphomas may comprise 24–48 % of NHL cases, and there incidence have increased during the past decade. Extranodal lymphomas may occur in any organ, most frequent sites being GI tract, followed by Waldeyer's ring, when tonsils are regarded as an extranodal site. Other common sites are skin and bone [1].

NHL commonly presents in the sixth to seventh decade of life with a male preponderance (50–75 %) for various histology. At the time of presentation, Stage I and II is seen in 40 % while stage IV is seen in 50 % patients. This data establishes the fact that NHL in India is no different from the developed world. Thus one would expect similar survivorship and outcomes between the western world and India [2].

## Case Report

A 63 year old male presented to hospital OPD with the complaints of fever and backache for past 4 months. Back pain was of severe intensity, dull in nature, non-radiating type and not subsiding even after taking medicines. No significant past history indicating any major trauma or major surgery was present. General examination revealed that the patient was pale, icteric and had bilateral palpable axillary lymphadenopathy. Per abdomen examination revealed non tender, moderate splenomegaly.

Preliminary laboratory workup showed RBS-203 mg/dl, HbA1c-6.5 %, direct bilirubin-0.27 mg/dl, ALT-64 IU/l, ALP-254 KA units, Hb-10.3 %, platelet count-110,000 cells/cu.mm., ESR-101 mm/h, neutrophil-80 %, lymphocyte-12 %, total cholesterol-231 mg/dl, Triglycerides-197 mg/dl and HDL-23 mg/dl. Test for MP/MF smear, HIV, HBs Ag, urine as well as blood culture, stool for occult blood test were negative. After 3 days of initial treatment with

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insulin, analgesic, antibiotics and antipyretics, patient could not be stabilized. Further laboratory investigations revealed highly elevated serum LDH levels of 3441 U/l (normal: 240–480 U/l) estimated by enzymatic photometric (UV assay pyruvate to lactate) method in Cobas P 800 auto-analyser. APTT levels increased from 47.7 to 92.5 s and platelet counts decreased from 110,000 to 23000 cells/cu. mm. within 1 week. Even after two packed cell and platelet transfusion, patient's platelet counts did not increase.

To rule out TB and lymphoma, excisional biopsy of axillary lymph nodes was done. No reactive acid fast bacilli were seen in lymph node biopsy. On USG, splenomegaly and para-aortic lymph node enlargement was seen. Laparoscopic excisional biopsy was planned for para-aortic and peri-pancreatic lymph node but due to the fragile and enlarged spleen, the procedure was cancelled to prevent internal bleeding. Bone marrow biopsy was done features of which confirmed NHL B cell type.

Over the following days renal function deteriorated gradually to a urea level of 383 mg/dl, creatinine level 5 mg/dl, serum electrolytes Na 124 meq/l and K 5.4 meq/l. Unfortunately, patient's condition deteriorated very soon and he succumbed to death within few days of being diagnosed as NHL B cell type. The cause of death was acute renal failure secondary to NHL and Type 2 DM.

## Discussion

Lactate dehydrogenase (LDH) is widely distributed in various tissues like muscle and liver cells and also hemopoietic cells. Because of this varied distribution, an elevated LDH level is seen in cases of myocardial infarction, myopathy, hepatic dysfunction, malignancies etc. [3]. Many cancers can raise serum LDH levels, thus it may be used as a tumor marker, but at the same time, it is not useful in identifying a specific kind of cancer because of its varied distribution.

LDH is found to involve in tumour metabolism. A hallmark of most cancer cells is an altered metabolism in which cancer cells are dependent on anaerobic respiration as the main source of energy. This involves production of lactate from glucose even under oxygen sufficient environment (Warburg effect). Thus tumour cells uptakes excess of glucose and uses it for accelerated growth and replication [4].

Several studies have shown association of LDH to several disease features like symptoms, size of tumour, organomegaly etc. Serum LDH activity is seen to increase in many cancer patients and thus can be used as a prognostic marker [5, 6].

Serum LDH is commonly elevated in lympho-proliferative disorders. In patients with non-Hodgkin's lymphoma

(NHL), LDH levels are of prognostic importance and thus can be used to monitor treatment response and recurrence, if any. Lactate dehydrogenase 5 (LDH-5) catalyzes the reaction of pyruvate to lactate by NADH, thus determining the availability of NAD<sup>+</sup> to maintain the continuity of glycolysis. Thus it's an important check point in the cellular energy release system. It's up-regulation is common in many malignant tumors [7]. Thus iso-enzyme study is more important than serum LDH level alone.

In this case, we report a fatal case of NHL in which serum LDH was highly elevated with a value of 3441 U/l. Serum LDH levels have been shown to negatively correlate with the survival of patients in previous studies. Studies have shown complete remission, low serum LDH, limited stage disease and a high serum albumin were independently associated with prolonged survival of such patients [8]. In addition to these, diagnosis of B cell lymphomas by Kiel histological classification was identified as an independent prognostic factor [9].

Hence, estimation of serum LDH in combination with above factors has prognostic importance for predicting survival in NHL patients.

## Conclusion

NHL, a cancer of lymphocytes with a preponderance in sixth to seventh decade of life range from indolent (slow-growing) type to aggressive (fast-growing) ones which are fatal as well. In such scenario, emphasis should be paid on the use of additional parameters like LDH levels, estimation of which can be used for prognostic evaluation of patients with NHL. However, serum LDH levels are only for prognostic importance and not specific for diagnosis of the type of cancer.

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