

## Original Research Article

# Evaluation of creatine kinase and lactate dehydrogenase for liver abnormalities: a biochemical study

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### ABSTRACT

**Background:** Lactate dehydrogenase (LDH) is an enzyme found in nearly all living cells. LDH catalyses the conversion of lactate to pyruvic acid and back. The aim of the present study was to determine lactate dehydrogenase (LDH) level as an indicator of liver, muscular or cancer abnormalities in patients of more than 40 years of age.

**Methods:** Two hundred and twenty patients had been tested for LDH and liver function tests (LFTs). Creatine kinase (CK) levels were measurement only in patients who had high levels of LDH.

**Results:** High levels of LDH had been observed in many patients suggestive as an indicator of liver abnormalities. For muscular damage, measurement of CK in patients with elevated levels of LDH. Whereas high LDH levels, as an indicator for cancer abnormalities, were found in six males and two female who had normal values of LFTs and CK.

**Conclusions:** LDH can be regarded as a good biomarker for diagnosis of liver, muscular and cancer abnormalities. There is little variable between males and females in the elevated value of LDH. Patients who had high values of LDH and CK are proposed to have unidentified cancer abnormality.

**Keywords:** CK, LDH, Liver abnormalities

### INTRODUCTION

Lactate dehydrogenase (LDH) known as oxidoreductase enzyme, is found in different types of human tissues.<sup>1</sup> Although LDH is tetrameric enzyme, but two subunits have been determined: H for heart and M for muscle.<sup>2</sup> Normally it is located in small amounts in most of active organs. Thus, high level of this enzyme may indicate unusual conditions that can result from liver, muscular disorder (e.g. acute myocardial infarction) and even from cancer abnormality. Moreover, total LDH level may elevate in blood of patients suffering from various abnormalities such as allergy, but not in patients with chronic obstructive pulmonary abnormality.<sup>3</sup>

Serum lactate dehydrogenase, a ubiquitous cellular enzyme is increased following tissue breakdown.

Consequently, elevated serum LDH1 is present in numerous clinical conditions, such as hemolysis, cancer, severe infections and sepsis brain infarcts, meningitis, encephalitis, pulmonary infections and infarcts, liver abnormalities, pancreatitis, muscle injury and myositis, hematologic malignancies, human immunodeficiency virus infections, and many others. As a diagnostic and prognostic marker, serum LDH has previously been reported mainly as a marker of ominous outcome in cancer patients, including a variety of solid tumors and hematologic malignancies.<sup>4</sup> In addition, the prognostic value of serum LDH was shown in patients with sepsis. However, despite the ubiquitous presence of elevated serum LDH in numerous abnormality states, it is not known whether high LDH would be a useful diagnostic and/or prognostic marker in patients admitted to the internal medicine ward.<sup>5</sup>

High level of LDH also described in other types of cancer, such as in 13.5% of non-small cell lung cancer patients and in children with Hodgkin lymphoma. The measurement of LDH as indicator for liver or muscular disorder or as biomarker for cancer abnormality in suspected patients was the main aim of this study.

## METHODS

Two hundred Twenty out department and in department patients (130 females and 90 males) in Gujarat Adani institute of medical science at Bhuj, Gujarat, India, were involved in present study from January to August 2011. All patients age up to 60 years old. The clinical examination by physician confirmed that all patients showed signs of abnormal liver functions. Thus, liver function tests (LFTs) were suggested for those patients.

Serum of all patients was collected with all due precautions and LDH levels were measured by using liquid UV method that modified based on the recommendations of the Scandinavian Committee on Enzymes. Through fully automatic biochemical analyzer of Erba company was used for testing the LDH values. CK levels were assayed according to Humazym M-test as described by the instructions of the produced company. Data of all biochemical tests were expressed as mean $\pm$ SD. The values were analyzed statistically with paired t-test between test value of patient and normal individual. The minimum level of P value was < 0.01 considered as significant level.

## RESULTS

The values of LDH in males and females were variable. From 220 patients, 50 females and 40 males showed normal levels of LDH. High LDH level are observed in large number in females (80 patients) than in males (60 patients). Increased LDH levels in blood could not be indicator for liver abnormalities only, but it may be resulted from damage in muscular tissues. 80 females and 60 males who possessed high level of LDH were investigated for CK, as monitor for muscular injury. Additionally, twenty patients (male and female) showed increased levels of LDH and CK in their blood which means they may sever from muscular damage.

**Table 1: Demographic data of the participants.**

	Number	Percentage
Male	90	41
Female	130	59
Total	220	100

None of our patients revealed abnormal levels of LDH that associated with normal level of CK which eliminated the possibility of severing from liver cancer abnormality. However, six males and two female who had high level of LDH showed normal levels of CK which increase the

possibility for those patients to sever from one types of cancers with excluded liver cancer abnormality.

## DISCUSSION

Human LDH can be separated into five different isoenzymes, based on their electrophoretic mobility.<sup>6</sup> Our preliminary observations suggested that a slight to moderate increase in serum LDH in admitted medical patients is very common, but not specific, probably reflecting the ubiquitous distribution of LDH in tissues. In contrast, a very high and isolated serum LDH might be a marker of specific diagnostic groups. Furthermore, whether isolated very high serum LDH would be an independent predictor of in-hospital outcome of admitted medical patients is largely unknown and should be addressed further.<sup>7</sup>

LDH plays an important role in human body represented by anaerobically converting of pyruvic acid to lactic acid and vice versa. Under normal conditions, LDH produced in human body in little amounts with low monitory value. There are many factors responsible for increasing LDH levels in blood stream that distributed between temporary conditions such as prolonged exercise and some of physiological disorder i.e. severity of preeclampsia, ascites and allergy.<sup>8</sup>

For clinical values, LDH is useful for diagnosis or as an indicator for many abnormalities in liver and muscles and also for cancers.<sup>8</sup> The main goal of present study is to determine if the increasing levels of LDH may result from either liver, muscular or cancer abnormalities in patients of more than 40 years of age. The present of LDH in muscle regarded to play a very important role for muscular tissues through its ability to convert muscular lactic acid into pyruvic acid, an essential step in producing cellular energy.<sup>9</sup> Moreover, LDH is not restricted in specific type of muscle, it can be found in various types of muscle, especially skeletal and cardiac muscles. These muscles are also known to contain CK rather than LDH which may release in blood with greater levels as result from various muscular abnormalities such as skeletal muscle necrosis, and Duchenne muscular dystrophy. Thus, if we need to confirm that high level of LDH is resulted from muscular disorder and not from other things, it's important to measure the CK level. CK is a better indicator of heart or muscular damage. Therefore, estimation of CK along with LDH may serve as suitable diagnostic marker for muscular damage i.e. Rhabdomyolysis, cardiac manifestations that associated with organo phosphorus poisoning, acute myocardial infarction and patients with prosthetic heart valves. However, in the present of normal CK levels, it's unlikely that the elevated levels of LDH derive from myocardial necrosis.<sup>10</sup>

There are many explanations for increasing LDH level in blood of patients whom suffering from cancer abnormalities. First, the increase number of cells during

cancer development will consume great amount of glucose to get energy by glycolysis which increasing LDH level when the condition is anaerobic.<sup>11</sup> Second, growing cancer cells will destroy other tissues and causing release of intracellular enzyme like LDH into the blood stream by the injury or dying cells. Third, increase LDH level by activating its production by tyrosine phosphorylation mechanism in cancer cells.<sup>4</sup> In conclusion, CK and LDH can use as a good biomarker for diagnosis of liver, muscular and even cancer abnormalities. There is little variable between males and females in the elevated values of LDH.

## CONCLUSION

It provides long lasting and virtually permanent solution due to its non-dependence on hardware and implants. Cost of equipment and availability of surgical expertise are the only impediments to this promising treatment modality.

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