



## Research Paper

# Correlation of blood glucose with lactate dehydrogenase in diabetic and non diabetic patients with viral infection

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## **Introduction**

The patients having diabetes and are also infected by viruses are more likely to develop the morbidity symptoms in contrast to the non-diabetic virus affected patients. Diabetes mellitus in viral affected patients stimulates the susceptible complicated side effects with side by side lowering of the immunity of the body and the immune system. <sup>(5)</sup> Diabetes mellitus is a challenging disease in the way of virus affected population of patients.

This disease has the ability to interfere with host and viral activities and interactions along with host and immunity via many principles and mechanisms which would result in quite poor results and outcomes. Patients of diabetes mellitus along with complications like high blood pressure and grade two obesity (BMI  $\geq$  40 kg/m<sup>2</sup>) might get high symptoms and are at a increasing risk for side effects and even death. <sup>(6)</sup>

## **Aims and Objectives**

To study the correlation between LDH and

serum glucose in diabetic and non diabetic patients with viral infection

## **Review of Literature**

Sarkar S et al <sup>(10)</sup> concluded in their studies that diabetes mellitus is one of the minor co morbidities. The type of diabetes that pre exists is not a major risk factor. The pathogenesis severity which can sometimes be the cause of death is more because of already existing diabetes mellitus.

Angiotensin II and the cytokines along with other effectors protein which facilitates complicated cycles and pathways which progressively result in fatal side effects and various complications. As already discussed diabetes mellitus is syndrome of multifactorial origin which adversely affects the immunity of the body. The infection can also result in over-activation of uncontrolled immune responses. There can be a cellular internalization of basic particles of virus which along with destructing the host cells along with this it can exacerbates some pro-

inflammatory responses which can be secreting the cytokines along with chemokines. This mechanism of exacerbation and altered path physiology can be associated closely with hyperactivity of the immune system. <sup>(9)</sup>

Bornstein SR et al. <sup>(1)</sup> showed in their research that DM can be one of the most key co morbidities in association with the severity of all the 3 human pathogenic viral infections, along with moderate and severe acute respiratory syndromes. Patients suffering from diabetes are also at greater risk in respect to severe complications like adult respiratory distress syndrome along with multiple organ failure.

Yina Y et al. <sup>(11)</sup> review showed that more quantity of patients having viral infections had co morbid DM that can result in increased risk for a poor prognosis sometimes. The basic cause and the basic mechanisms of this associated viral and diabetes conditions are not well understood.

The unwanted dangerous outcomes of the complicated system are the binding of virus particle with receptors of ACE2 resulting in acute inflammatory secretion and release of cytokines. In patients with diabetes, this further exacerbates already impaired immune function and increases the risk of inflammatory cytokine storm with viral infection. For people with diabetes, as well as those with other chronic infections it is necessary for improving awareness regarding capability of self-managing even more in some pandemic situations when there is very little time to consult face-to-face with the patient. Sometimes buffer zones can be created between stopping infection or preventing or providing therapy for different requirements there may arise various opportunities for the sufferer patients for getting updated knowledge so that the

physicians and caregivers could properly monitor the conditions remotely. Also a global database is the need which could reinforce and also accurate validity of evidence is required to fulfill their proper care of the patient monitoring functions.

### Material and Method

Sample Selection criterion:

Sample size calculation by formula

$$n = Z^2(S.D)^2/d^2$$

Z= critical value of normal variate (1.96),  
S.D = Standard deviation <sup>(12)</sup>

Total number of 200 patients admitted at PMCH Udaipur was selected as subjects of the present study.

### Blood Sampling and Laboratory Evaluation:

The blood samples for investigating blood Glucose in Fasting were taken after minimum of 12 hours of full fasting. The subjects were instructed to take 12 hour full fasting before sampling.

For preventing artifactual alteration in Lactate dehydrogenase (LDH)

The samples were analyzed on the same day.

Lactate Dehydrogenase (LDH):

Henry et al (DGKC Method):

Pyruvate + NADH → Lactate + NAD<sup>+</sup>  
Lactate dehydrogenase enzyme catalyzes reduction of Pyruvate into lactate with subsequently oxidizing reduced nicotinamide adenine dinucleotide (NADH) to form NAD. The activity of the enzyme is got by rate of decrease in absorbance at 340 nm as NAD is formed.

### Statistical Analysis

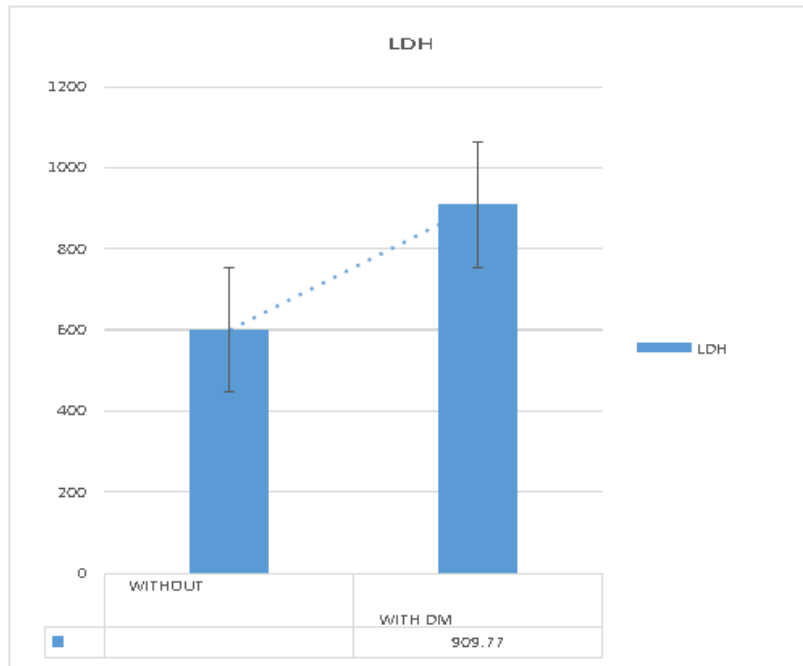
The mean levels of different variables correlated with basal reference for normal individuals and controls. Proper and relevant statistical method of student't' test was taken for observing significance of difference in

mean values in between groups and also to understand the correlations. Ethical clearance was taken from the ethical committee of PMCH.

The mean SD (standard deviation) of LDH in group of non-diabetics ( $601.35 \pm 255.34$ ) and in group of Diabetics ( $909.77 \pm 570.7$ ) was significantly different, the p value is showing significant ( $p < 0.0001$ ).

**Results and Graph**

Lactate dehydrogenase (LDH):

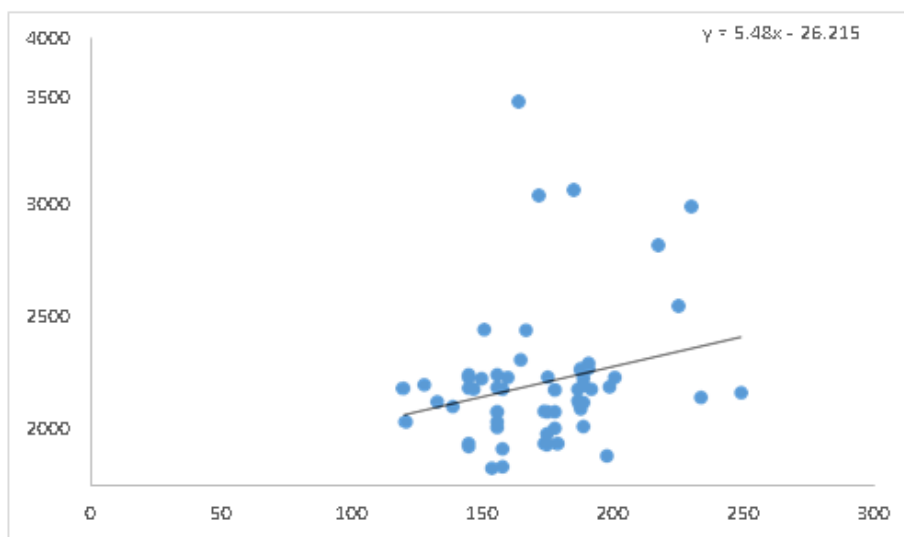


**Figure No. 14:** Comparison of LDH in diabetic and non Diabetic category

**Correlated blood glucose with LDH**

S. No	Correlation of	Correlation to	Correlation coefficient	R <sup>2</sup>	P value
1	Blood Glucose	LDH	0.2356	0.0555	P=0.522

The correlation coefficient between the 2 parameters is 0.22 it is statically insignificant (P=0.532)



### Discussion

LDH enzyme activates the action of lactate transporters on the T cells that are fully responsible for the mechanism of chronic inflammation. The metabolism and oxidative mechanism of NADH causes reformation of NAD<sup>+</sup>. The process of oxidative phosphorylation forms the ATP which gets deranged during hypoxic conditions. LDH concentration gets more in order to compensate and satisfy the demand for energy of the body. Therefore we can conclude that LDH enzyme is a quite key and promising biomarker as higher LDH intensity is associated with poor outcome in viral infected groups of patients. (Lai et al, Deshmukh et al, Lim et al, Zhong et al, Li H et al, Choi, J. Y et al).<sup>(3 6 7 8)</sup>

### Summary and Conclusion

Study has shown that the mean value and SD of hematological parameters and LDH is high significantly in category of diabetic patients in comparison to that in category of non-diabetic patients.

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