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Correlation Study Between Glycated Hemoglobin and Inflammatory Markers in Newly Diagnosed Diabetes Mellitus type 2 patients

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ABSTRACT:

Diabetes Mellitus type 2 (T2DM) is one of the metabolic syndrome that spread worldwide in the present era. It's important to diagnosed T2DM to prevent the complications and HbA1c is an important tool to diagnosis T2DM. Fasting Blood Sugar (FBS) and Inflammatory markers such as SOD, hs-CRP and MDA are also the markers to diagnosed T2DM in early stage. The present study is to correlate between HbA1c and FBS, Inflammatory marker (SOD, hs-CRP and MDA) in newly diagnosed T2DM.

Aims & Objectives: To estimate the correlation between HbA1c with FBS and Inflammatory markers such as SOD, hs-CRP and MDA in newly diagnosed T2DM patients.

Materials & Methods: A total of 200 patients both IPD/OPD were selected for the present study from the Department of Medicines and samples were collected for the investigations. All the test were performed in Department of Biochemistry, Index Medical College, Hospital and Research Center, Indore (M.P.).

Results & Observations: The present study showed that FBS, hs-CRP and MDA level increased in newly diagnosed T2DM with positive correlation and significant p-value. But in case of SOD the level decreased in newly diagnosed T2DM with positive correlative and significant p-value.

Conclusion & Summary: The study reveals that there is strong correlation between FBS and Inflammatory markers (SOD, hs-CRP and MDA) in the diagnosis of early stage of T2DM and these markers also helpful for the diagnosis of T2DM.

Keywords: T2DM, hs-CRP, MDA, SOD

Introduction:

In present word Metabolic Syndromes are common among young population and India is the epic center of Diabetes Mellitus types 2 (T2DM). It's a chronic metabolic disorder characterized by either complete absent of Insulin Secretion or Production or both which lead to hyperglycaemia. It is associated with various metabolic abnormalities and long-term complications. Also, HbA1c is a tool to diagnosed Diabetes Mellitus along with other parameters such as Fasting Blood Sugar, Post Prandial Blood Sugar and Random Blood Sugar. Increase of HbA1c level $\geq 6.5\%$ indication of T2DM. HbA1c may indicate underlying metabolic disorders and may be useful in glycaemic control. Inflammatory markers play a significant role for the diagnosis of T2DM. Elevated HbA1c levels have been linked to dyslipidemia, increasing the risk of cardiovascular disease.⁽¹⁻³⁾ The present study is to correlate the HbA1c and various inflammatory markers such as SOD, hs-CRP and MDA.

Aims & Objectives:

Aims: To correlate between HbA1c level and Inflammatory Markers in Newly Diagnosed Diabetes Mellitus type 2 (T2DM).

Objectives:

- To estimate the level of HbA1c, FBS, hs-CRP, SOD and MDA in newly diagnosed Diabetes Mellitus type 2 patients.
- To correlate the HbA1c and hs-CRP, SOD and MDA level.

Materials & Methods:

A total of 200 newly diagnosed Diabetes Mellitus type 2 patients were selected for the study and Sample was taken from IPD/OPD of Department of Medicine and all the biochemical test were performed in Department of Biochemistry, Index Medical College Hospital and Research Center, Indore (M.P.) and the study included the persons with ≥ 30 years of aged newly diagnosed T2DM and also don't take any antidiabetic treatment. Also, we were not selected the who was young < 30 years, pregnant women and others hormonal diseases patients.

S.No.	Parameter	Method
1.	Fasting Blood Sugar	Trinder's (1969) Method ⁽⁴⁾
2.	HbA1c	Nathan D M et al.(2008) method ⁽⁵⁾
3.	Highly Sensitive C-Reactive Protein (hs-CRP)	Rifai N et al. (2008) method ⁽⁶⁾
4.	Superoxide Dismutase	Marlund and Marklund (1974) ⁽⁷⁾ method.
5.	Malondialdehyde	Jeans CD et al. (1983) ⁽⁸⁾ method

Results & Observations:

Parameters	Mean $\pm$ SD	r-value	p-value
HbA1c (%)	6.86 $\pm$ 0.21		
FBS (mg/dl)	130.36 $\pm$ 2.69	0.79	<0.000
hs-CRP (mg/ml)	3.98 $\pm$ 0.42	0.99	<0.000
SOD (units/ml)	3.45 $\pm$ 0.57	0.99	<0.000
MDA (nmol/ml)	5.77 $\pm$ 0.68	0.99	<0.000

In table no.1, the Mean(SD) of HbA1c is 6.86(0.21)%, FBS is 130.36(2.69)mg/dl,hs-CRP is 3.98(0.42)mg/ml,SOD is 3.45(0.57)units/ml and MDA is 5.77(0.68)nmol/ml.r-value of FBS,hs-CRP,SOD and MDA is 0.79,0.99,0.99 and 0.99 respectively and all parameters shows significant p-value.

Discussion:

The present study shows that the FBS increased in case of newly Diagnosed T2DM patients and the level 130.36 $\pm$ 2.69mg/dl.Also, its shows positive correlation with significant p-value. hs-CRP also increased in newly diagnosed Diabetes Mellitus type 2 patients and the value is 3.98 $\pm$ 0.42% and r-value shows positive correlation and p-value shows significant compared with HbA1c.Super Oxide Dismutase (SOD) shows decrease level in newly diagnosed T2DM patients.The Mean $\pm$ SD of SOD was 3.45 $\pm$ 0.57 units/ml had positive correlation with significant p-value.Malondialdehyde (MDA) shows 5.77 $\pm$ 0.68 nmol/ml and showed positive correlation with significant p-value, indicated slightly higher value than normal individuals.Our study resemble with Shyam Murarai Garg et al. (2017)⁽⁹⁾, Zephy Doddigarla et al. (2016)⁽¹⁰⁾,Suchrita Mustur Manohar et al.(2013)⁽¹¹⁾.

Conclusion:

In our present study, the correlation with Inflammatory markers with HbA1c was shown and it's concluded that the level of hs-CRP level increased, the level of SOD decreased and MDA level also increased in Newly Diagnosed Diabetes Mellitus type 2.So, it would a indicator for the start of T2DM and also Inflammatory markers are the tools for the diagnosis of T2DM in early stage.

Summary:

In the present study we aimed to correlate HbA1c levels with FBS and Inflammatory Markers in newly diagnosed Type 2 Diabetes Mellitus (T2DM) patients. A total of 200 patients were selected from the IPD/OPD of the Department of Medicine, and all biochemical tests were performed in the Department of Biochemistry, Index Medical College Hospital and Research Center, Indore. The result showed increased level of hn-CRP,MDA and FBS whereas SOD decreased in Newly Diagnosed T2DM patients.

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