ORIGINAL RESEARCH PAPER

General Medicine

SERUM GGT ACTIVITY AND HSCRP LEVEL AS A MARKER OF GLYCEMIC CONTROL IN PATIENTS WITH TYPE 2 DIABETES MELLITUS.

KEY WORDS:

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ABSTRACT

Background: Diabetes mellitus (DM) comprises a group of common metabolic disorders that share common phenotype of hyperglycemia[1]. Hyperglycemia not only defines the disease but is the cause of its most characteristic symptoms and long-term complications. Research in the pastfew years has linked oxidative stress and inflammation to β-cell dysfunction resulting from chronic exposure to hyperglycemia[2].Gamma-glutamyl transferase is a cell-surface protein contributing to the extracellular catabolism of glutathione (GSH).

METHODS:. Under aseptic precautions about 5 ml of blood were be drawn from the medial cubital vein after minimum of 8 hours of fasting for fasting blood sugars and hba1c. Post prandial blood sugars were analyzed after 2 hours of their regular unchanged breakfast/diet and medication if any. complete haemogram ,serum GGT and hsCRP was analyzed .

Conclusion: the present study suggests that serum GGT and hsCRP concentration is significantly increased in type 2 diabetes mellitus. Both are further increased in diabetic patients with complications and poor glycemic control. There is a significant positive correlation between serum GGT activity and hsCRP.Serum GGT level and hsCRP concentration was independently and positively correlated with FBS, PP2BS and HbA1c (markers of glycemic control).

NEED FOR STUDY:

Diabetes mellitus (DM) comprises a group of common metabolic disorders that share common phenotype of hyperglycemia[1]. Hyperglycemia not only defines the disease but is the cause of its most characteristic symptoms and long-term complications. Research in the pastfew years has linked oxidative stress and inflammation to β-cell dysfunction resulting from chronic exposure to hyperglycemia[2].Gamma-glutamyl transferase is a cell-surface protein contributing to the extracellular catabolism of glutathione (GSH). GGT has a pivotal role in the maintenance of intracellular antioxidant defences. Increase in the levels of gamma glutamyl transferase enzyme may be considered as a hallmark for oxidative stress[3]. Increased insulin levels is associated with increase in the levels of gamma glutamyl transferase (GGT),CRP (C-reactive protein) is strong acute phase reactant that is increased in inflammatory and infectious conditions. It is considered as a marker for "inflammation". Chronic, systemic, subclinical inflammation has also been identified as a driving force for insulin resistance, metabolic syndrome and type 2 diabetes mellitus[4]. The purpose of this study is to measure serum GGT activity and hsCRP levels in diabetic subjects and to study the correlation between serum GGT activity and hsCRP with glycemic control in diabetic patients.

OBJECTIVES OF THE STUDY :

1. To evaluate serum gamma-glutamyl transferase (GGT) activity and high sensitivity C reactive protein (hsCRP) level in type 2 DM subjects with good and poor glycemic control.
2. To correlate between serum GGT and hsCRP level with glycemic control (FBS, PP_2BS, HbA_1c) in subjects.

METHOD OF COLLECTION OF DATA:

A detailed history was taken and recorded. The patients were then subjected to complete clinical examination. Patients were explained entire procedure and informed consent was taken in his own understandable language. Under aseptic precautions about 5 ml of blood were be drawn from the medial cubital vein after minimum of 8 hours of fasting for fasting blood sugars and hba1c. Post prandial blood sugars were analyzed after 2 hours of their regular unchanged breakfast/diet and medication if any. complete haemogram ,serum GGT and hsCRP was analyzed .Fasting blood sugar was estimated by enzymatic reference method with hexokinase..HbA_1C is estimated by the gold slandered High Performance Liquid Chromatography (HPLC) method. CRP was estimated by measured by immunoturbidimetric method. Serum GGT was estimated by carboxy substrate kinetic method.

INCLUSION CRITERIA:

The subjects selected for study were grouped as follows:

Group I – Control group (n=30)Age and sex matched healthy subjects

Group II – Type 2 DM patients with good glycemic control (n=30)patients with type 2 DM with duration < 8 years,HbA_1c < 7%. on life style modifications and oral hypoglycemic drugs and free from clinical evidence of any complication of diabetes mellitus.

Group III – Type 2 DM patients with poor glycemic control (n=30)patients with type 2 DM with duration > 8 years, HbA_1c > 7%, on life style modifications, oral hypoglycemic drugs, insulin or combination of all three

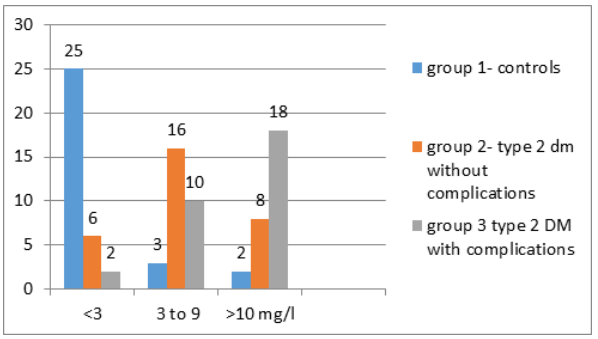
EXCLUSION CRITERIA:

1. Patients with type 1 diabetes mellitus,
2. High (>30 g/d) alcohol consumption,
3. known liver or gastrointestinal diseases, with liver enzyme concentrations higher than three times the upper limit
4. on corticosteroids, methotrexate, amiodarone, tamoxifen or other hepatotoxic drugs, any chronic infection like tuberculosis, sarcoidosis etc, hemolytic anaemia, hemoglobin variants were excluded from this study.

Results :

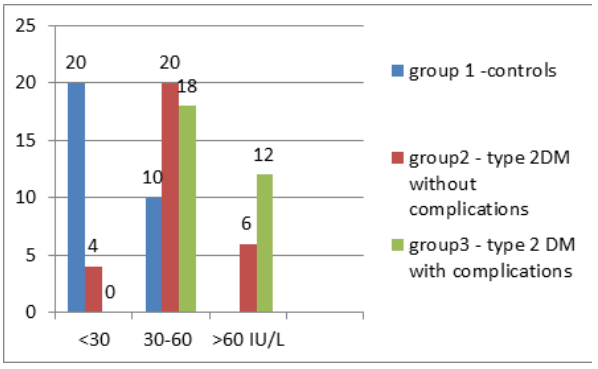
Our study shows mean serum GGT concentration in group III was significantly higher compared to control (group I) and group II cases (p values < 0.001). Also serum GGT concentration in group II was significantly higher compared to group I (p values < 0.05).Mean hsCRP levels in group III and group II were significantly higher compared to group I (p values < 0.001).Also hsCRP level in group III was higher than group II (p values < 0.001).We have found a statistically significant positive linear relationship between serum GGT and serum hsCRP concentration and with glycemic control (HbA1c, FBS, and PPBS).Also a significant positive association was observed between serum hsCRP level with glycemic control (HbA1c, FBS, and PPBS)

Comparison of serum hs- CRP between the study groups



There is an increase in serum hscrp levels in patients with poor glycemic control compared to controls.

Comparison of serum GGT between study groups



There is an increase in serum GGT levels in patients with poor glycemic control compared to controls.

Discussion :

Our study shows statistical significantly increased concentration of GGT and hsCRP in serum in patient with type 2 DM with poor glycemic control compared to healthy persons as well as subjects having type 2 DM with good glycemic control.Also we found a significant positive linear relationship between GGT and hsCRP concentration as well as both with HbA1C, FBS, and PPBS.These findings suggest a link between oxidative stress (indicated by increased serum GGT concentration), inflammation (raised hsCRP concentration) and glycemic control in patients with type 2 DM and related complications.Chronic subclinical inflammation is associated with resistance to the actions of insulin which favours the pathogenesis of type 2 diabetes mellitus and its complications[6].Elevation of serum GGT could be the expression of an excess deposition of fat in the liver, termed nonalcoholic fatty liver disease. Fatty liver is thought to cause hepatic insulin resistance and to contribute to the development of systemic insulin resistance and hyperinsulinemia[7].In recent years, much attention has been focused on the role of oxidative stress, and it has been reported that oxidative stress may constitute the key and common event in the pathogenesis of secondary diabetic complications[8].Implication of oxidative stress in the pathogenesis of diabetes is suggested, not only by oxygen free-radical generation, but also due to nonenzymatic protein glycosylation, autooxidation of glucose, impaired glutathione metabolism, alteration in antioxidant enzymes, lipid peroxides formation and decreased ascorbic acid levels[9]. Raised GGT concentrations could be a marker of oxidative stress, which might also play a role in the cause and development of diabetes and its complications

Conclusion :

In conclusion, the present study suggests that serum GGT and hsCRP concentration is significantly increased in type 2 diabetes mellitus. Both are further increased in diabetic patients with complications and poor glycemic control. There is a significant positive correlation between serum GGT activity and hsCRP. Serum GGT level and hsCRP concentration was independently and positively correlated with FBS, PP2BS and HbA1c (markers of glycemic control). All these finding suggesting a link between oxidative stress, inflammation and glycemic control in patient with type 2 diabetes mellitus.

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