Asian Journal of Pharmaceutical Technology & Innovation
ISSN: 2347-8810

Research Article

Received on: 03-10-2015
Accepted on: 07-10-2015
Published on: 15-10-2015

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Assessment of Serum Paraoxonase Levels In Patients Fatty Liver Disease

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ABSTRACT

The liver plays a key role in the synthesis of serum Paraoxonase (PON). It is circulating enzyme in the serum and bound to HDL. PON has function as an anti-oxidant effective of protecting low density lipoproteins against peroxidative reactions. PON1 levels have been reported in a variety of diseases along with the liver diseases.

The study was planned with the aim of ascertaining the diagnostic use of level of the PON in various diseases.

The two group of patients were selected based as Fatty Liver disease patients and control group patients. The blood samples were withdrawn from the patients. The various biochemical parameters such as fasting blood glucose, lipid profiles, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and gamma glutamyl transferase (GGT) levels were reposted in the two groups of the patients.

The study has established PON levels were declined in patients with fatty liver disease. With the specificity and sensitivity of this enzyme being high, it could emerge as a parameter to assess liver function.

Key-words: Paraoxonase, Liver diseases, fatty liver diseases,

Cite this article as:
Ramanujam Singh, Guria Kumari, Assessment of Serum Paraoxonase Levels In Patients Fatty Liver Disease, Asian Journal of Pharmaceutical Technology & Innovation, 03 (14); 2015. www.asianpharmtech.com

Introduction

Paraoxonase (PON) is an aryldialkylesterase existed in the plasma of mammals. It circulates in plasma associated with high-density lipoprotein. It has been revealed to function as an anti-oxidant effective of protecting low density lipoproteins against peroxidative reactions. The PON 1, PON 2 and PON 3 are the 3 different types of the PON enzymes seen in there types[1-3].

The antioxidant enzyme paraoxonase-1 (PON-1), associated with high density lipoprotein (HDL), utilizes an anti-atherogenic outcome by protecting low density lipoprotein (LDL) from oxidation. HDL has a well-established inverse relationship with the risk of atherosclerosis. HDL is required for the reverse transport of cholesterol from peripheral fibroblasts to the liver, but is also thought to protect LDL from oxidative modification, a key event in the initiation and acceleration of atherosclerosis. The antioxidant role of HDL has been attributed to HDL-bound PON-1[3].

The liver plays a key role in the production of serum PON1. Furthermore, several studies have shown that low serum PON1 activity constitutes a risk factor for atherosclerotic disease such as coronary artery disease, hypercholesterolemia, type 2 diabetes and renal failure that is under increased oxidative stress. In a recent article, Pasqualini et al. reported that PON1 plays a key role in regulation of endothelial function as PON1 activity modulates endothelial functions[4].

PON1 plays a foremost role in alleviating tissue injury due to formation of free radicals. The study is planned to establish whether acute liver disease produced any significant changes in serum PON activities. The second objective was to determine whether there was any correlation between serum PON and the various routine liver function tests.

Samples:

The patients were selected from the Indian Hospitals with the proper consents from the patients to enroled in to the study.

Group I : Fatty Liver Diseases: This group had 50 patients with a diagnosis of fatty liver disease, based on clinical examination and laboratory data.

Group II : Controls group: 50 healthy human adults who were voluntary blood donors of the hospital.

Methodology[5]:

The fasting Blood samples were from patients. 10 ml of plain blood was collected from each subject, the serum was carefully separated by centrifugation and transferred to micro tubes and stored at cool storage. The biochemical parameters such as fasting blood glucose, lipid profiles, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and gamma glutamyl transferase (GGT) levels were analysed. Serum PON activity was estimated by using 5.5 Mm p- nitrophenyl acetate as a substrate in 20 mM Tris–HCl buffer at a pH of 8.0. The change in the absorbance at 412 nm due to the formation of p- nitro phenol was measured by using spectrophotometer.

Results:

The biochemical parameters like serum fasting blood glucose, total cholesterol, triglycerides, and LDL-c were significantly increased, whereas decreased levels of HDL in fatty liver diseases individuals when compared to controls. AST, ALT and GGT activities were significantly higher in fatty liver diseases than normal subjects.

Table 1 : Parameters in 2 group of patients

	Glucose level in blood (Fasting condition) (mg/dl)	Cholesterol level (mg/dl)	TG (mg/ dl)	HDL (mg/ dl)	LDL (mg/ dl)	AST (u/l)	ALT (u/l)	GGT (u/l)
Group I : Liver Diseases:	108.5±8.5	222.6±18.5	204.1±22.5	42.5±6.9	132±16.2	51.1±10.9	99.2±14.9	6.5±2.1
Group II : Controls:	82.6±7.5	151.3±22.5	108.6±23.9	50.0±5.9	98.6±15.2	20.2±7.9	130.0±17.5	3.8±0.7

HDL-c=High density lipoprotein,
LDL-c = Low density lipoprotein,
AST=Aspartate aminotransferase,
ALT=Alanine aminotransferase,
GGT= Gamma glutamyl transferase.

Table 2 : PON levels in the Liver disease patients & Control patients

Group I : Fatty Liver Diseases:	95.3 ± 14.2
Group II : Controls:	130.2 ± 17.5

Discussion:

Fatty liver disease is a very common disorder and refers to a group of conditions where there is accumulation of excess fat in the liver. Although this is not normal, it is not serious but if it doesn't lead to inflammation or damage.

A number of studies have estimated serum PON 1 in humans[6] and experimental animals[6] with chronic liver disease. They have observed that serum PON 1 levels decline in various types of liver diseases. In contrast, there are only a few reports on this enzyme in acute liver disease[7].

PON1 is classified in a member of a super family of proteins that also consists of PON2 and PON3. Serum PON1 is synthesized mainly in the liver. The gene expression has been observed only in the liver. Arylesterase and PON1 activities have been shown to be functions of a single enzyme. There are several reports about the important of PON in liver disease, but only few of them has focused on the importance of its polymorphism in the liver disease mechanism. As mentioned earlier the liver plays a key role in the synthesis of PON1, and chronic liver diseases are associated with increased oxidative stress and inflammation. PON1 protects liver against inflmmation, liver disease and firosis[8,9]. Hussein et al[10] and Nguyen et al[11] revealed that decrease of PON1 activities in NAFLD patients. Similarly in the present study, we fid signifiantly decreased levels of PON activity in NAFLD patients when compared to controls. But Mohammed Hashemi et al[12] reported that no signifiance difference between in NAFLD patients and controls in PON1 activity.

To conclude, this study has demonstrated PON decline in patients with fatty liver disease. With the specificity and sensitivity of this enzyme being high, it could emerge as a parameter to assess liver function.

The measurement of serum PON1 activity is a simple, reliable, fast, inexpensive, readily automated method. SO it can be explored for the diagnosis of the fatty liver diseases.

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