STUDY OF RELATIONSHIP OF GLUCOSE AND SERUM GLUTAMIC PYRUVATE TRANSAMINASE (SGPT) INBLOOD SERUM OF PATIENTS OF GUJRANWALA DISTRICT

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ABSRACT;- *In individuals who have diabetes, they are a higher incidence of liver function test abnormalities than individuals who do not have diabetes. The most common liver function tests (LFTs) include the Serum Glutamic Pyruvate Transaminase (SGPT) activity, to measure the concentration of intracellular hepatic enzyme that has leaked into the blood and serves as a marker of hepatocytic injury. Present investigation was done on the blood serum samples of 125 outdoor patients including 57 males and 68 females. As a result of study it was found that, 16 were those patients with abnormal values of both glucose and SGPT while 43 patients had normal or control values of both glucose (90-140 mg/dl random) and SGPT (5-35 U/l). 46.4% and 75.2 % of the total patients were normal with glucose level and SGPT activity respectively. In age wise study, results showed that, of the total patients tested (male and female) 47%, 49% and 4% were in the range of, less than 30 year, 31-60 year and 61-above years respectively. Almost all the patients tested were of age less than 60 years (96%) and less patients of age above 60 years (4%) visited the hospital. It was found that 67 and 31 patients separately were suffering from elevated values of glucose and SGPT activity respectively while 16 patients (13%) were suffering from elevated values of both serum glucose and SGPT combinly. Conclusion is that there is biochemical relationship between glucose and SGPT and further research work & thorough studies are required.*

Key words: SGPT, LFT, Serum, Diabetes, Glucose, Gujranwala, Biochemical link, Biochemistry

INTRODUCTION

In the digestive system of vertebrates and other animals, there is a vital organ which is known as liver [1]. It performs many functions including production of the biochemical substances which are necessary for the digestion, Proteins synthesis, Glycogen storage, decomposition of the red blood cells, metabolism, immunity, detoxification and hormone production. Liver is very necessary for survival. Absence of liver cannot be compensated in our body [2].

Serum Glutamic Pyruvate Transaminase (SGPT) or Alanine Aminotransferase (ALT) is an enzyme which plays an important role in the production of energy. It occurs in many tissues like skeletal muscles, heart & liver, But most abundantly it is present in the liver. So along with other liver enzymes, it is used to detect liver diseases, like cirrhosis or hepatitis without jaundice [3]. In addition to it along with Aspartate aminotransferase test (AST), it helps to discriminate between liver tissue damage and heart damage. SGPT is an enzyme which usually occurs in heart cells and in the liver cells. It is released into the blood when the heart or liver is damaged. Blood ALT values are raised in case of viral hepatitis or heart attack [4]. Its values can also be raised due to some medications [5]. Normal values of SGPT/ALT in healthy adults are 0-45 U/l. In women its value is lower than men i.e. 0-35 U/l. For new born babies its value is double than that of adults (Table 1). Raised values of SGPT (ALT) means that there are some medical problems such as diabetes, viral hepatitis, congestive heart failure, bile duct problems, liver damage, myopathy or infectious mononucleosis[6]. Hence SGPT is a test for the screening of liver problems. Some standard references of ALT are shown in Table 1.

Table 1 Normal levels of SGPT

Sr. No	Gender	Value Range	Reference
1	Male	≤ 45 IU/l	http://en.wikipedia.org October 16, 2014
2	Female	≤ 35 IU/l	Do
3	Infants	Twice of adult	Do

Diabetes is not a disease itself, rather it is a heterogeneous group of syndromes characterized by an elevation of fasting blood glucose caused by a relative or absolute deficiency in insulin. It has two groups [7]. Type I is called insulin dependent diabetes mellitus and Type II is called as non-insulin dependent diabetes mellitus [8]. There are various methods in history which have been used for estimation of sugars and enzymes in the blood samples. Different researchers have used different techniques in this regards in the world for estimation of liver enzymes separately and combinely. Although much work has been done on LFTs and structure & functions of SGPT but up to our knowledge there is no evidence in literature about the relationship of SGPT and glucose changes. So it was utmost necessary to investigate the relationship between glucose level and SGPT activity in the human blood serum. We used Slectra E matchine for estimation of both glucose and SGPT in the blood samples of patients who visited DHQ hospital Gujranwala.

MATERIALS & METHODS

Collection of Blood Samples

Patients came in the outdoor laboratory and they were taken to the sample collection room. A tourniquet was tied first of all on the arm of patients and on the clear visibility of the vein. Blood was drawn from the vein with the help of the BD syringe (3 ml) volume. 2.5 ml of blood was drawn from each patient, it was kept in the 5ml test tube, and each test tube was marked with a number. After that, all these blood samples were kept at 4ºC in refrigerator.

Centrifugation

Blood samples were centrifuged by the HP-BC screening device (BIOTECH) at the rate of 4000 rpm for 2 minutes. Blood changed into 2 layers. Upper yellowish layer was serum and the lower layer was containing blood cells in it. All of these test tubes were left for 15 minutes in order to settle down the moving elements.

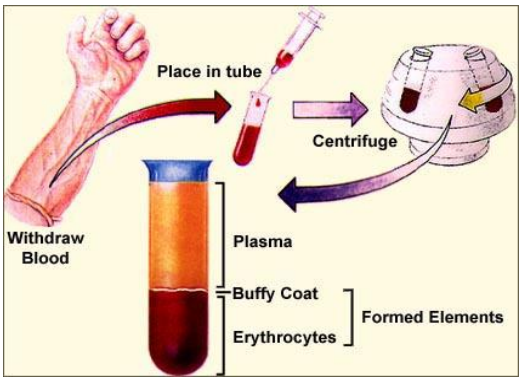

Fig 1 Schematic flow sheet of Blood sampling and centrifugation (www.google.com)

Estimation of Glucose

For the estimation of Glucose, serum of each blood sample was used. Supernatant from each test tube was carefully removed with the help of micropipette. 50 micro liter serum was taken from each test tube into a fresh eppendorf and was kept at proper place in Selectra E (which is a complete automatic machine) according to its sample number for the estimation of glucose at 37^0 C and 546 nm.

Estimation of SGPT

Using the supernatant as described above, SGPT activity was estimated in each sample using Selectra E automatically. The operational conditions were 37^0C temperature and UV radiation of 546 nm. While the uncertainty was ±2 and the spectral half width value was 10±2 nm, measuring range was -0.1 to 3.0 Abs. and temperature was 37ºC±2 ^{0}C.

Loading and testing of samples

The sample handling menu deals with the sample rotor and starting of procedure. The programmed samples can be placed in any position to the outer two rings of sample rotor be loaded and started the STAT sample, calibrator, controls and pediatric samples. The analyzer showed the present status of the samples. New samples can be placed in the sample rotor as soon as the previous was removed and new will automatically be processed.

RESULT & DISCUSION

Blood samples of 125 outdoor patients, male and female of all age groups, belonging to rural and urban areas of District Gujranwala were tested in the pathological laboratory, DHQ Hospital Gujranwala. All the people were suffering from different major and minor diseases because all were referred by duty doctors (Male/Female) for various kinds of tests. The values of only serum glucose and SGPT activity were noted for analysis.

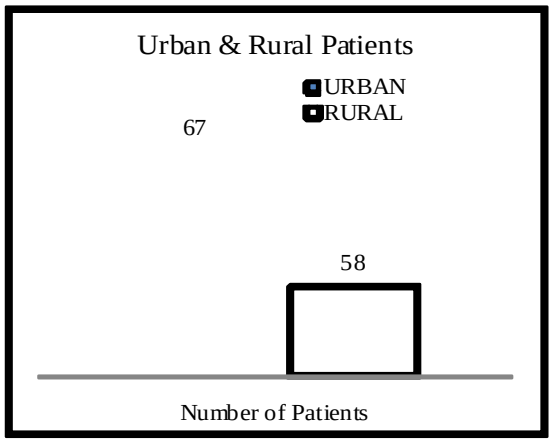

Fig 2 Ratio of male and female patients included in this study

We studied number of male & female patients among the people who visited the outdoor of DHQ hospital. It was noticed that there were more female patients than that of male patients (Fig 2). It may be due to several reasons, one reason may be that females have more physio-medical problems than males and also that females have more free time to visit the doctors while males in our society have a lot of work and duties to do. The other reason may be life style in our society that males have an active lifestyle and they stay healthy while females are not very active so they suffer a lot of problems. Another reason is that females at home consume a variety of food, which may cause positive or negative effects in their bodies. So they become more conscious towards their health and hence they visit hospitals more frequently. Female patients were also more due to this reason that they are mostly educated and qualified but males are not very conscious about their healths as well as they prefer to visit the private clinics and hospitals [9].

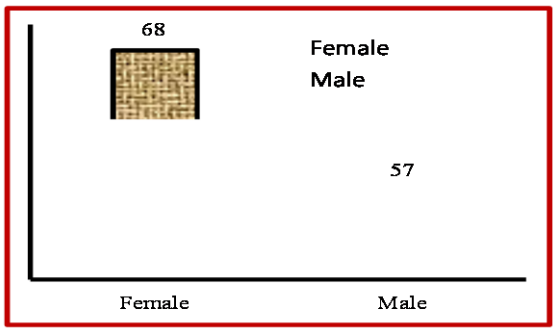

Fig 3 Study of Patient of Different areas of District Gujranwala

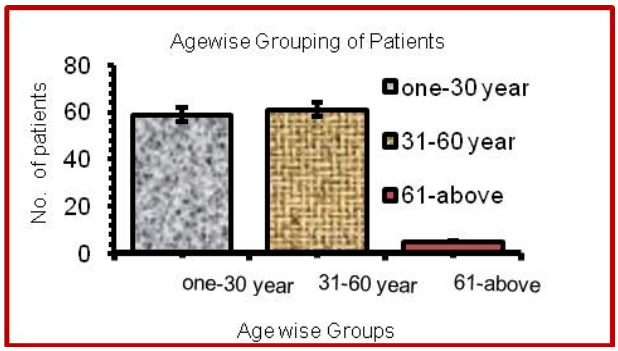

Fig 4 Study of effect of age factor on the glucose level and SGPT activity

In another study, it was found that urban patients are more in number than that of rural patients (Fig 3). It shows that urban population has many health problems and these health problems may be due to their environmental problems like pollution, contaminated food and impure water. Rural population has fresh air, pure environment and foods as well as they have an active lifestyle. One possibility of more urban and less rural patients may be that urban people are more educated, aware and are more conscious about their health than that of rural population, so they visit doctor as early as possible and whenever they feel defect or infection.

When we studied the diabetes and elevated SGPT activity in age-wise groups, we found that there is more abnormality in blood sugar level and SGPT level in the middle age group i.e. 30-60 years old people (Fig 4). There may be a number of causes for this. One reason may be the change in lifestyle of the people. It changes from active lifestyle to sessile lifestyle. With increasing age, immune system becomes weaker and people become more vulnerable to many diseases. Also that their energy and strength decreases due to decreasing amount of intake of food. While in youngsters, teenagers there is a lot of potential and energy so they mostly have normal values of Blood sugar level & SGPT activity [9]. They also have a strong immune system to tackle with all the problems & fluctuations in their bodies. Infants and Juveniles have doubled values of SGPT than normal value in youngsters. While Fig 3 also shows that last group, 60-above year age, has a very less number of people (5 patients only). One reason is that they are not very active and they cannot go outside them self and entirely depend on their young ones. Another reason is that in Pakistan average age is this, so people do not live long hence their number is very less.

In another study it was found that there are large number of people who have high blood sugar levels (Fig 5). They are large in number due to many reasons. One main reason of occurrence of diabetes mellitus may be that it is genetic disease and can be inherited from one generation to the other, so if one of the parents is diabetic then there is a risk of diabetes mellitus for all of their offspring. Obesity is another major reason for the diabetes [10]. More people become obese due to their lifestyle that they have inactive lifestyle. Hypertension is another reason for the elevated blood sugar level, because it causes high blood pressure and ultimately it causes elevated blood glucose level. Pancreatic disorders also contribute to abnormal Blood Glucose level. Metabolic disorders may also ultimately end into diabetic mellitus. So due to all these possibilities the ratio of people having abnormal blood sugar level is very high. SGPT levels are not normal mainly due to liver disorders, consequently glycogen storage capacity of liver is reduced and thus glucose level in blood is increased. Its main reason is Hepatitis B & C. Jaundice is another reason for elevated SGPT level due to hepatocytic injuries [11]. There were 16 patients who had both abnormal values of both SGPT & Blood glucose, it may be due to the reason that these people have liver dysfunction as well as some of the problems described above [5,12,9]. This study showed a positive link between abnormalities of blood serum glucose and SGPT activity.

CONCLUSION

Present investigation was done on the blood serum samples of 125 outdoor patients including 57 and 68 male and female respectively. As a result it was found that, 16 patients, which were 13% of the total patients involved in this study, were suffering from elevated values of both serum glucose and

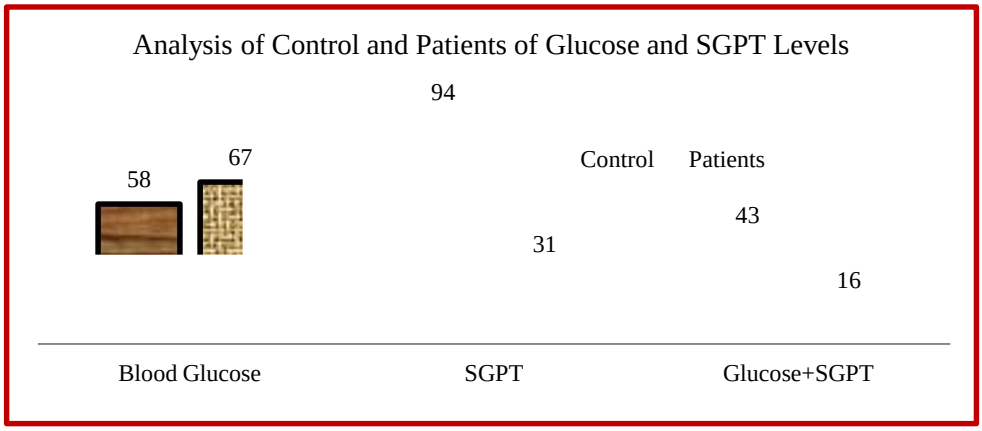

Fig 5 Study of patients suffering with and without higher level of glucose alone, SGPT alone and both glucose+SGPT combinely

SGPT activity combinely. Conclusion is that there is biochemical relationship between glucose and SGPT and further research work & thorough studies are required. Furthermore, Looking at elevated glucose & SGPT levels along with those of other liver enzymes, such as SGOT and alkaline phosphatase etc, can give doctors more precise and accurate information about liver problems.

ACKNOWLEDGMENTS:- Authors are thankful to DHQ hospital, Gujranwala, Pakistan which provided all the facilities to complete this research project. Laboratory staff was very cooperative and helpful. Special thanks to Higher Education Department (HED), Govt. of Punjab, Prof. Masood Naeem, Principal and Prof. Mahmood Akhtar Lak, HOD Department of Chemistry, Govt. P/G Islamia College Gujranwala.

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