DETERMINATION OF CORRELATION BETWEEN SERUM GLUCOSE LEVEL AND SERUM GLUTAMIC OXALOACETIC TRANSAMINASE ACTIVITY IN PATIENTS OF DIFFERENT DISEASES

Zia ullah khokhar[1], *Asra yaqoob[1], Khalid Mehmood[1], Muhammad Imran[2] Javed Tanveer Butt[4], Sheikh Asrar Ahmad[3]

[1]Department of Chemistry, Govt. Post Graduate Islamia College, Gujranwala, Pakistan
[2]Department of Zoology, Post Graduate Islamia College, Gujranwala, Pakistan
[3]Division of Science and Technology, University of Education, Lahore, Pakistan
[4]DHQ Hospital, Gujranwala, Pakistan
*Corresponding author: zia2_khokhar@hotmail.com; asrahundal62@gmail.com Cell No. +923007432748

ABSTRATCT:- *This study was conducted to investigate relationship of abnormalities of serum glucose level (SGL) and serum glutamic oxaloacetic transaminase (SGOT) activity in patients of Gujranwala District Pakistan. SGL and SGOT activity were determined using Selactra E method. 120 patients of different diseases, age groups, areas, and gender were screened for control and abnormal values of SGL and SGOT activity respectively. It was found that, percentage of male patients (60%) was significantly higher than that of female patients (40%) who visited the public hospital. Study also showed that 62% and 38 % patients were belonging to urban and rural area, respectively. 29%, 46% and 25% of the total patients were 10-30, 31-50 and above 50 year old respectively while average ages were 23±5.34, 36.5±6.08, 57.8±4.67 years respectively. 19 male and 18 female patients had abnormal value of SGL and 20 male and 32 female patients had abnormal value of SGOT activity, separately. Data also showed 13 patients who were 11% of the total, were abnormal with respect to both SGL and SGOT activity. Increased SGL and SGOT activity revealed a biochemical relation between them.*

Keywords: Liver function tests, SGOT, Diabetes, Serum Glucose, Biochemical Association

INTRODUCTION

Recent studies revealed that malnutrition, polluted water, socio-economic stress and afraid of terrorism causes lethal liver disorders like jaundice, hepatitis & hepatocytic injuries. Such liver injuries lead to release of serum biomarkers (SGPT, SGOT and ALP), which could indicate a internal damage [1, 2].

SGOT is part of an initial screening for liver disease. It catalyzes the reversible transfer of a α-amino group between aspartate and glutamate and such is an important enzyme in amino acid metabolism [3]. SGOT is commonly measured clinically as a biomarker for healthy liver. Aspartate transaminase catalyzes the interconverssion of aspartate and α-Ketoglutarate to oxaloacetate and glutamate.

The normal range of SGOT is about 5 to 40 international units per liter of serum [4]. Estimation of SGOT activity in relation to liver enzymes can give important information about the liver whether a disease, inflammation, or other problem is affecting or not. If there is ongoing injury the SGOT will remain elevated whereas decreased amount of SGOT is seldom [5].

Although much work has been done on LFTs and structure & functions of SGOT but up to our knowledge there is no published literature about the relationship of SGL and SGOT abnormalities. So it was utmost necessary to investigate the relationship between SGL and SGPT activity in the human blood serum, this may lead to suitable pharmaceutical formations diabetes and liver disorders, which is need of the day.

MATERIALS & METHODS

Collection of Blood Samples

All subjects involved in this study were those patients who visited themselves outdoor clinics in the DHQ hospital, Gujranwala, Pakistan, for different diseases and their Doctors recommended them some kind of tests; they came to the sample collection room. A torniquit 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 4°C in refrigerator.

Preparation of Samples

Blood sample were centrifuged by the HP-BC screening device (BIOTECH). These samples were centrifuged 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 formed elements. Serum was removed and was used for next experiments.

Estimation of Serum Glucose (SGL)

For the estimation of glucose, serum/supernatant from each test tube was carefully removed with the help of micropipette. 50 micro litter serum was taken from each test tube into fresh ependorfs and was kept at proper place in *Selactra* E (which is a complete automatic machine, works on spectrophotometry principal) according to its sample number. For the estimation of glucose *Selactra* E was used at 37^{0} C. and UV length was 546 nm [6].

Estimation of SGOT Activity

Using the supernatant prepared as described above, SGOT level was estimated in each sample using *Selactra* E automatically. The operational conditions were 37^{0}C 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 37°C±2 ^{0}C.
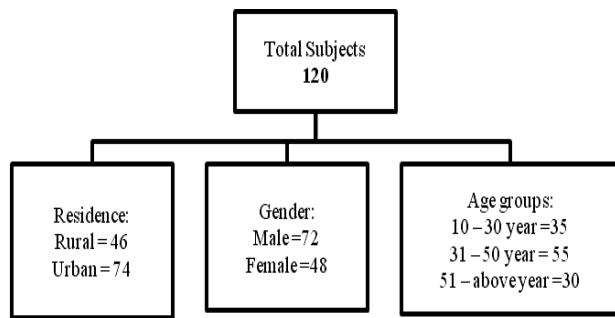
Fig.1. Subjects involved in this study; Patients were of different ages, sex and areas who visited outdoor clinics in DHQ hospital, District Gujranwala, Pakistan and Doctors recommended them for sugar test and LFTs.

Statistical Analysis of Data

Aforementioned experiments were conducted in triplicate. Important data were subjected to analysis of mean, variance and standard deviation (±SD) using *Standard Deviation Calculator* "live" software. The formula for Sample Standard Deviation was obtained from (http://www.mathsisfun.com/data/standard-deviation-calculator.html)[7].

RESULTS & DISCUSSION

Results showed that among 120 patients involved in this study, 72 (60%) were male and 48 (40%) were females. The percentage of male patients was significantly higher than that of female patients (Figure 2). Diabetes is known as the mother of all the diseases as it not only affect the glucose metabolism in the body but also disturb the other metabolic pathways by affecting the enzymes regulating them [8]. SGOT is also one of the markers of liver function tests [9]. In this study correlation of SGOT and diabetes was investigated to find that to what extent both parameters affect each other. The present study was done on patients in a public hospital, including male and female patients suffering from different type of diseases, SGL and SGOT activity was tested in their blood serum. Present study showed that male patients were more than female patients who visited public hospital, which indicated the dominant and independent behavior of males as they easily approach doctors and can have the treatment. Whereas the females most of the times have to depend on their males to visit doctors. On the other hand this may be relevant to the more efficient immune system of the females which nature has given them [10]. Our findings are similar to Ikram *et al*. [11] who reported that increasing worldwide incidence of diabetes mellitus in adults have an important effect on lifestyle, quality and expectancy of life of patients. Another previous research reported that the prevalence of diabetes is higher in men than women, but women with diabetes are more in number than men, the findings also reported that the main reason of diabetes was obesity [12].

Figure 3 shows the analysis of rural and urban patients to find the frequency of patients coming to the public hospitals. Among 120 patients 74 patients (62%) were belonging to urban area while 46 patients (38%) were belonging to rural
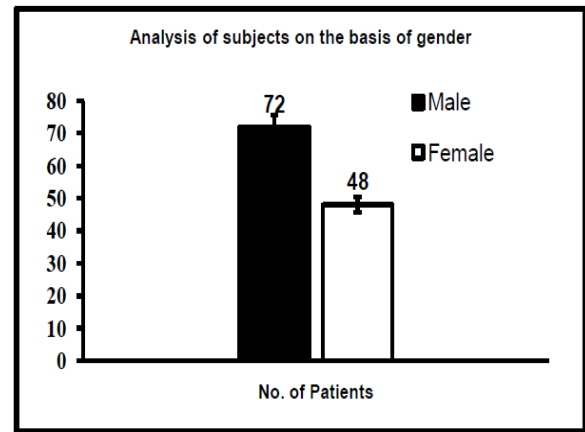
Fig. 2. Number of male & female patients involved in this study. The percentage of male and female patients has been shown in the form of bars. There were 60% male and 40% female patients who were observed in the ward of D.H.Q hospital.

habitats. It was found that urban people have more awareness of approaching doctors on any kind of abnormality. While in rural areas traditional medication is preferred [13] before going to qualified Doctors and hospitals. In another study Kumar et al. (2013)[10] reported diabetes is a global disease with enormous effects on mortality, morbidity and health. Traditional medicines used worldwide are obtained from plants.
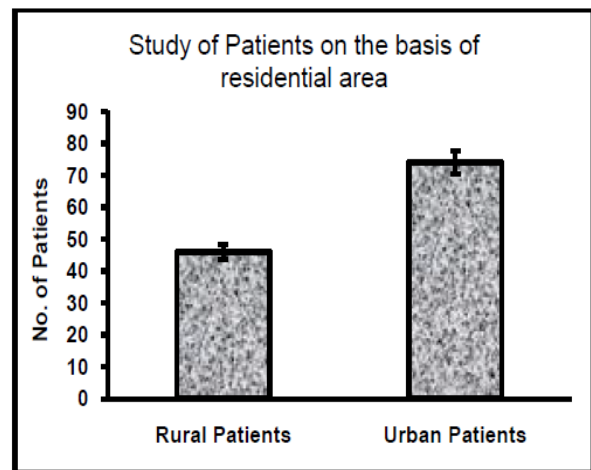
Fig. 3. Analysis of patiens involed in this study on the basis of their residence i.e. rural & urban.

In present study, all the patients were analyzed in to three age groups to find which age group has higher frequency of diabetic patients. Results showed that 55 out of 120 patients i.e. 46% or nearly half of the patients were from 31-50 age group (Figure 4) and their average age was 36.5±6.08 years. There were 35 patients (29%) between age 10-30 year with average age 23±5.34, and 30 patients (25%) of the age 51 and above respectively and their average age was 57.8±4.67. The ratio of patients of age 30-50 years was significantly higher than other patients. Results depicted that habitat and lifestyle play significant role, as data was taken from public hospital of Gujranwala. Whitehead et al. (1999) [14] summarized that the reason of increased AST is not measured in 38% patients and rest 62% having correct diagnosis having higher SGOT values are due to liver diseases including hypoxia, pancreatobiliary disease and hepatocellular disease, this

disturbs insulin metabolism. Chatila et al., (1996) [15] also reported that DM is the most obvious cause of liver failure and other affiliated disorders. Diabetes is a major challenge for the healthcare system, being associated with multiple local and general complications which involve increased medical and socio-economic costs and an important reduction of the patient's quality of life [8].
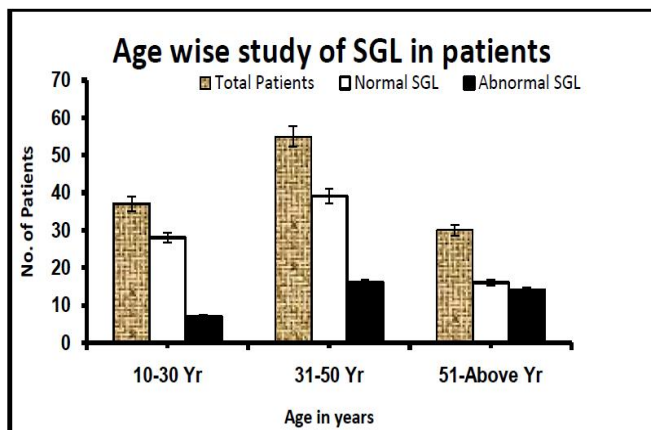

Fig. 4. Age wise analysis of patients for SGL. The results showed that 29% patients were of age 10-30, 46% patients were of age 30-50, 25% patients were above 50 years of age.

Figure 5 shows the division of total patients involved in this study, into 3 age groups 10-30years, 31-50 years and 51 & above age, the purpose was to find which age group has higher SGOT activity. This division shows that in age 10-30, 35 were the total people among which 26 were normal while 9 were having abnormal value of SGOT, in age group 31-50 were 55 people 28 were normal while 27 were having abnormal values of SGOT and in age 51-above there were 30 people among which 14 were normal while 16 were having abnormal value of SGOT. Results also showed that the number of females with higher SGOT activity in all age groups was higher than male patients (Figure 5).

Normal and abnormal value of SGOT with respect to three age groups indicated that abnormal values of SGOT are higher in age groups 31-50 year, in which females' percentage as even higher. Also abnormal values of SGOT activity were particularly found in females of all ages, most of them belonged to urban habitats. One reason of greater number of urban females may be physical exercise in urban living style is not up to the mark due to which elevation in liver enzyme, SGOT occurred. Whereas in rural areas females work from dawn to dusk and their metabolic functions are in far better condition [16].

From total 120 patients 68 were having normal value of SGOT while 52 were having abnormal values of SGOT (Figure 6). In contrast to which 37 patients were having abnormal sugar level as they were diabetic patients. While 31 were the subjects having both normal blood sugar and SGOT values and 13 were having abnormal values of SGOT and blood sugar. Present study concludes that diabetic patients have higher liver function abnormalities in contrast to those who do not have diabetes. High chronic elevation of transaminase sometimes reflects underlying resistance of
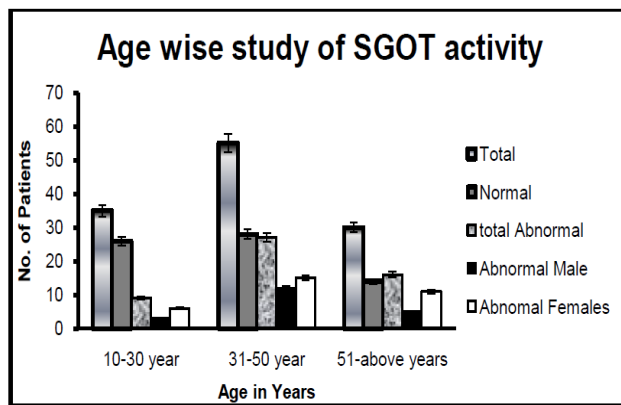

Fig. 5. Age wise analysis of SGOT activity in blood serum of patients. Age wise and gender distribution was shown on x-axis while number of patients was taken on y-axis. Study shows that maximum number of patients belong to 31-50 age group.
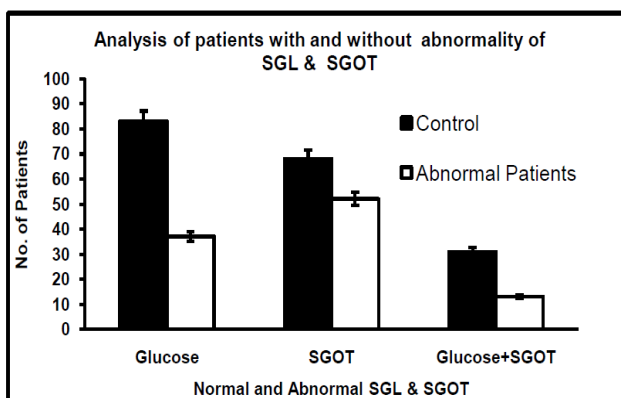

Fig. 6. A study of patients suffering with and without higher level of SGL and SGOT separately and both Glucose+SGOT combinely.

insulin. Our findings are different than one previous study according to which more patients (76%) were having abnormal values, while less patients were having normal values of SGOT [17, 18]. This difference may be due different countries and lifestyle. Our findings strengthen the reports of Gorasia et al. [19], who claimed that diabetes mallitus disturbs largely the liver functions due to which elevation in SGOT level occurs. Previous studies [6] had repotted biochemical link between abnormalities of SGL and SGPT, according to which 13% patients were suffering from elevated values of both SGL and SGPT. Our own preliminary data confirmed intensive association of SGL and ALP activity in 23% of the total subjects belonging to different age, sex, profession and area i. e. rural and urban. No data on investigation of close association of abnormalities of SGL and SGOT activity in patients, using *Selectra* E method is reported until now; therefore novelty of our research work is confirmed.

CONCLUSION:-

 It was found that 26% of the total patients were having no abnormality of SGL & SGOT activity but they were suffering from different diseases. Their glucose level was in the range

of 70-140 mg/dl, while SGOT was in the range of 5-40 IU/l. This data also showed 13 patients who were 11% of the total patients, were abnormal with respect to both SGL and SGOT activities. An increased SGL and SGOT activity revealed a biochemical relation between them. Diabetic patients have higher frequency to have liver diseases due to abnormalities of LFT than those who are not. Outcomes from this investigation clearly demonstrated that success of treatment of any disease is based on knowledge of cause and association with surrounding parameters. Further investigation is suggested.

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