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Correlation of serum ferrtin with SGOT, SGPT and ALP among type 2 diabetic males

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Abstract
Among non-communicable diseases diabetes is one of the common multifactorial metabolic X disease responsible for huge mortality and economic burden worldwide. Liver is most important metabolic control organ of body and serum ferritin is regarded as important indicative of diabetes. As studies pertaining to combined incidence of serum ferretin, b. sugar and Liver enzymes are scarce. So present study was aimed to describe correlation if any between the diabetic subjects with serum ferritin and lipid enzymes as the biomarkers for biochemical importance. The study included 75 diabetic and 25 control subjects for biochemical analysis. The results showed significant relationship between serum ferritin and liver enzymes among the diabetic ones as compared to non-diabetics.

Keywords: Diabetes type II, serum ferritin, liver enzymes

Introduction
Diabetes a syndrome of metabolic disorder usually considered as multifactorial as well as multifaceted syndrome affecting the majority of communities worldwide. It can be type I (insulin dependent), type II (insulin independent), as well as gestational diabetes. Among these all type II is described as a significant economic burden disorder because of its co morbidities (Zheng *et al* 2018) [14]. WHO in its factsheets has continuously been providing emphasis on diabetes as most prevalent causative of morbidity with escalating effect majorly in developing countries (WHO 2022) [12]. Serum Ferritin (S. Ferritin) is an intracellular plasma protein which stores iron is regarded as biomarker for various diseases. Liver as one of most important organ for body metabolism is producing plasma enzymes suggestive of fitness level of body. Thus, the study was planned to associate the relation of Serum ferritin and vital liver enzymes *viz* Serum Glutamate oxaloacetate transferase (GOT or ALT), Serum glutamic pyruvic transaminase (SGPT) and Alkaline Phhosphate (ALP) to find any cumulative effect or correlation.

Material and Method
The study was carried out on 75 clinically verified type 2 diabetic (As per WHO criteria) male subjects of age group 35-50 years, irrespective of the period of commencement of disease along with that 25 clinically healthy male subjects free of diabetes of same age as control for assessment. The approval from each subject was taken for their inclusion in the study as per ethical requirement. In order to examine various non-biochemical parameters like age, gender, alcohol intake data was recorded. Body Mass Index (BMI) and previous family history was also recorded for the same subjects. The clinical analysis of samples the analysis was performed at Trans Care labs, Punjab. For measurement of biochemical variants the standardised techniques were used. Regarding levels of S. Ferritin WHO 2011 criteria was considered. BMI was calculate as per Quit let index while for analysing the fasting blood sugar (GOD-POD method) was adopted. Liver enzymes were estimated by IFCC method without pyridoxal phosphate for SGOT, and for SGPT PNPP, AMP Buffer methods were used.

Result and Discussion
The analytical study included the diabetic and control subjects. The various biochemical and non-biochemical records were procured and the findings were recorded for statistical analysis for their significant relationship. The various variables are describes ahead

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Blood sugar and non-biochemical variables

The findings revealed that 35% of individuals were obese, 29% were alcoholic and 48% were found to be hypertensive, while 17% were smokers. The increased BMI levels were significantly found in diabetics (p=0.003) which can be due to poor glycemic control.

Blood sugar and non-biochemical parameters

Regarding biochemical analysis Serum Ferritin, SGOT, SGPT and ALP levels were examined for clinical significance. There were quite surprising outcomes as 64% of diabetic subjects were found to be having elevated SGOT levels 53% were with increased SGPT levels and 58% were with enhanced ALP levels. S. Ferritin levels were significantly higher ($p<0.001$) among diabetics as compared to the controls. The various parameters are detailed in table no 1 underneath.

Table 1: The levels of various parameters for diabetic and non-diabetic subjects

S. No	Parameter	Diabetics	Non Diabetics	P value	Significance
1	Age	42.5±9.8	42.12±8.7	0.85	NS
2	BMI	28.32±4.32	24.97±3.8	0.008	S
3	FBS	158.4±29.65	87.9±3.86	<0.001	S
4	S. Ferritin	201.3±29.8	124.07±27.3	<0.0001	HS
5	SGOT	40.80±10.87	19.44±3.28	<0.0001	HS
6	SGPT	41.05±11.03	21.34±7.9	<0.0001	HS
7	ALP	186.92±6.9	135.12±16.02	<0.0001	HS

HS= highly significant, S= significant, NS= non-significant.
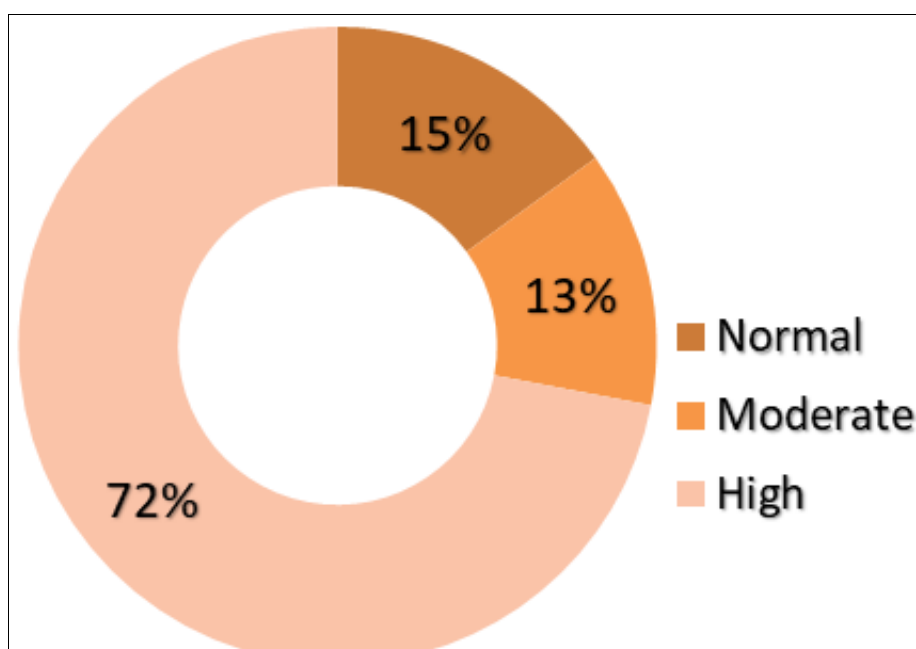
Fig 1: Showing the percentage of subjects with regard S. Ferritin Levels

Blood Sugar and S. Ferritin

The mean serum ferritin levels among diabetics were found to be significantly associated (201.3 ng/ml) as compared to (124.07 ng/ml) in control ones ($p<0.0001$) as shown in figure 1. The results are in consonance with the findings of Rajpathak *et al.* (2009) [9] and Kapoor (2017) [5] as they also found significant association of increased risk of type II diabetes and S. ferritin. Yan *et al.* (2021) [13], Amin *et al* (2019) [1] also found highly significant correlation between serum ferritin and diabetes.

Islam *et al* (2020) [4] aimed to evaluate the association of liver enzymes with type II diabetics and described significant regression analysis ($p<0.01$) among two.

Blood Sugar and Liver Enzymes

The liver is considered as major site for the insulin clearance by Duckworth *et al.* (1998) [2]. Harris (2005) [3] also described high incidence of liver enzyme malfunctions among diabetics. The findings in present study showed significantly enhanced levels of SGOT, SGPT, ALP ($p<0.001$) as shown in figure 2. The liver enzymes presently are found to be an important indicator of liver deterioration due to increased blood sugar. Karimabad *et al.* (2022) [6] in their findings also expressed the relationship among ALT, AST, GGT and ALP with the diabetics and defined it as an important biomarker for diabetes. Ni *et al.* (2012) [8] in their study illustrated increased ALT and AST levels as markers for non-alcoholic fatty liver disease among diabetics. Whereas contrary to the findings of present study they did not record any significant relationship of AST in males.
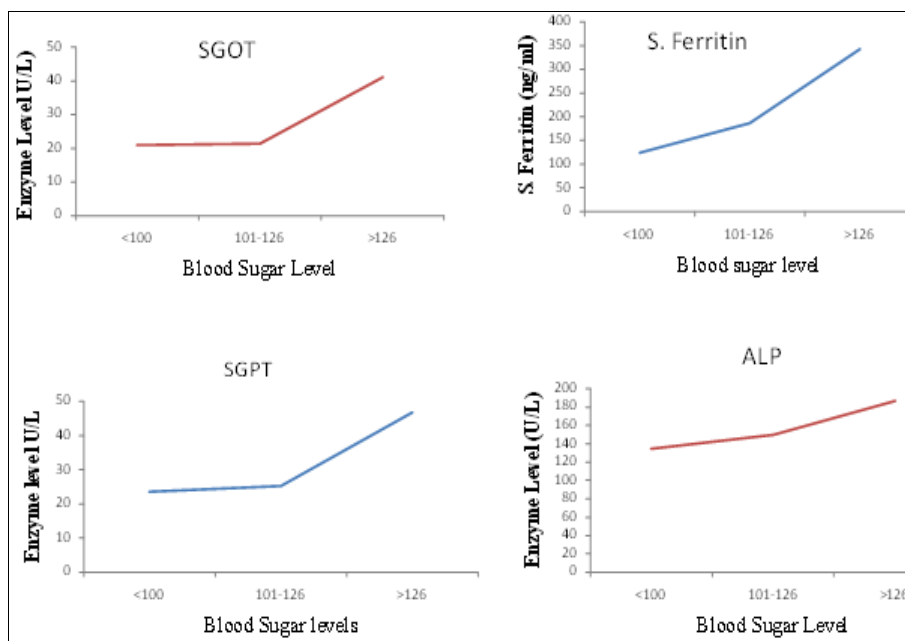
Fig 2: The figure presenting the levels of various biochemical variable among diabetics

Serum Ferritin and SGOT, SGPT & ALP

Serum Ferritin as in important marker for iron overload and iron induced injury. Hence increased ferritin levels could be important for prediction of deteriorated liver among diabetics. The subjects with raised ferritin levels were found to be having greater levels of SGOT (45%), SGPT (53%) and ALP (60%). The results depicted significant relation of SGPT levels among high ferritin levelled subjects. The findings are in agreement with Kowdley et al. (2012) [7] who demonstrated elevated risk of non-alcoholic fatty liver disease with elevated levels of serum ferritin. Where as in conflict to present findings Siriwardana et al. (2017) [10] among Srilankan population described serum ferritin levels to be markedly elevated among non-diabetic alcoholics and found no association of serum ferritin with advancing age and liver cirrhosis.

Conclusion

The diabetics are having escalated liver enzymes and serum ferritin is also significantly associated with diabetes. In the present study the diabetics are found to be having highly significant correlation with liver enzymes as well as serum ferritin. The combined studies to elucidate effect of collaborative effect of liver enzymes and ferritin among diabetics are scarce, hence more such type of studies are required to be conducted at large scale. The evaluation of the inter relationship of various biomedical biomarkers for the physical and metabolic status of the population is of high requirement and have potential to be important for rapid curative method.

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