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Study of Liver Functions Parameters in Diabetic Patients from Raipur Region

Vishwaprakash Roy[1], Jayant Biswas[2] and Ashish Saraf[3]
[1,3]School of Biological and Chemical Sciences, MATS University, Raipur
[2]Director Cave Protection Organization, Raipur, C.G.
Corresponding author: Vishwaprakash Roy

Abstract: The study deal with the pattern of impairedliver function or fatty liver conditions in diabetic patients. Study was conducted in Clinical Path Lab., Raipur, C.G. over the period of one year on 300 subjects out of which 150 belongs to normal subjects (NG) group and 150 diabetic subjects (DG). The male and female ratio in studied subjects was same (1:1). All the 300 subjects were divided in 4 groups on the basis of age and the value were presented in mean ± SEM for all age groups and complete liver parameters. The Diabetic Patients of all the age groups *viz.*, G1, G2, G3 and G4 showed significant increase in S. Billirubin, S.G.O.T., S.G.P.T. and Alkaline Phosphataseas compared to that of normal subjects. The major variation in complete LFT was recorded for diabetic patients of G4 age group subjects, both in male and females from normal subjects. The pattern of lipid profile for G4 group subjects (both male & female) wereS. Billirubin (1.04±0.15mg/dL, 1.57±0.20mg/dL), S.G.O.T(68.84±1.11 mg/dL, 55.03±1.35 mg/dL), S.G.P.T. (59.13±0.65 mg/dL, 44.54±1.11 mg/dL) and Alkaline Phosphatase(110.20±0.64 mg/dL, 121.87±0.72 mg/dL). Study showed the prevalence of impairedliver conditions associated with diabetic patients whose intensity and horrific consequences are increasing along with old age.

Key words: Diabetes mellitus, Liver Function Test, Raipur

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I. INTRODUCTION

Diabetes is a complex disorder characterized by disordered metabolism, hyperglycemia, resulting from low levels of insulin production by beta cells of pancreas. The prolong hyperglycemia of Type 2 diabetes is leads to long-term damage, dysfunction or failure of various organs, such as eyes, kidneys, nerves, heart, and blood vessels etc. Two main types of diabetes mellitus exist Liver function tests (LFTs) are commonly used in clinical practice to screen for liver disease, monitor the progression of known disease, and monitor the effects of potentially hepatotoxic drugs. The prevalence of diabetes worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of diabetes is projected to increase from 171 million in 2000 to 366 million in 2030. Diabetes is more prevalent in men than women (Wild *et al*., 2004).

The liver plays a major role in the regulation of carbohydrate metabolism, as it uses glucose as a fuel, it has the capability to store glucose as glycogen and also synthesize glucose from non-carbohydrate source. This key function of liver makes it vulnerable to diseases in subjects with metabolic disorders, particularly diabetes (Levinthal and Tavill, 1999; Meybodi*et al*., 2000).

The most common LFTs include the serum aminotransferases, alkaline phosphatase, bilirubin, albumin, and prothrombin time. Aminotransferases, such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST), measure the concentration of intracellular hepatic enzymes that have leaked into the circulation and serve as a marker of hepatocyte injury. Alkaline phosphatase (AP), γ-glutamyl transpeptidase (GGT), and bilirubin act as markers of biliary function and cholestasis. Albumin and prothrombin reflect liver synthetic function (Lewis et al., 2002).

The aminotransferases AST and ALT are normally <30–40units/l. Elevations of aminotransferases greater than eight times the upper limit of normal reflect either acute viral hepatitis, ischemic hepatitis, or drug- or toxin-induced liver injury. Much more common than patients with acute hepatitis, however, are patients with chronic mild elevation of aminotransferases, or AST and ALT < 250 units/l for > 6 months. Chronic mild elevation of transaminases isfrequently found in type 2 diabetic patients. This article will provide a review of the pathology, incidence, causes, and drug therapy related to type 2 diabetic patients with elevated LFTs (Baig*et al*., 2002; Erbey*et al*., 2000).

Several biochemical tests are useful in the evaluation and management of patients with hepatic dysfunction. Liver Function Tests (LFTs) are commonly used in clinical practice to screen for liver disease. The most common LFTs include the serum aminotransferases (ALT, AST), alkaline phosphatase, bilirubin and albumin. Increased activities of liver enzymes such as aspartate aminotransferase (AST), alanine aminotransferase (ALT) and γ-glutamyltransferase (GGT) are indicators of hepatic damage or injury.

II. MATERIAL AND METHODS

Study Subjects:

In the present study the 300 total subjects were included belongs to both normal blood glucose level and diabetic. Out of which 150 patients of normal blood glucoses (75 males and 75 females) and 150 diabetics patients (75 males and 75 females) with age group from 35-75 years. On the basis of age and health condition four groups were formed viz. Group1(G1) included age between 35-45 years, Group 2 (G2) 46-55 years, Group 3 (G3) 56-65 years and Group 4 (G2) 65-75 years. This research was done on those patients who were regular visitors to the CPL Pathology Laboratory, Raipur as well as the patients who were advised by clinician for lipid profile analysis.

In addition to this, their various information has also been collected and kept as record to find any kind of correlation, such habits and condition includes dietary intake, alcoholism, smoking, thyroidism, working condition or any kind of disease and body ailments.

Analysis of Liver Function Parameters:

Blood samples were drawn from cubital vein by expert peoples and lab technicians with disposable syringes (Dispo-Vein) and then immediately transferred to labeled EDTA containing vacutainer tubes supplied by BD. The samples were centrifuged at 3000 r/min for 5-10 min. and serum were stored in refrigerator for future analysis of biochemical parameters.

The following biochemical parameters were used to determine the complete liver function tests serum bilirubin, Serum Glutamic Oxaloacetic Transaminase [S.G.O.T. (AST)], Serum Glutamic Pyruvic Transaminase [S.G.P.T. (ALT)] and Alkaline Phosphatase (S. ALP) were measured for each subject (diabetic and non-diabetic). The analysis of ALT/ GPT Bilirubin (Total, Direct, Indirect) was performed by the method of Jendrissik&Grof (1998), ALT/ GPT (Alanine Aminotransferase) by Tiez(1994)and Alkaline Phosphatase by Bowers and McCommb (1972).

All patients underwent a clinical and laboratory evaluation and answered standardized questionnaire. The patients were suggested to revisit the clinical laboratory for examination oftest parameter after regular of interval of 3 months in some cases we had visited patients house with expert technicians to collect the samples for analysis of above mentioned parameters. The values were expressed as mean ± SEM.

III. RESULT AND DISCUSSION

A total of 300 confirmed subject were taken for the study both health control (150) and diabetes patients (150) in this study. To perform this, comparison analysis was done to see if there is any difference between controls and diabetic patients. An attempt was made to correlate between all liver function parameters. The findings of this study included 150 known diabetic patients and 150 healthy (non-diabetic) controls out of 150 diabetic patients 11% patient's suffered from type l and 89% patients have type2 kind of diabetes. 43% patients of all the studied subject were found to be with family history of diabetic disorder and all diabetic patients were under medication.

The study of liver function test was done to know about the status of liver functions in diabetic and nondiabetic patients. The serum SGOT levels showed significant increase in type 2 diabetes mellitus subjects (Group 3 & 4) when compared to G2 and G1 diabetes mellitus subjects. The serum SGPT levels also showed significant increase in type 2 diabetes mellitus subjects (Group 4) when compared to G3, G2 and G1 diabetes mellitus subjects. No significant difference was observed in values of total serum bilirubin of type 2 male diabetes mellitus (G 3 & G 4) subjects from female diabetic subjects and no association was recorded when compared with all age groups of normal subjects. Serum Total protein levels also showed non-significant values in type 2 diabetes mellitus subjects when compared to normal subjects the values are not recorded.

The mean± SD value of AST in male healthy control subjects were 25.36±1.25 IU/L, 25.68±1.62 IU/L, 32.22±1.11 IU/L and 39.20±0.98 IU/L for all age groups G1, G2, G3 and G4 subjects respectively. Whereas, in female healthy control subjects were 23.25±0.37 IU/L, 24.12±0.49 IU/L, 26.08±1.02 IU/L and 27.00±0.84 IU/L for G1, G2, G3 and G4 subjects respectively. The values of AST in diabetic groups are varied from normal group normal group subject but significant variation was recorded for G3 and G4 diabetic group subjects it was 57.45±1.21 IU/L and 68.84±1.11 IU/L for male diabetic subjects and for female diabetic subject's values were 45.70±0.87 IU/L and 55.03±1.35 IU/L both for G3 and G4 age groups respectively as shown in Table 4. AST level also showed highly significant increase in type 2 diabetes mellitus subjects (Group II) and in type 2

diabetes mellitus subjects (Group III) when compared with healthy controls. The AST levels also showed significant increase when normal subjects (G3 & G4) were compared with type 2 diabetes mellitus subjects (G3 & G4) (Table 1).

The mean ± SD value of ALT in male healthy control subjects were 23.00±2.21 IU/L, 25.14±1.65 IU/L, 31.00±0.95 IU/L and 35.00±0.25 IU/L for all age groups G1, G2, G3 and G4 subjects respectively. While for female control subject the values for ALT were 19.68±1.45 IU/L, 23.25±0.65 IU/L, 25.11±0.42 IU/L and 29.20±1.31 IU/L for G1, G2, G3 and G4 age group subjects respectively. The significant difference was recorded in both male and female diabetes subjects group (G3 & G4) from same category of G1 and G2 groups as well as from all groups of healthy control subjects.

The mean value for male and female diabetes mellitus subjects (Group 3) was 51.45±2.21 IU/L and 40.92±1.39 IU/L. Whereas, male and female diabetes mellitus subjects (Group 4) values was 59.13±0.65 IU/L and 44.54±1.11 respectively (Table 4). ALT level showed significant increase when compared to healthy control subjects.

The mean± SD value of ALP in male healthy control subjects was 59.20±2.11 IU/L, 66.64±1.84 IU/L, 79.2±0.65 IU/L and 80.55±0.87 IU/L and for female control subjects the value of ALP was 42.31±0.54 IU/L, 54.22±0.76 IU/L, 86.40±1.39 IU/L and 86.92±0.95 IU/L for all four age groups of normal subjects viz. G1, G2, G3 and G4 respectively.

Type 2 diabetes patients have been reported to be associated with higher incidence of abnormal liver function tests (LFT) compared to the normal individuals, elevated ALT being the most common abnormality reported by Harris (2005).

Table 1. Effect of diabetes on various parameter of Liver profile in different age groups

Parameters	Subjects	Gender		Age groups 35-45 (G1)	46-55 (G2)	56-65 (G3)	65-75 (G4)	Reference Range	Statistical Analysis
S. Billirubin (mg/dl)	Normal Group (150)	Male (75)	Total	0.49±0.03	0.48±0.03	0.61±0.12	0.69±0.08	0.3 - 1.2 mg/dl	P <0.001[a,b]
			Direct	0.28±0.02	0.25±0.06	0.32±0.02	0.35±0.03	< 0.6 mg/dl	P <0.05[b], P <0.001[a]
			Indirect	0.21±0.09	0.23±0.05	0.29±0.06	0.34±0.04	0.2 - 0.4 mg/dl	
		Female (75)	Total	0.52±0.11	0.53±0.01	0.69±0.14	0.64±0.08	0.3 - 1.2 mg/dl	P >0.05[b], P <0.001[a]
			Direct	0.33±0.09	0.26±0.08	0.40±0.07	0.31±0.02	< 0.6 mg/dl	
			Indirect	0.19±0.05	0.27±0.07	0.29±0.03	0.33±0.05	0.2 - 0.4 mg/dl	P <0.001[a,b]
	Diabetic Group (150)	Male (75)	Total	0.45±0.06	0.52±0.05	0.87±0.09	1.04±0.15	0.3 - 1.2 mg/dl	P <0.001[a], P <0.05[b] P <0.001[a,b]
			Direct	0.22±0.04	0.29±0.05	0.52±0.04	0.72±0.02	< 0.6 mg/dl	
			Indirect	0.23±0.08	0.23±0.08	0.30±0.05	0.32±0.04	0.2 - 0.4 mg/dl	
		Female (75)	Total	0.52±0.11	0.69±0.04	1.32±0.09	1.57±0.20	0.3 - 1.2 mg/dl	
			Direct	0.33±0.09	0.40±0.05	0.97±0.04	1.02±0.11	< 0.6 mg/dl	
			Indirect	0.19±0.05	0.29±0.03	0.33±0.05	0.55±0.07	0.2 - 0.4 mg/dl	
S.G.O.T. (AST) Serum Glutamic Oxaloacetic Transaminase (IU/L)	Normal Group (150)	Male (75)		25.36±1.25	25.68±1.62	32.22±1.11	39.20±0.98	M: 15 - 45 IU/L F: 5 - 30 IU/L	P <0.001[a,b] P <0.05, P <0.001[a,b]
		Female (75)		23.25±0.37	24.12±0.49	26.08±1.02	27.00±0.84		
	Diabetic Group (150)	Male (75)		29.00±1.45	30.65±0.38	57.45±1.21	68.84±1.11		
		Female (75)		24.20±0.95	26.84±0.42	45.70±0.87	55.03±1.35		
S.G.P.T. (ALT) Serum Glutamic Pyruvic Transaminase (IU/L)	Normal Group (150)	Male (75)		23.00±2.21	25.14±1.65	31.00±0.95	35.00±0.25	M: 10 - 40 IU/L F: 5 - 35 IU/L	P >0.05[b], P <0.001[a] P <0.001[a,b]
		Female (75)		19.68±1.45	23.25±0.65	25.11±0.42	29.20±1.31		
	Diabetic Group (150)	Male (75)		32.44±0.84	33.47±0.75	51.45±2.21	59.13±0.65		
		Female (75)		26.97±1.23	28.22±1.01	40.92±1.39	44.54±1.11		
S. ALPAlkaline Phosphatase (IU/L)	Normal Group (150)	Male (75)		59.20±2.11	66.64±1.84	79.2±0.65	80.55±0.87	Children: 250 - 770 IU/L Adults: 37 -147 IU/L	P >0.05[b], P <0.001[a] P <0.001[a,b]
		Female (75)		42.31±0.54	54.22±0.76	86.40±1.39	86.92±0.95		
	Diabetic Group (150)	Male (75)		79.21±2.65	82.53±1.34	99.00±3.11	110.20±0.64		
		Female (75)		72.82±1.47	88.60±0.97	94.42±1.23	121.87±0.72		

- Data presented in tables are multiple of three observations.
- All values are mean ± SEM
- [a,b]P value for 65–75 years vs. 35–45 years, [a]P value for 65–75 years vs. 45–55 years; [b]P value for 65–75 years vs. 55–65 years

Salmela*et al.* in 1984 studied the liver function tests of 175 diabetic patients without chronic liver disease, where 57% were found to have at least one abnormal LFT, 27% had at least two abnormal LFTs. However, these increases in liver function values were rarely more than two times of the upper limit of normal values. A cross sectional study from Iran demonstrated a rise of ALT and AST in 10.4% and 3.3% of type 2 diabetes patients respectively (Meybodi et al., 2008). Our findings are closer to those reported by Gonem et al. (2007) in a UK cohort, he had study on 959 diabetic patients over four-year period, 15.7% had raised ALT, 10.4% had

elevated alkaline phosphatase whereas only 3.9% had hyper-bilirubinemia. Our findings are in agreement with those, obtained by Han *et al*. (2012).

In the present study, means value of ALT and AST were highly increased were recorded in G3 and G4 diabetic subjects with increased liver echo and presence of fatty liver on ultrasound imaging. This might be due to the presence of non-alcoholic steatohepatitis in these patients. However, exact confirmation will require histological examination which is invasive and not as part of this work.

IV. CONCLUSION

The outcome of this study is to highlight the effect of diabetes and fatty liver in both males and female studied subjects. The comparative study of liver function parameters both in diabetic and non-diabetic will help to minimize the risk of various kind of body diseases and ailments. However, exact confirmation will require histological examination which is invasive and not as part of this work. Larger studies are required in future to find out the exact association and correlation between the biochemical and histological parameters changes of liver in diabetes patients without chronic liver pathology.

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REFERENCES

[1]. **Baig**, N.A., Herrine, S.K. and R. Rubin (2001). Liver disease and diabetes mellitus. Clin Lab. Med., 21: 193–207.
[2]. **Erbey**, J.R., Silberman, C. and E.Lydick (2000). Prevalence of abnormal serum alanine aminotransferase levels in obese patients and patients with type 2 diabetes. Am. J. Med. 109: 588–590.
[3]. **Gonem**, S., Alan, W. and P. De(2007). Prevalence of abnormal liver function tests in patients with diabetes mellitus Endocrine Abstracts, 13:157.
[4]. **Han**, N., Soe, H.H.K. and A. Htet (2012). Determinants of Abnormal Liver Function Tests in Diabetes Patients in Myanmar International Journal of Diabetes Research 2012, 1(3): 36-41
[5]. **Harris**, E. H. (2005). Elevated Liver Function Tests in Type 2 Diabetes. Clinical Diabetes; 23 (3): 115-119.
[6]. Levinthal, G.N. and A.J. Tavill (1999). Liver disease and diabetes mellitus. Clin. Diabetes, 17: 73.
[7]. **Lewis**, G.F., Carpentier, A., Khosrow, A. and A.Giacca(2002). Disordered fat storage and mobilization in the pathogenesis of insulin resistance and type 2 diabetes. Endocr Rev., 23:201–229.
[8]. **Meybodi**, M. A., Afkhami-Ardekani, M. and M. Rashidi (2008). Prevalence of Abnormal Serum Alanine Aminotransferase Levels in Type 2 Diabetic Patients in Iran. Pakistan Journal of Biological Sciences; 11: 2274-2277.
[9]. **Salmela**, P.I., Sotaniemi, E.A., Niemi, M. and O.Maentausta (1984). Liver function tests in diabetic patients. Diabetes Care, 7: 248–254.
[10]. **Wild**, S., Roglic, G., Green, A., Sicree, R. and H. King (2004). Global Prevalence of Diabetes: Estimates for the year 2000 and projections for 2030. Diabetes Care, 27(5):1047–1053.

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