



Short Communication



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Comparative Study of Liver Enzymes Activities in Smokers and Diabetic Sudanese Patients

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Abstract

Background: liver function can be affected by many factors; the proposed effects of diabetes and smoking in liver function require a comprehensive evaluation. This study was conducted to compare the effect of these factors on liver enzymes in Sudanese population.

Method: activity of liver enzyme AST, ALT and ALP were estimated in 235 volunteer (75 smokers, 75 diabetic patients and 85 normal individual as control).

Results: Mean±SD of AST, ALT and ALP of smoker were (14±5.9), (27±13) and (105±18.9) respectively, and of diabetic were (25±7.8), (28±5.8) and (130±20) respectively, which were higher compared to control groups (15.5±4.6), (23±5.1), and (88.3±16.7), respectively, *P*.value= 0.000.

Conclusion: The findings advise that both cigarette smoking and diabetes have effects in liver function leading to variable alteration in liver enzyme activity.

Key words: Transaminases, ALP, Diabetes, Smoking, Sudanese

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INTRODUCTION

Diabetes mellitus is actually a group of metabolic diseases, characterized by hyperglycemia, resulting from defect in insulin secretion, insulin action or both. Diabetes mellitus is classified into two major categories type 1 (Insulin-dependent diabetes mellitus IDDM) and type2 (non Insulin dependent diabetes mellitus NIDDM) [1].

Complication of diabetes atheroma, hypertension, diabetic nephropathy, diabetic retinopathy, which may lead to blindness, bacterial infection and peripheral neuropathy (nerve damage). Recent studies have shown that the incidence of diabetic complication in both type1, and type2, diabetes can be reduced by treating hypertension vigorously and ensuring strict control of blood sugar level [2].

Glucose metabolism is regulated mainly by liver [3]. The liver has the capability to store glucose as glycogen. An association exists between diabetes and patient has been smoker and liver injury including fatty liver fibrosis and cirrhosis [4].

Serum level of liver enzymes increased according to the damage of the liver cell, these enzymes include transferase enzymes, Aspartate transferase (AST), and Alanine transferase (ALT) and Alkaline phosphatase (ALP).

Alkaline phosphatase is the most frequently measured indicator for liver bile ducts disease [5]. AST and ALT enzymes frequently appear in the serum following liver cell injury or sometimes in smaller amounts from degraded cells [6]. The liver has a central and critical biochemical role in metabolism digestion detoxification and blood from intestinal tract initially passes through the liver.

Elevated liver enzymes may indicate inflammation or damage to cells in the liver [7].

Most people are well aware about the effects of smoking on the heart and lungs. However what you may not know is that smoking cigarettes can also severely affect your liver, the numerous toxins found in cigarette tobacco lead to chronic inflammation and scarring in the liver, which in turn, increases your risk for liver damage including diseases such as Hepatitis B, and C, liver cancer and liver fibrosis [8]. Additionally smoking affects the way your liver processes alcohol and medications, which can increase your risk for alcoholism as well as your overall drug and alcohol tolerance level [9].

This study was conducted to investigate the effect of smoking and diabetes on liver enzyme in Sudanese population.

Material and method

A total number of 235 volunteer was introduced in the study, (75 known diabetic patient, 75 cigarette smoker

and 85 control non smoker non diabetic individual), age range of diabetic was (21-52) year, (Mean ±SD) (36±7.6), for smoker (Mean ±SD) (40±6.4) and for control (42±12.3) and the duration of diabetes (Mean ±SD) (6.7±4.6) year and the duration of smoking (Mean ± SD) (12.4±6.2) year and they smoke about (11±3.2) cigarette/day, all volunteer participant were from Khartoum state, any individual complaining from thyroid dysfunction, renal disease, liver disease, Hypertension and overweight or history of other disease affect the heart were excluded from the study. From each participant, 5.0 ml of venous blood were collected using antiseptic for the skin (70% alcohol) in heparin containing container. Blood was then centrifuged for 3-5 min immediately and plasma was separated then the activity of AST, ALT and ALP were estimated using (Mindray BS380-China). Statistical evaluation was performed using SPSS (SPSS for windows version 17) to assess significant difference using T-test and Correlations between liver enzyme and the duration of smoking and diabetes were assessed using bivariate correlations. P < 0.05 was considered statistically significant.

Result

The table -1 shows comparison between liver enzymes of cigarette smokers and control (Mean±SD). Control AST, ALT, and ALP activities were (15.5±4.6), (23±5.1), and (88.3±16.7), the Mean±SD of smoker were (14±5.9), (27±13) and (105±18.9), respectively, there was significant differences in ALT, ALP activities, P.value=(0.000), while there was no significant difference in AST activities P.value = (0.261).

Table-2 shows comparison between liver enzyme of diabetic patient and control, Mean±SD of diabetic AST, ALT, and ALP activities were (25±7.8), (28±5.8) and (130±20), respectively, there was significant difference in AST, ALP P.value = (0.000), while there was no significant difference in ALT activities P.value = (0.352). Table-3 shows comparison between liver enzyme of diabetic patient and the smokers, liver enzyme activities in diabetic were significantly differ from smokers, P.value (0.000).

Parameter	Group 160		P.value
	Control (n=85) Mean ± SD	Smokers(n=75) Mean ± SD	
AST	15.5±4.6	14±5.9	0.261
ALT	23±5.1	27±13	0.000
ALP	88.3±16.7	105±18.9	0.000

Table-1: Liver enzyme in Control and Smoker

Parameter	Group 160		P.value
	Control (n=85) Mean ± SD	Diabetic (n=75) Mean ± SD	
AST	15.5±4.6	25±7.8	0.000
ALT	25±5.1	28±5.8	0.352
ALP	88.3±16.7	130±20	0.000

Table-2: Liver enzyme in Control and Diabetic

Parameter	Group 150		P.value
	Diabetic(n=75) Mean ± SD	Smokers(n=75) Mean ± SD	
AST	25±15	14±5.9	0.000
ALT	28±28	35±13	0.000
ALP	130±73	105±18.9	0.000

Table-3: Liver enzyme in Diabetic and Smoker

Discussion

The effects of smoking on liver enzymes are controversial. Some previous reports suggest that cigarette smoking does not cause liver injury, but may enhance the effects of alcohol on liver damage in heavy drinkers [10].

Published study in the effect of diabetes and smoking in the liver enzyme of Sudanese is deficient. However, Goya S et al, studied the effect of cigarette smoking on the liver, they found that cigarette smoking was significantly associated with increased levels of ALP, this is in accordance with our findings. Other study performed by Kurtul N et al, found that there was no statistically significant difference in serum AST levels between smokers and non-smokers and serum ALT levels were higher in smokers than controls, also the this study was in agreement with our study. A possible explanation for increased transaminases level in smokers is the synergistic effects between smoking and oxidative stress. This assumption is further supported by the significantly higher ALT of this study.

Hepatocellular glycogen accumulation leads to hepatomegaly and liver enzyme abnormalities in poorly controlled diabetes patients. In hyperglycemic states, there will be intracellular glycogen accumulation in the hepatocytes due to increased glycogen synthesis, causing typical biochemical findings of mild to moderately elevated aminotransferases, normal liver synthetic function, with or without mild elevations of alkaline phosphatase [11], these results is confirmed by our results which revealed elevation in AST, ALT, and ALP in diabetic patients.

The study indicated that the alteration in liver enzymes is more significant in diabetic patients in comparison to smokers.

Conclusion

The findings suggest that cigarette smoking has mild effect on liver cell in comparison with diabetes which leads to liver injury indicated by increased liver enzymes.

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