Original Article

Assessment Alpha-1-Antitrypsin and Correlation with Liver Enzymes in Non-Alcoholic Fatty Liver Patients in Thi-Qar Province, Iraq

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ABSTRACT

Objective: The research aims to evaluate the relationship between alpha-1-antitrypsin and liver enzymes alanine aminotransferase and aspartate aminotransferase in patients with fatty liver disease.
Study Design: Comparative study.
Place and Duration of Study: This study was conducted at the University of Thi-Qar, Al-Nasiriyah Teaching Hospital, Iraq from 1st December 2023 to 1st May 2024
Methods: Serum Alpha-1-antitripsin, alanine aminotransferase and aspartate aminotransferase levels were measured in 96 volunteers, 23 healthy control group members and 73 patients. An internist physician made the diagnosis for the patients. Patients with non-alcoholic fatty liver disease are the instances that were included, fatty liver to diabetes mellitus and hypertension. Individuals with fatty liver disease caused by alcoholism, or fatty liver along with other illnesses like cardiac and kidneys were excluded.
Results: Significant decrease in the concentration of alpha-1-antitripsin in patient's groups in comparison to the control group ($p \leq 0.05$). Notable rise in the concentration of alanine aminotransferase in patient's group comparison to controls groups ($p \leq 0.05$).notable rise in the concentration of aspartate aminotransferase in patient's group comparison to controls groups ($p \leq 0.05$).
Conclusion: The negative correlation between alpha-1-antitripsin and aspartate aminotransferase in the fatty liver group and the association factor (r= -0.13). A negative relationship between Alpha-1-antitripsin and alanine aminotransferase in the fatty liver group and the association factor (r= -0.26).
Key Words: Non-alcoholic fatty liver disease (NAFLD), Alpha-1-antitripsin (AAT), Alanine aminotransferase (ALT), Aspartate aminotransferase(AST)

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INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is a growing global health concern due to its connection to insulin-resistant metabolic diseases and heart ailments. NAFLD is characterized by chronic buildup of lipids in the liver, insulin resistance, and steatosis.[1] It can lead to malignancy of the liver, cirrhosis, and non-alcoholic steatohepatitis (NASH), and simple steatosis of the liver.[2] Despite its prevalence, only 5% of NAFLD patients are aware of it, compared to 38% of those suffering from viral liver disease.[3]

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Antioxidants play a critical role in the body's defense to combat free radicals.[4] Reduced antioxidant activity and higher blood oxidative markers like MDA are correlated in people with non-alcoholic fatty liver disease (NAFLD)

Alpha-1-antitrypsin (AAAT), an average-sized glycoprotein, is a key enzyme in identifying liver problems, hepatic inflammation, and heart failure. The site of action is made up of serine and methionine at locations 358 and 359, respectively, and extends from its spherical form. Locations 46, 83, and 247 contain residues of asparagine (Asn). Bind the mature molecule to the protein, which is made up of three branching carbohydrate side chains and a core chain with 394 amino acids. The molecule's half-life is greatly extended, and its electrophoretic heterogeneity is defined by carbohydrates.[5]

Elevated ALT levels indicate serious liver disorders, such as toxic liver necrosis or hepatitis. Alanine Aminotransferase (ALT) is most concentrated in the liver and plays a crucial role in identifying liver problems, hepatic inflammation, and heart failure.[6]

Aspartate aminotransferase (AST) is a distinct isoenzyme type that differs genetically. Elevated mitochondrial AST has been associated with chronic liver illnesses, such as hepatic tissue degeneration and necrosis. Elevated AST levels are common in people with cirrhosis, even in liver conditions where a high ALT is often observed.[7]

METHODS

The study, conducted from from 1st December 2023 to 1st May 2024, involved 96 volunteers from the University of Thi-Qar, Al-Nasiriyah Teaching Hospital, and private laboratories, Iraq. The participants were divided into four groups: 28 cases of fatty liver, 22 cases of DM and fatty liver, 23 individuals with diabetes and hypertension, and 23 controls. The ultrasound device detects illness, and men and women give 5 milliliters of blood intravenously. Serum is separated using centrifugation-based separation, then chilled at -20°C for testing chemical indicators. The data was entered and analyzed through SPSS-25.

RESULTS

The important decrease in the concentration of Alpha-1-antitripsin in the patient groups relative to the baseline group ($p \leq 0.05$). There was no noticeable variation in the amount of focus of alpha-1-antitripsinamong every patient's group ($p \leq 0.05$) Table No. 2).

The increase in the concentration of ALT in the patient groups relative to the baseline group ($p \leq 0.05$). There was no discernible difference in the concentration of ALT between fatty liver and fatty liver with DM groups ($p \leq 0.05$) [Table 3].

Figure 1 showed a negative correlation between Alpha-1-antitripsin and ALT in the fatty liver group in association factor (r= -0.26), negative correlation in the fatty liver with DM group in association factor (r= -0.19) and negative correlation in the fatty liver with DM and HTN group in association factor (r= -0.22)

An important increase in the concentration of AST in the patient groups relative to the baseline group ($p \leq 0.05$). There was no discernible difference in the concentration of AST between fatty liver with DM and fatty liver with DM and HTN groups ($p \leq 0.05$) [Table No. 4].

Table No. 1: Descriptive statistics of the patients

Group	BMI (kg/m^2)	Age (years)
Fatty liver	31.38±4.82	44.53±13.81
Fatty liver with DM	32.64±5.19	50.00±7.69
Fatty liver with DM and HTN	35.66±3.6.88	56.82±12.48
Controls	28.24±4.85	51.65±12.38

Table No. 2: Serum Alpha-1-antitripsin levels of control and patient's groups

Group	No.	Alpha-1-antitripsin (mg/mL)
Fatty liver	28	1.75±0.27
Fatty liver with DM	22	1.85±0.29
Fatty liver with DM and HTN	23	1.71±0.27
Controls	23	2.02±0.50
LSD		0.16

Table No. 3: Serum ALT levels of control and patient's groups

Group	No.	ALT (U/L)
Fatty liver	28	30.24±4.1
Fatty liver with DM	22	31.20±5.64
Fatty liver with DM and HTN	23	35.78±6.07
Controls	23	20.77±6.05
LSD		2.45

Table No. 4: Serum AST levels of control and patient's groups

Group	No.	ALT (U/L)
Fatty liver	28	26.76±3.51
Fatty liver with DM	22	32.63±5.39
Fatty liver with DM and HTN	23	30.71±3.99
Controls	23	19.78±5.76
LSD		2.11

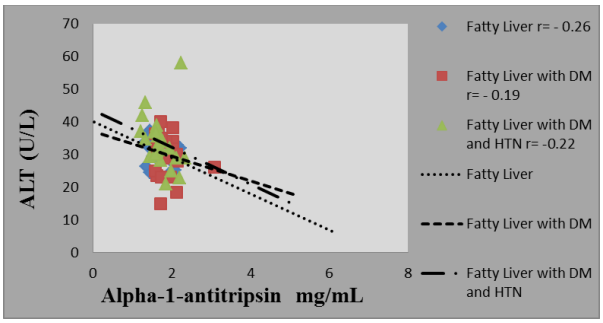

Figure No. 1: Correlation between alpha-1-antitripsin and ALT in the patient's groups.

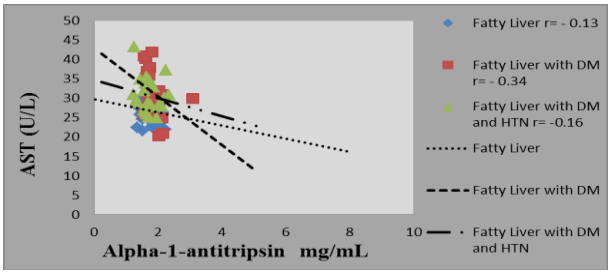

Figure No. 2: Correlation between alpha-1-antitripsin and AST in the patient's groups

Figure 2 indicates a negative relationship between Alpha-1-antitripsin and AST in the fatty liver group in

association factor (r= -0.13), negative relationship in the fatty liver with DM group in association factor (r= -0.34) and a negative relationship in the fatty liver with DM and HTN group in association factor (r= -0.16)

DISCUSSION

The liver's cells release the protein AAT, which protects pulmonary tissue from proteolytic enzymes.[8] AAT is a highly variable gene with over 120 variations, including 60 deficiencies. The most prevalent defective alleles are S and Z respectively.[9] The Z variant alters the protein's tertiary structure, leading to polymerization and mis-folding, causing protein build up in the hepatocellular endoplasmic reticulum.[10] This accumulation can lead to liver damage, apoptosis, and fibrosis.[11] The majority of individuals with liver illness are homozygous for the dysfunctional Z allele, but heterozygotes may have varying levels of liver inflammation.[12] The most common cause of alpha-1 antitrypsin deficiency (AATD) is the Z mutant version of AAT (ZAAT), an inadequate allele of the gene SERPINA1. This mutation causes ZAAT to misfold, accumulate, and cause endoplasmic reticulum stress in hepatocytes, leading to chronic liver illness.[13] This validates the study's findings of Hamesch et al.[14]
NAFLD is a common liver disease with higher average liver enzyme quantities.[15] Alanine aminotransferase is a key indicator of NAFLD with elevated levels associated with severe histopathological ranges.[16] Hypertension, high blood sugar, and abnormal triglycerides, total cholesterol, and adiposity are also associated with elevated ALT.[17] Serum ALT is strongly correlated with insulin resistance, glucose tolerance, and other metabolic disorders. AST, a composite measure, is used to detect hepatic steatosis but does not represent a clinical diagnosis. Many studies indicate that increasing abdominal size Adipose tissue is associated with elevated liver enzymes.[18]

CONCLUSION

An important decrease in the concentration of alpha-1-antitripsin in patients' groups compared to controls group ($p \leq 0.05$), a negative relationship between alpha-1-antitripsin and AST in the fatty liver group with association factor (r= -0.13) and negative relationship between alpha-1-antitripsin and ALT in the fatty liver group with association factor (r= -0.26).

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Muna Hameed Kazem
Drafting or Revising Critically:	Jamal Harbi Hussein Alsaadi
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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