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Original Research

Assessment of serum free fatty acid levels in non-alcoholic fatty liver disease patients

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ABSTRACT:

Aims- Assessed the association between alterations in serum free fatty acid (FFA) levels and non-alcoholic fatty liver disease (NAFLD). **Materials and methods-** The study initially involved 200 patients diagnosed with fatty liver through abdominal ultrasonography. Exclusions were made based on specific criteria, resulting in a cohort of 110 patients with non-alcoholic fatty liver disease (NAFLD) and 90 age- and gender-matched healthy individuals for analysis. Statistical analysis was performed using SPSS software. **Results-** Our analysis revealed significantly elevated serum free fatty acid (FFA) levels in patients diagnosed with non-alcoholic fatty liver disease (NAFLD) compared to the control group. **Conclusion-**A notable association exist between serum free fatty acid (FFA) levels and non-alcoholic fatty liver disease (NAFLD).

Keywords- Free fatty acid, Non-alcoholic fatty liver disease

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INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) affects approximately 25% of the global population and is a primary cause of cirrhosis and hepatocellular carcinoma.[1] It is characterized by the accumulation of fat in the liver, typically seen in individuals with risk factors such as obesity and type 2 diabetes. NAFLD can be categorized into two main stages: non-alcoholic fatty liver (NAFL) and non-alcoholic steatohepatitis (NASH). The development of NAFLD is influenced by a complex interplay of genetic, neurohumoral, metabolic, and stress-related factors. The liver plays a crucial role in lipid metabolism, including the uptake of free fatty acids (FFA) from the bloodstream and the synthesis, storage, and transportation of lipid metabolites.[2,3] The accumulation of lipids, particularly triacylglycerol (TAG), within hepatocytes is a key feature in the pathogenesis of NAFLD.

Metabolic syndrome (MS) encompasses a cluster of cardiovascular risk factors such as abdominal obesity, diabetes, hypertension, and dyslipidemia. MS is associated with an increased risk of NAFLD and cardiovascular complications, leading to a significant economic burden.[4] Insulin resistance (IR) is a central mechanism underlying MS, leading to increased fatty acid flux and subsequent lipid accumulation. Excessive FFA levels can exacerbate IR by influencing insulin receptor expression and signalling pathways.[5- 7]The primary objective of this cross-sectional study was to explore the association between alterations in serum free fatty acid (FFA) levels and non-alcoholic fatty liver disease (NAFLD).

MATERIAL AND METHODS

The study initially involved 200 patients diagnosed with fatty liver through abdominal ultrasonography. Exclusions were made based on specific criteria, resulting in a cohort of 110 patients with non-alcoholic fatty liver disease (NAFLD) and 90 age- and gender-matched healthy individuals for analysis. Liver ultrasound examinations were conducted by experienced radiologists using sonography machine.Diagnostic criteria for NAFLD were based on standard guidelines. NAFLD diagnosis was determined through characteristic liver ultrasound patterns.Statistical analysis was performed using SPSS software.

RESULTS

Our analysis revealed significantly elevated serum free fatty acid (FFA) levels in patients diagnosed with non-alcoholic fatty liver disease (NAFLD) compared to the control group.

Table 1: Demographic and biochemical characteristics of the study participants

Variable	Controls n=110	NAFLD patients n=90	p value
Age (yr)	46.1	45.2	0.21
Free fatty acid (mmol/L)	0.51	0.77	<0.001 (Significant)

DISCUSSION

Non-alcoholic fatty liver disease (NAFLD) is characterized by the accumulation of excessive fat, particularly triglycerides, in the liver of individuals who do not consume alcohol in amounts considered harmful to the liver. One key aspect of NAFLD pathogenesis is the role of serum free fatty acids (FFA).[7,8] Elevated levels of FFA in the bloodstream can contribute to the increased delivery of fatty acids to the liver, promoting lipid accumulation within hepatocytes and exacerbating liver damage. Research suggests that the interplay between circulating FFA levels and hepatic lipid metabolism plays a crucial role in the progression of NAFLD, highlighting the importance of understanding and managing FFA levels as a potential therapeutic target in the treatment of this common liver condition.[9- 11]

Our analysis revealed significantly elevated serum free fatty acid (FFA) levels in patients diagnosed with non alcoholic fatty liver disease (NAFLD) compared to the control group. The results suggest that serum FFA levels are strongly association with NAFLD.Zhang J, et al assessed the association of fasting serum FFAs with nonalcoholic fatty liver disease (NAFLD) in a Chinese population. A total of 840 subjects fulfilled the diagnostic criteria of NAFLD and 331 healthy control participants were enrolled in this cross-sectional study. Fasting serum FFA levels and other clinical and laboratory parameters were measured. NAFLD patients had significantly higher serum FFA levels than controls ($P < 0.001$). Serum FFA levels were significantly and positively correlated with parameters of MS, inflammation indexes, and markers of hepatocellular damage. Elevated serum FFA levels were found in NAFLD subjects with individual components of MS (obesity, hypertriglyceridaemia, and hyperglycaemia). Stepwise regression showed that serum FFA levels were an independent factor predicting advanced fibrosis (FIB-4 $\geq$ 1.3) in NAFLD patients. Serum FFA levels correlated with NAFLD and could be used as an indicator for predicting advanced fibrosis in NAFLD patients.[12]Gambino R, et al assessed 21 patients with NAFLD. The control group consisted of nine healthy subjects. All subjects underwent an oral standard fat load. Triglycerides; cholesterol; FFA; glucose and insulin were measured every 2 h with the determination of fatty acid composition of FFA.higher serum FFA levels in NAFLD subjects are mainly due to levels of oleic, palmitic and linoleic acids at different times. Significant increases were shown for docosahexaenoic acid, linolenic acid, eicosatrienoic acid, and arachidonic acid, although this was just on one occasion. In the postprandial phase, homeostatic model assessment HOMA index positively correlated with the ω3/ω6 ratio in NAFLD patients. The higher serum levels of FFA in NAFLD subjects are mainly due to levels of oleic and palmitic acids which are the most abundant circulating free fatty acids.[13]

CONCLUSION

In conclusion, our findings highlight a notable association between serum free fatty acid (FFA) levels and non-alcoholic fatty liver disease (NAFLD).

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