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The Relationship between Fatty liver and Liver enzymes

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Abstract

Introduction:

The Nonalcoholic fatty liver is the most common cause of hepatic steatosis that identifying the causes and risk factors is essential. The aim of this study was to investigate the relationship between the between fatty liver and liver enzymes.

Methods:

The study included 100patients with nonalcoholic fatty liver. The demographic data and consent, body mass index and liver enzymes and grade fatty liver for all persons were recorded. T, chi-square, ANOVA was used to compare the data.

Results:

Our results showed that increasing the degree of NAFLD is directly correlated with the increased BMI (P<0.001), liver enzymes (AST and ALT) and the ratio of ALT to AST (P<0.001).

Conclusion:

Our study showed that the higher BMI and liver enzymes are predictor factors in determining the degree of NAFLD.

Keywords: Nonalcoholic fatty liver, liver enzymes, body mass index

INTRODUCTION:

Nonalcoholic fatty liver disease (NAFLD) is the most common cause of liver steatosis (1) and occurs in people who do not consume alcohol or consume a very small amount of alcohol (less than 20 gr in a day for women and less than 30 gr in day for women) (2). Nonalcoholic fatty liver turned from a minor a minor disease in 1981 to the most common cause of the occurrence of the chronic liver disease at the end of the current decade (2, 3). Nonalcoholic fatty live disease is a clinical condition that includes a wide range of liver damages (from simple steatosis, which is the benign clinical course of the disease, to steato hepatitis, progressive fibrosis, cirrhosis, and even hepatocellular cancer) (4). The final stage of the liver disease is among the ten most common causes of death in people above the age of 15 all around the world (5), in a way that, based on the mortality statistics released by the Iranian Ministry of Health in 2002, chronic liver diseases accounted for 1 % of the deaths in people aged above 15 all around the country (6, 7). Furthermore, liver cirrhosis has been the third cause of death and the first cause of hospitalization in the departments of gastroenterology and live in Iranian hospitals (8). The risk factors for nonalcoholic fatty liver disease include: obesity, diabetes, resistance to insulin, dyslipidemia, and systemic hypertension. Obesity is considered to be an important risk factor for liver diseases (9). The global spread of obesity has been associated with an increase in nonalcoholic fatty liver and also an increase in the risk of type 2 diabetes (9, 10). The pathogenesis of the disease has not been precisely identified, and it does not have significant clinical symptoms. In laboratory experiments on the patients, the increase in the level of ALT and AST has been reported to be 1.5 to 3 times (11). Unlike alcoholic fatty liver, in NASH the ALT serum level is often higher than AST. Since oxidative processes in liver and the damages caused by it have been identified as effective factors in the development of the disease, the administration of antioxidant medicines has been considered as one of the methods for controlling this disease (12). The studies conducted by Meraat et al. in the research center for digestion and liver diseases of Tehran University of Medical Sciences showed that serum level of the ALT enzyme of the serum of patients suffering from NASH will decrease if the antioxidant medicine Probucol is administered (13). Unfortunately, despite the abundant studies and suggestions, there is not a definite treatment method for NASH yet (14). Since there is the possibility that the liver injury may advance into fibrosis and liver failure, it is essential that laboratory tests and liver biopsy be performed to timely diagnose the disease and examine its severity and for the follow-up after the treatment of the disease. Since the semi-quantitative interpretation and reporting of the histological changes by the pathologist provides more objective information to the examining doctor, the existence of a rating system seems essential for determining the severity of the liver damage, the standardization of histopathological reports, the follow-up of the effects of the medicines and other therapeutic measures, and for determining the prognosis of the disease. Given the materials discussed above, the identification of risk factors for this disease and preventing or minimizing the risk factors that can be prevented become important in decreasing the severity and damages caused by the disease. The present study aims at investigating the relationship between fatty liver and liver enzymes.

METHODS:

This study is a descriptive-analytical of a prospective cross-sectional type. The participants in this study include all the patients suffering from nonalcoholic fatty liver who visited Amir-al-Momenin Hospital. By considering the study conducted in 2005 titled "comparing the relationship between liver enzymes and the degree of nonalcoholic fatty liver" and setting the confidence interval at 95 % and the

test power at 80%, 100 patients were selected as the participants of this study (3). The criterion for entering the study was patients suffering from nonalcoholic fatty liver who visited the above-mentioned center and who had consented to participate in this study. The criterion for exclusion from the study was patients who had a specified cause for their fatty liver, including hyperlipidemia, diabetes, systemic hypertension, hypothyroidism and alcohol consumption, recent pregnancy, and lack of consent for entering the study. During the study, all the patients with impaired fatty liver were studied for a period of 12 months and were selected for performing the ultrasound and liver enzymes test if they did now meet the exclusion criteria (hyperlipidemia, diabetes, systemic hypertension and hypothyroidism, alcohol consumption, and recent pregnancy). The degree of the fatty liver was graded by the ultrasound machine based on a 1, 2, 3 grading scale, and liver tests were done by sending the blood samples to the reference laboratory. All the information about the patients, including demographic factors and paraclinical symptoms, were recorded in the checklist developed by the investigator and were entered to the SPSS 22 software. Statistical analyses were presented in two sections of descriptive and analytical. Chi square test was used to analyze the qualitative data, and a t-test was used to compare the quantitative dada. All the statistical test were performed with the error level set at 5 %.

FINDINGS:

This study was conducted on 100 patients of whom 55 patients (55 %) were men and 45 patients (45 %) were women. The mean age of the patients was turned out to be 56.29 ± 12.09, with the youngest being 31 years old and the oldest being 80 years old. The mean BMI was calculated to be 28.68, and the means obtained for AST and ALT levels were 55.17 and 75.55, respectively. The results of the study showed that there was no significant relationship between demographic factors (age and sex) and the main variables including the degree of fatty live, liver enzymes, and BMI ($p > 0.05$). However, the results indicated that the mean BMI was significantly related to the grade of fatty live, in a way that the highest BMI was found for patients with grade 3 fatty liver (32.6), and the lowest BMI was for patients with Grade 1 (26.68) ($p < 0.001$). also, there is a significant relationship between the mean AST and the grade of fatty liver, in a way that the highest mean AST was for patients with grade 3 fatty liver (67.39) and the lowest amount for patients with grade 1 (48.52) ($p < 0.001$). a significant relationship was also found between the mean ALT and the grade of fatty liver, in a way that the highest level of ALT was for patients with grade 3 fatty liver (87.6) and the lowest level for patients with grade 1 (68.76) ($p < 0.001$). Moreover, the mean ration of ALT to AST was significantly related to the degree of nonalcoholic fatty liver, in a way that the lowest ratio was for patients with grade 3 (1.31) and the highest ratio for patients with grade 1 (1.42) ($p < 0.001$).

Table 1: The mean and Standard Deviation for the Investigated Variables by Fatty Liver Grading

Variable	Fatty liver grade	number	Mean	Standard deviation	*p*-value
BMI (kg/m^2)	Grade 1	38	26.68	3.46	< 0.001
	Grade 2	39	28.25	4.53	
	Grade 3	23	32.6	4.4	
	Total	100	28.65	4.67	
ASL (U/L)	Grade 1	38	48.52	8.15	< 0.001
	Grade 2	39	54.43	13.45	
	Grade 3	23	67.39	14.14	
	Total	100	55.17	13.8	
ALT (U/L)	Grade 1	38	68.76	8.73	< 0.001
	Grade 2	39	75.05	13.54	
	Grade 3	23	87.6	14.55	
	Total	100	75.55	14.06	
ALT/ASL	Grade 1	38	1.42	0.075	< 0.001
	Grade 2	39	1.40	0.102	
	Grade 3	23	1.31	0.077	

BMI: Body Mass Index, AST: Aspartate Aminotransferase, ALT: Alanine Aminotransferase

DISCUSSION:

The results of this study showed that BMI, AST, ALT, and a high ratio of ALT to AST are significantly related to a high grade of fatty liver. In a study conducted by Ashrafi et al. to investigate ferritin serum and the ration of liver enzymes and their agreement with the severity of nonalcoholic fatty liver, it was shown that there was significant relationship between the grade of fatty liver and the ration of the AST/ALT enzymes ($p = 0.004$), and the degree of agreement (Kappa number) was 68.3 %, while there was not a significant relationship between the ratio of ferritin to these two enzymes and the severity of fatty liver. The findings of the above-mentioned study indicated that there was an agreement between the severity of fatty liver and level of ferritin serum and the ratio of liver enzymes in patients with NAFLD but not the ratio of ferritin to liver enzymes (15). Sotoudeh et al. showed that there was a good statistical relationship between the investigated histological indicators (except for the inflammation of the port space) and the serum level of enzymes of aminotransferase ($p < 0.01$). There has been a considerable diagnostic agreement between the two pathologists in how they reported the different lesions associated with NASH in all the investigated indicators ($p < 0.01$). In the end, they arrived at the conclusion that corrected system suggested in the study is easy to use, has repeatability, and has acceptable validity to be used for determining the severity of lesions associated with NASH and can used as a grading system for determining the severity of nonalcoholic fatty liver lesions and the resulting hepatitis (16). In another study conducted by Younesian et al. to investigate the frequency of fatty liver using ultrasound in male students without a history of liver diseases and its relationship with liver enzymes, body mass index, and the fat around the waist, it was shown that there was a significant relationship between weight, BMI, and WHR and the liver enzymes AST/ALT, and there was not a significant relationship between liver enzymes and blood measurement factors including LDL, CHOL, FBS, TG, and HDL. Also, the grade of the fatty liver was significantly related to weight ($p = 0.001$), body mass index ($p = 0.001$), waist to hip ration (0.009), and HDL ($p = 0.021$). No significant relationship was found between the grade of fatty liver and other factors. In the end, they arrived at the conclusion that the frequency of fatty liver in this age group in relatively high, and it seems that male high school students who are overweight and have a body mass index of higher that 30 are highly probable to have fatty liver. These people should be identified at this age and their lifestyle and diet should be changed in order to prevent metabolic problems in adulthood (17). The results of the above-mentioned studies are in line with the results of the present study. Obesity, which is usually determined by MBI and high liver enzymes, can be very effective in predicting the occurrence of the nonalcoholic fatty liver disease. Since the fatty liver disease is the liver manifestation of the metabolic syndrome, liver performance tests and ultrasound can be used as screening tests to diagnose the disease so that we are able to prevent the progression of the disease at early ages by timely using known intervening methods. Also, based on the results of this study, it can be claimed that obesity and high levels of liver enzymes, and especially a decrease in the ratio of ALT to AST in patients with nonalcoholic fatty liver, is related to the severity of the disease. Therefore, these factors can be used to predict the severity of nonalcoholic fatty liver so that the treatment and prevention of the disease is started earlier, and the disease is prevented from progressing.

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