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ORIGINAL ARTICLE

Relationship between Alanine and Aspartate Transaminases (ALT and AST) and Fatty Liver on Ultrasound

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ABSTRACT

Background: Non-alcoholic Fatty liver disease, also known as NAFLD is said to result from a number of disorders such as insulin resistance, Obesity & diabetes mellitus possibly as a result of an unhealthy and sedentary life style. The prevalence of NAFLD is stated to be 25.23%, but it ranges between 115 to 45% in Asian countries globally. Plasma aminotransferases (aspartate1aminotransferase [AST] & alanine aminotransferase [ALT]) are increased in patients with non-alcoholic fatty liver disease (NAFLD).
Aim: To find the relationship between alanine and aspartate transaminases (ALT and AST) and fatty liver on ultrasound**.**
Study design & duration: Retrospective Study, September 2017-2018.
Settings: Radiology Department of Avicenna Medical College and Hospital, Lahore.
Methods: 274 patients present with age of 18 years and above with demographic features as body mass index, grade of fatty liver and also noted ALT, AST and size of fatty liver were included from the study. Grade I was labeled if there was increased hepatic echogenicity but visible periportal & diaphragmatic echogenicity. Grade II was considered if increased hepatic echogenicity causes imperceptible periportal echogenicity, without obscuration of diaphragm. Grade III was considered as marked increase in liver echogenicity with imperceptible periportal echogenicity and diaphragm. The patients were then followed for the Alanine transaminase (ALT) and Aspartate transaminase (AST)
Results: In this study The mean age of patients 53.8±11.94. There were 116(42.3%) male and 158(57.6%) females. Majority of patients were of grade II fatty liver 126(45.9%). Grade III fatty liver was found in 110(40.1%) and grade I fatty liver was found in 38(13.8%). hepatomegaly was seen in 153(55.8%) patients. None of the grade I fatty liver patients were found to have raised ALT or AST. Raised ALT was found in 21 patient of grade II and 15 of grade III fatty liver patients. Raised AST was found in 20 of grade II and 7 had grade III fatty liver patients.
Conclusion: The conclusion of this study that mean of ALT increased as compare to AST. None of the grade I fatty liver patients were found to have raised ALT or AST. Raised ALT was found in 21 patient of grade II and 15 of grade III fatty liver patients.
Keywords: Fatty liver disease, Grade I, II, III, AST, ALT

INTRODUCTION

Non-alcoholic Fatty liver1disease, also known as NAFLD is thought to be caused by a number of disorders such as insulin resistance, obesity & diabetes mellitus possibly as a result of an un-healthy & sedentary life style[1,2].Normally NAFLD is not, considered a serious illness, if remains untreated or un-diagnosed, it can lead to hepatic complications & liver cirrhosis. Though it was the most serious health problem in western countries[3]. NAFLD, is now being given full consideration in Asia, due to increase in obesity & related with metabolic health complications[4]. The prevalence of NAFLD is stated to be 25.23%, while it ranges between 15 to 45% in Asian countries globally[3].

Normally, plasma aminotransferases (aspartate aminotransferase [AST]& alanine aminotransferase [ALT]) are increased in nonalcoholic fatty liver disease (NAFLD)patients. But, the factors behind their elevation remain unknown. Previous research has suggested that patients with normal level of plasma aminotransferase may be at risk of developing NASH & fibrosis, but the findings have been mixed, and the issues related with NASH in this setting are unknown[5,6].

Generally, population visits gastroenterologists when they find high levels of serum alanine transaminases. That is the main reason in many studies it is found that NAFLD diagnosis is made on the levels of aspartame transaminase (AST) and alanine transaminase (ALT)[7,8]. In clinical settings blood lipid profile and serum AST, ALT levels are done along with impaired blood sugar fasting levels[9,10].All such biomarkers have a significant role in the development of NAFLD. These biochemical markers help in understanding the pathogenesis and future outcome of the disease so that early intervention can be done to reduce the risk of cirrhosis, hepatocellular carcinoma[11].

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METHODOLOGY

This retrospective study was conducted from September 2017 to 2018 in the Department of Radiology, Avicenna Medical College and Hospital, Lahore after approval from

the Ethical Committee. Written consent was obtained from patients. 274 sample size with 80% power of test and 5% level of significance by taking expecting percentage of NAFLD. Patients present with age of 18 years and above with demographic features as body mass index, grade of fatty liver and also noted ALT, AST and size of fatty liver were included from the study. Patients with Heart failure, Hepatitis A,B or C, Wilson disease, hemochromatosis, drinking alcohol, taking hepatotoxic medications or any liver related disease were excluded from the study.

Grade I was labeled if there was improved hepatic echogenicity but visible periportal & diaphragmatic echogenicity.Grade II was considered if increased hepatic echogenicity causes imperceptible periportal echogenicity, without obscuration of diaphragm. Grade III was considered as marked increase in liver echogenicity with imperceptible periportal echogenicity and diaphragm. The patients were then followed for the Alanine transaminase (ALT) and Aspartate transaminase (AST) and their values were recorded.

Data was entered in SPSS 21. Age, BMI, liver size, Alanine transaminase and Aspartate transaminase levels were presented ad mean and standard deviation. Categorical data like gender & grade of fatty liver were presented as frequencies & percentage.

RESULTS

Total 274 patients with fatty liver were included in the study. The mean age was 53.8±11.94. There were 116(42.3%) male and 158(57.6%) females with male to female ratio of 1.5:2 (Table 1). Out of 274 patients, hepatomegaly was seen in 153(55.8%) patients. Table: 1 Out of total patients having hepatomegaly, 12(8.4%) had grade I fatty liver, 66(43.2%) had grade II & 75(49%) had grade III fatty liver (Figure 1).

The mean BMI was 32.5±5.90. The raised BMI was found 254(93%) with p value <0.05. It was found to be higher in 93(59.2%) of females having average BMI of 34.6±6.3 as compared to 47(40.7%) of males with average BMI of 29.5±3.9 (p value =0.20) Table: 268(24.8%) patients had grade I disease, 142(51.8%) had grade II disease and 64(23.4%) had grade II disease. The mean of grade I, II & II as shown in table 3'. 36(13.13%) were found to have raised ALT and 27(9.85%) were found to have raised AST. ALT value range was between 14.4-163.8 IU/L with mean of 34.3IU/L±24.1, while AST value was in range between 12.5-98.2 IU/L having mean of 22.8IU/L±13.5 (Table 4). None of the grade I fatty liver patients were found to have raised ALT or AST. Raised ALT was found in 21 patients of grade II and 15 of grade III fatty liver patients. Raised AST was found in 20 of grade II and 7 had grade III fatty liver patients.

Table1:Distribution of Gender & Grades of Fatty Liver

		Frequency (%)
Gender	Male	116(42.3%)
	Female	158(57.6%)
Hepatomegaly	Yes	153(55.83%)
	No	121(4.1%)

Table 2: Gender distribution of raised BMI

	Raised BMI	Mean± SD
Yes	254(93%)	32.5±5.9
No	20(7%)	
Female	93(59.2%)	34.6±6.3
Male	47(40.7%)	29.5±3.9

Table 3: Distribution of grades of disease

	Grade I	Grade II	Grade III
Yes	68(24.8%)	142(51.8%)	64(23.4%)
Enlarged Liver	10(13.6%)	73(26.6%)	52(19%)
Mean± SD	20.12± 9.73	23.57±15.98	23.72±14.07

Table 4: Mean value of Raised ALT & AST

	Raised ALT	Raised AST	Pvalue
Mean± SD	22.74±14.25	31.92±19.93	0.88
Male	22.89±13.85	32.82±22.91	0.52
Female	22.65±13.58	31.2±16.4	
Mean value IU/ml	88±26.7	57.5±17.8	
Value range IU/ml	63-163.8	43-98.2	

Figure 1: Hepatomegaly (n=153)

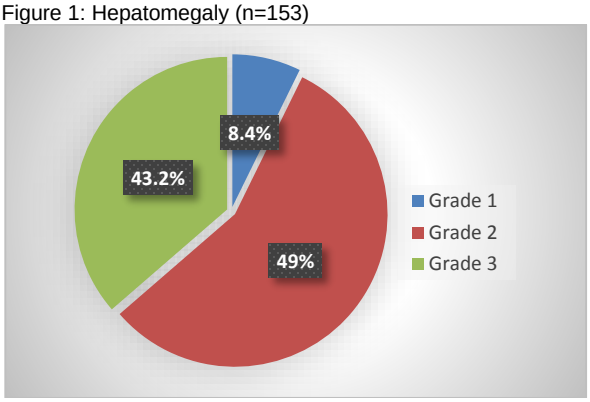
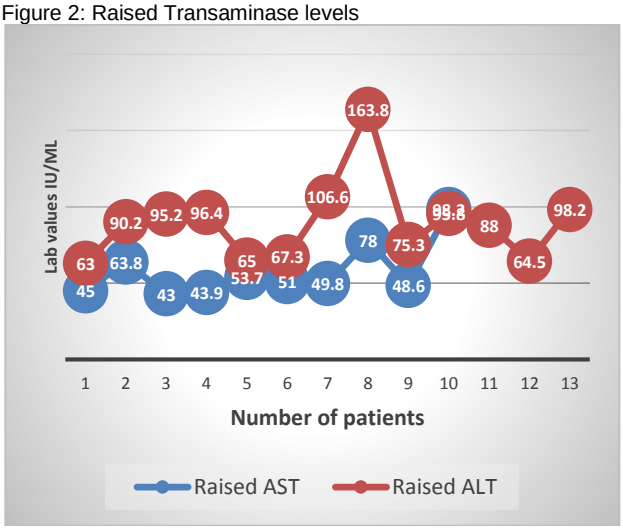


Figure 2: Raised Transaminase levels



DISCUSSION

Nonalcoholic fatty liver disease and its subtype, nonalcoholic steatohepatitis, affect approximately 30% and 5% of the US population, respectively. In nonalcoholic steato-hepatitis patients, half deaths are due to malignancy & cardiovascular disease, however awareness of this issue remains low[12].

Growing morbidity of non-alcoholic fatty liver and its association with steatohepatitis, cirrhosis, hepatocellular carcinoma, cardiovascular disease and diabetes mellitus are compelling enough to found its correlation with hepatocytes predominant amninotransferases (ALT/AST), which are the primary investigations prescribed by the clinician after the diagnosis of fatty liver.

We found ALT/AST the poor indicators of hepatic steatosis which were raised AST & ALT only in 13.13% and 9.85% respectively. All patients with raised ALT/AST were found to be of grade II and III fatty liver with no significant difference in the number of patients between these grades. None of the grade I fatty liver patients were found to have raised ALT/AST values. According to the American College of Gastroenterology (ACG) Clinical Guidelines 2017, many patients of NAFLD may have normal liver chemistry and unlike alcoholic fatty liver, non-alcoholic fatty liver disease shows no peculiar pattern of increase in ALT or AST although ALT levels are found to be higher than AST levels but rarely above 300IU/L[13]. Another study by Musso G, et al. in 2011 labeled ALT and AST as not a useful predictor of NAFLD[14].Liver enzymes are neither sensitive nor specific for diagnosis of NAFLD[15,16].Similar results were seen in our fatty liver patients having more raised ALT than AST with ranges between 14.4-163.8 IU/L and12.5-98.2 IU/L respectively. Contrary to this in one study by Sanyal, et al. in 2015 conducted on diabetic patients, non-alcoholic fatty liver is significantly correlated with higher AST/ALT and found to be raised in 31% of patients with positive predictive value of around 91.4% suggesting it to be a good detector of NAFLD[17].

In many other studies, raised BMI (93%) in our study was also found to be associated with disease of fatty liver and no significant difference in male and females BMI. Benedict M, et al. found raised BMI in 80% of the patients[18].Some studies labelled obesity as a biggest risk factor of fatty liver like many other studies[19].

One more study done in 2009, female predominance was seen in our fatty liver patients but variable trend is noticed in other studies[20]. Male predominance was seen in one study, while no gender predominance in other[21]. Our raised AST/ALT were found to be more in males. Male and old age are significantly associated with higher risk of developing NAFLD[19,22].

Mean age of our patients was around 53.8 years similar to previous study showing average age of 57 years[23]. Majority (51.2%) of our patients were of grade II followed by grade III (23.4%) but Hepatomegaly was found to be more in grade III (52.7% of patients) than grade II (40%) hitch might be related to be increased fatty content in hepatocytes. Although histological grading is not synonymous with sonographic grading but in one study moderate histological grading was seen in most of the patients (61.3%) than severe[15].

The limitations of the study were sample size and fatty liver evaluation by ultrasound. We need large scale of prospective study to validate our observation. Ultrasound is the routine investigation done in fatty liver patients and is considered cost effective. Although histological analysis is gold standard and no imaging modality can reliably confirm diagnosis, stage the disease and determine the justification for the need of therapy. But still we did not perform liver biopsy because of its invasiveness, potential complications and cost.

CONCLUSION

The conclusion of this study that mean of ALT increased as compare to AST. None of the grade I fatty liver patients were found to have raised ALT or AST. Raised ALT was found in 21 patient of grade II and 15 of grade III fatty liver patients. Raised AST was found in 20 of grade II and 7 had grade III, fatty liver patients.

Conflict of interest: Nil

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