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To Study the Biochemical Parameters in Non-Alcoholic Fatty Liver Disease Patients

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Abstract
Background: *Non-alcoholic fatty liver disease (NAFLD) is a major cause of liver related morbidity. It occurs even more frequently in patients with metabolic syndrome. Patients with NAFLD have an increased risk of cardiovascular disease because these diseases share several risk factors and surrogate markers like obesity, insulin resistance, diabetes mellitus type 2, hypertension and hyperlipidemia.*
Objectives: *To study the various biochemical parameters in non-alcoholic fatty liver disease patients.*
Material and Methods: *The present study was conducted in the Department of Medicine M.G.M. Medical College & M.Y. Hospital, Indore on 65 patients with ultrasonographic finding of fatty liver disease with no history of alcohol. Various biochemical parameters like serum cholesterol, serum triglycerides, ALT, AST were measured and recorded. For analysis, statistical software SPSS latest Version 20.0 was used. The results were analysed using the appropriate statistics.*
Results: *In our Study we found that 65% patients had elevated Triglyceride level and only 29% patients had hypercholesterolemia. We also found that 49% patients had elevated ALT level and only 26% patients had elevated AST level.*
Conclusion: *our study shows higher triglyceride level is more associated with NAFLD than cholesterol level but the values of ALT and AST were unremarkeble in cases of NAFLD.*
Keywords: *biochemical parameters, serum cholesterol, serum triglycerides, AST, ALT, non-alcoholic fatty liver disease.*

Introduction

Non-alcoholic fatty liver disease (NAFLD) is a major cause of liver related morbidity and is frequently associated with obesity and metabolic syndrome. It represents the hepatic manifestation of the metabolic syndrome, a variably defined aggregate of disorders related to obesity, insulin resistance, diabetes mellitus type 2, hypertension and hyperlipidemia

The definition of the non alcoholic fatty liver disease (NAFLD) requires (a) there is evidence of hepatic steatosis, either by imaging or by histology and (b) there are no causes for secondary hepatic fat accumulation such as significant alcohol consumption, use of

steatogenic drugs or hereditary disorders. NAFLD is histologically further categorised into non-alcoholic fatty liver (NAFL) and non-alcoholic steatohepatitis (NASH).

Non-alcoholic fat liver disease (NAFLD) is a frequent liver disease characterized by elevated serum alanine aminotransferase (ALT) levels, hepatomegaly and accumulation of fat in liver accompanied by inflammation and necrosis resembling alcoholic hepatitis in the absence of heavy alcohol consumption[1]. This entity is common in morbidly obese persons. Insulin resistance has been associated with fatty liver and NAFLD, too[2]. Insulin resistance, through the inhibition of lipid oxidation and increased fatty acid and triglycerides synthesis, is believed to be a key factor in the development of fatty liver. The association with insulin resistance and obesity has also suggested to some that NAFLD should be considered part of the metabolic syndrome with hyperlipidemia, glucose intolerance, hypertension and obesity[3].

This disease represents a spectrum of conditions that span from asymptomatic steatosis to potentially deadly non alcoholic steatho-hepatitis (NASH) Although simple steatosis is a benign condition but NASH can progress to cirrhosis, liver failure and in some cases, hepatocellular carcinoma[4]. NAFLD is likely to be the most common Cause of chronic liver disease in many countries. Prevalence of NAFLD in general population is estimated to be 16%-30%. Prevalence of NAFLD in coastal eastern India is estimated 24.5%[5], which shows that prevalence of NAFLD is also increasing in India. NAFLD has the potential for major economic impact on healthcare costs because of liver related morbidity and mortality[6].

Thus the aim of this study was to find out the association between various biochemical parameters and non-alcoholic fatty liver disease.

Material & Methods

The present study was conducted in the Department of Medicine on 65 patients with ultrasonographic finding of fatty liver disease with no history of alcohol. Total 65 patients with ultrasonographic finding of fatty liver disease were selected either on OPD basis or on IPD basis of Department of medicine, M.Y. Hospital, Indore.

Place of Study

Department of Medicine, M.G.M. Medical College & M.Y. Hospital, Indore (M.P.).

Study Population

The study includes the patients who are of non-alcoholic fatty liver disease as assessed on ultrasonography.

Sample Size and Sampling Technique

Total 65 patients with non-alcoholic fatty liver disease presenting to the Department of Medicine, M.G.M. Medical College & M.Y. Hospital Indore (M.P.) during the study period, willing to provide their voluntary written informed consent were included in the study. The convenient sampling technique was used.

Inclusion Criteria

1. All cases of Fatty liver disease assessed on imaging.
2. Patients of either gender.
3. All cases of NAFLD with ongoing alcohol consumption of not taking >21 drinks/week (10 gms/drinks) in males and >14 drinks/week in females for over two years.
4. Patients and/or his/her legally acceptable representative willing to provide written voluntary informed consent for participation in the present study.

Exclusion Criteria

1. Those having history of alcohol abuse more than baseline.
2. Those on steatogenic drugs for more than six month.
3. Prisoners and orphans.
4. Patients and/or his/her legally acceptable representative not willing to provide written

voluntary informed consent for participation in the present study.

Methodology

After identifying the suitable candidate for the study, the patient and/or his/her legally acceptables were explained in detail about the study, its risks/benefits, costs involved, about the study procedures etc. in detail. After getting their verbal approval for participation, a voluntary written informed consent was obtained from patient and/or his/her legally acceptable representative.

After obtaining the consent, the patients having fatty liver disease, but no history of alcohol consumption were asked to undergo following blood investigations viz. serum cholesterol, serum triglycerides, AST, ALT. These investigation were measured and recorded.

Data Collection Method

The data has been collected on a customized proforma designed specifically for the study purpose.

Statistical Analysis

In the present study, results were expressed as Mean ± SD. All statistical analysis was done by using SPSS software version 20. All the parameters were recorded in standard format and parameters were compared with each independent parameters using appropriate statistics. A P value of < 0.05 will be considered as statistically significant. In the final report, the data has been represented in the form of tables and graphs.

Results

Total 65 patients with ultrasonography finding of fatty liver disease without the history of alcohol intake were selected either on OPD basis or on IPD basis of Department of medicine, M.Y. Hospital, Indore. The patients were evaluated and asked for various laboratory investigations and these details are recorded in approved proforma in details.

Table: 1: Distribution of Cases According to age Group

S.No.	Age group	No. Cases	Percentage
1	20-30	6	9%
2	31-40	16	25%
3	41-50	21	33%
4	51-60	12	18%
5	61-70	8	12%
6	71-80	2	3%
Total		**65**	**100%**

As per this table total 65 patients were included. In our study most of the patients were of the age group 41-50 years ie 33% of total patients and Minimum no of patients were of the age group 71-80 years with 3% of total patients. With this table it is observed that maximum patients are of middle age from age 31-60 years comprising 76% of patients.

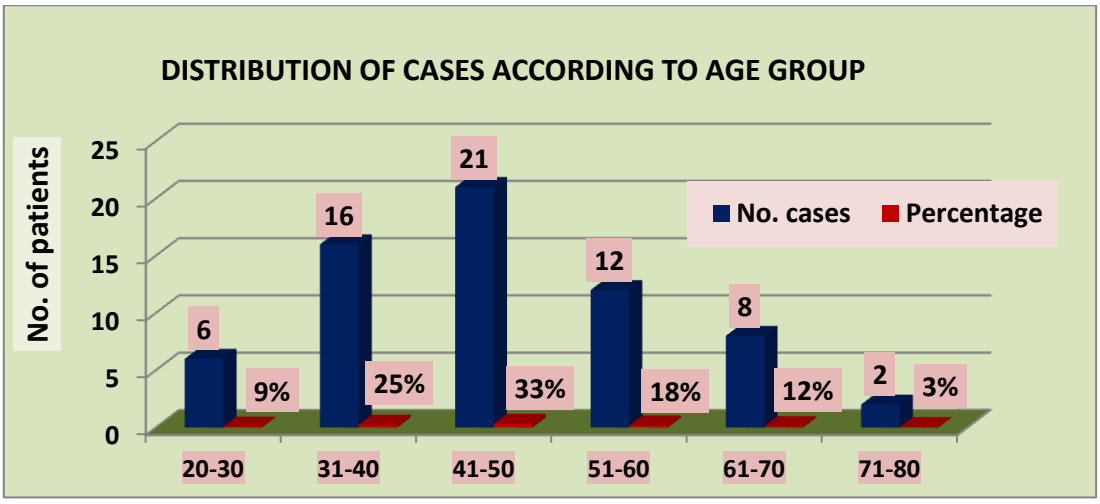

Table: 2: Distribution of Subject According to Cholesterol

S.No.	Cholesterol	No. of Cases	Percentage
1	<200mg/dl	46	71%
2	>200mg/dl	19	29%

Out of 65 patients, 19 patients had hypercholesterolemia i.e, 29% patients had elevated cholesterol level and remaining 46 patients i.e, 71% were having normal cholesterol level.

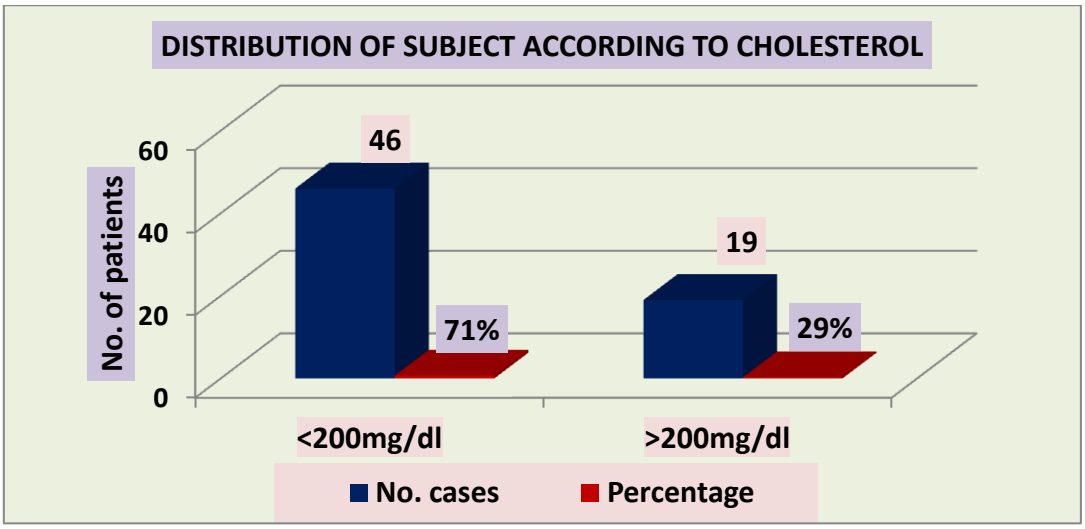

Table: 3: Distribution of Subject According to Triglycerides

S.No.	Triglycerides	No. of Cases	Percentage
1	≤150mg/dl	23	35%
2	≥150mg/dl	42	65%

Out of 65 patients, 42 patients had higher triglyceride level i.e, 65% patients had elevated Triglyceride level and remaining 23 patients i.e, 35% were having normal Triglyceride level.

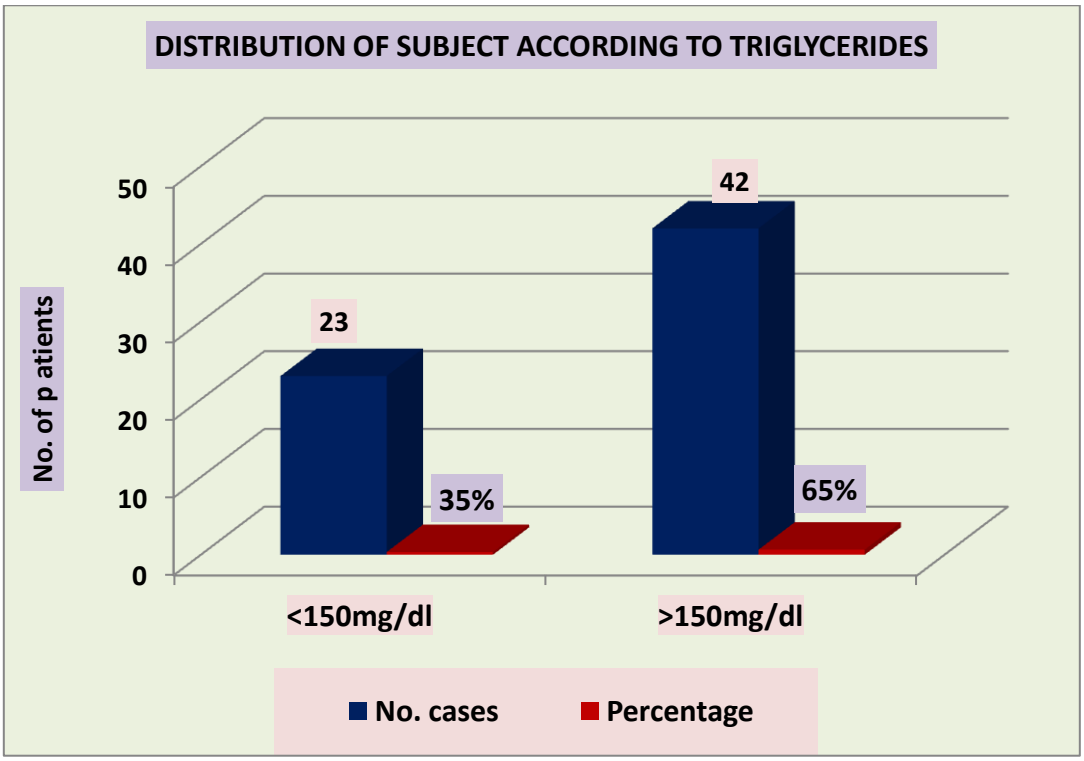

Table 4: Distribution of Subject According to ALT

S.NO.	ALT	No. of Cases	Percentage
1	<36	33	51%
2	>36	32	49%

Out of 65 patients, 32 patients had higher ALT level i.e, 49% patients had elevated ALT level and remaining 33 patients i.e, 51% were having normal ALT level.

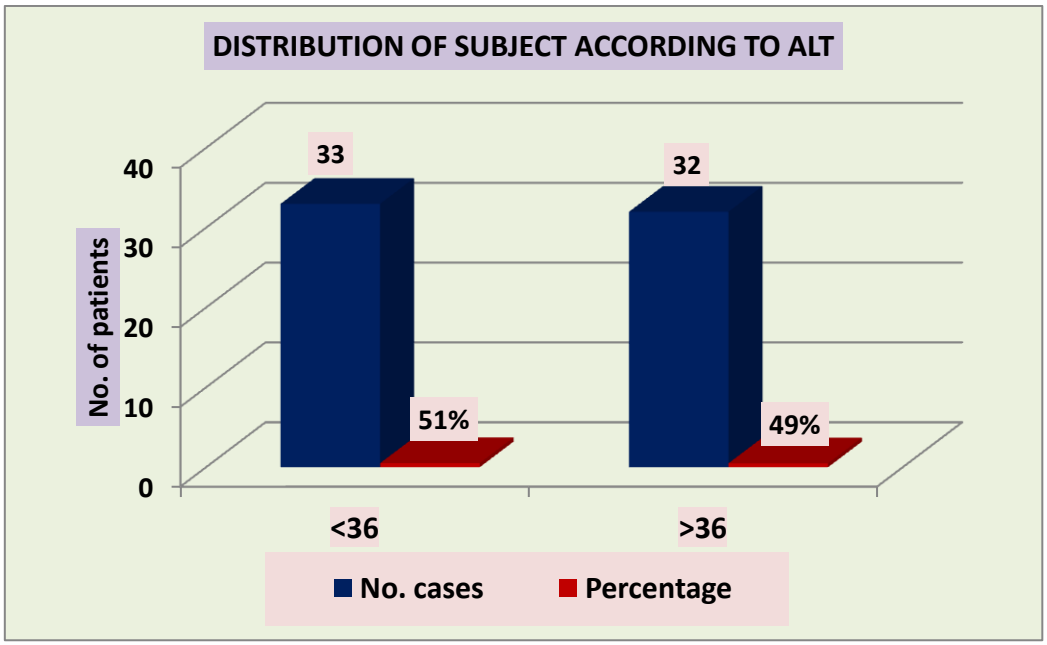

Table 5: Distribution of Subject According to AST

S.NO.	AST	No. of Cases	Percentage
1	<43	48	74%
2	>43	17	26%

Out of 65 patients, only 17% patients had higher AST level i.e, 26% patients had elevated AST level and remaining 48 patients i.e, 74 % were having normal AST level.

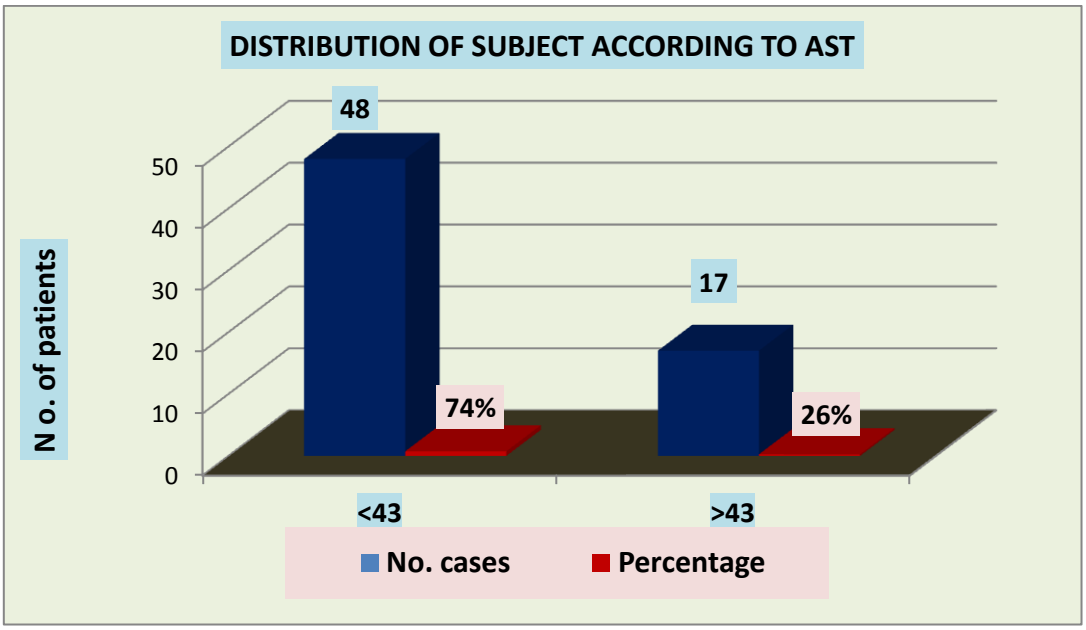

Table: 6: Distribution of the biochemical Parameters across the categories of gender

Biochemical Parameters	Male	Female	P Value
Cholesterol	154.27 ± 46.011	185.07 ±45.38	0.014
Triglyceride	159.41±49.15	170±57.78	0.533
ALT	39.14±16.49	54±15.495	0.342
AST	42.95±27.870	33.77±2.486	0.167

As per this table various biochemical parameters of the patients were compared across the gender where it was found that variable like triglycerides, ALT, AST were approximately same across the Gender without any significance with P values respectively of (0.533,0.342,0.167) but cholesterol values across the gender was significant (P=0.014).

Table: 7: Correlation of cholesterol to the various parameters

S. No.	Pair	'r' value	P value
4	Cholesterol – Triglyceride	0.560	0.000
5	Cholesterol – ALT	-0.107	0.395
6	Cholesterol – AST	-0.214	0.086

As per this table cholesterol has positive correlation with triglycerides which is statistically significant (p=0.000).

Table: 8: Correlation of triglycerides to the various parameters

S.No.	Pair	'r' value	P value
4	Triglyceride – Cholesterol	0.560	0.000
5	Triglyceride – ALT	0.098	0.437
6	Triglyceride – AST	-0.061	0.627

As per this table Triglyceride has positive correlation with cholesterol which is statistically significant (p=0.000).

Table: 9: Correlation of ALT to the various parameters

S.No.	Pair	'r' value	P value
4	ALT – Cholesterol	-0.107	0.395
5	ALT- Triglyceride	0.098	0.437
6	ALT – AST	0.371	0.002

As per this table ALT has a moderate positive correlation with AST which is statistically significant (p=0.002).

Table: 10: Correlation of AST to the various parameters

S.No.	Pair	'r' value	P value
4	AST – Cholesterol	-0.214	0.086
5	AST - Triglyceride	-0.061	0.627
6	AST – ALT	0.371	0.002

As per this table AST has a moderate positive correlation with ALT which is statistically significant (p=0.002) .

Discussion

In our study the total 65 patients with ultrasonography finding of fatty liver disease without the history of alcohol intake were selected either on OPD basis or on IPD basis of Department of medicine, M.Y. Hospital, Indore. The patients were evaluated and asked for various biochemical parameters and these details are

recorded in approved proforma in details. All the parameters were recorded in standard format and parameters were compared with each independent parameter using appropriate statistics.

In our study most of the patients were of the age group 41-50 years ie 33% followed by 31-40 years ie. 25% and from age group 51-60 years 18% of total patients and Minimum no of patients were of the age group 71-80 years with 3% of total patients. So with this we concluded that maximum patients are of middle age ie from age 31-60 years comprising 76% of total patients and mean age was found 47.24 ± 12.22. Similar findings was also observed by Adams LA et al[7] and Agrawal R et al[8] who reported mean age 45.0 ± 11.0 and 42.70 ± 10.09 respectively.

various biochemical parameters of the patients were also compared across the Gender where it was found variable like triglycerides, ALT, AST were approximately same across the Gender without any significance with P values of (0.533,0.342,0.167) respectively but cholesterol levels across the Gender was significant (P=0.014).

In our study we also studied individual parameter's correlation with other parameters and we found that cholesterol has good correlation with triglycerides which is statistically significant (p=0.000), ALT has a moderate correlation with AST which is statistically significant (p=0.002), AST has a moderate correlation with ALT which is statistically significant (p=0.002).

In our study Out of 65 patients, 32 patients had higher ALT level i.e, 49% patients had elevated ALT level and remaining 33 patients i.e, 51% were having normal ALT level. Similarly AST levels in our study also signifies that maximum patients have the normal AST levels in NAFLD ie, Out of 65 patients, 48 patients i.e, 74% were having normal AST level and only 17 patients had higher AST level i.e, 26% patients had elevated AST level.

Similar finding was also observed by Browning JD et al[9] who reported that most subjects with hepatic steatosis had normal levels of serum alanine aminotransferase (79%). As per Verma S et al[10] study that there is no optimal ALT level to predict NASH and advanced fibrosis. Metabolic risk factors should be evaluated to select patients for a liver biopsy to confirm NASH and advanced fibrosis, but study conducted by Agrawal R et al[8] observed elevated ALT and AST in majority of patients 97.6% and 98.4% respectively.

In our Study Out of 65 patients, only 19 patients had hypercholesterolemia i.e, 29% patients had elevated cholesterol level and remaining 46 patients i.e, 71 % were having normal cholesterol level and 42 patients had higher triglyceride level i.e, 65% patients had elevated Triglyceride level and remaining 23 patients i.e, 35% were having normal Triglyceride level that means in our study higher triglyceride level is more associated with NAFLD than cholesterol level.

Similar findings was also observed by Agrawal R et al[8] who reported High level of Cholesterol (Hypercholesterolemia) only in 21.8% Patients and hypertriglyceredemia was reported in 63.7% patients, but Kim EJ et al[11] did a study according to them high cholesterol and triglyceride levels are associated with NAFLD and atherosclerosis.

The pathogenesis of NAFLD/NASH and, in particular, the mechanisms responsible for liver injury and disease progression remain still incompletely understood[12]. The hallmark feature of the pathogenesis of NAFLD, both histologically and metabolically, is the accumulation of triacylglycerol in the liver. Insulin resistance has a key role in the development of hepatic steatosis and potentially, steatohepatitis. Resistance to the action of insulin results in important changes in lipid metabolism. These include enhanced peripheral lipolysis, increased triglyceride synthesis, and increased hepatic uptake of fatty acids. Each of these contributes to the accumulation of hepatocellular triglycerides[13]. The deposition of triglycerides is suggested to increase vulnerability to further injury in NAFLD caused by triglyceride accumulation. However, it remains unclear how remote systemic inflammation exacerbates

NAFLD and atherosclerosis. Further studies are required to investigate the underlying mechanism.
It is evident that NAFLD patients of the present study showed a state of dyslipidemia presented by significantly higher level of serum Triglyceride, was important risk factors for developing NAFLD.

Conclusion

In conclusion, our study shows higher triglyceride level is more associated with NAFLD than cholesterol level but the values of ALT and AST were unremarkeble in cases of NAFLD. These data support a role of higher triglyceride level in the pathology of NAFLD. Therefore assessment of biochemical parameters in NAFLD patients may be useful in clinical follow-up. Further studies are needed to evaluated this interesting interaction with therapeutically implications.

References

1. Ludwig J, Viggiano TR, McGill DB, Oh BJ. Nonalcoholic steatohepatitis: Mayo Clinic experiences with a hitherto unnamed disease. Mayo Clin Proc. 1980; 55(7): 434-8.
2. Marceau P, Biron S, Hould FS, Marceau S, Simard S, Thung SN, Kral JG. Liver pathology and the metabolic syndrome X in severe obesity. J Clin Endocrinol Metab. 1999; 84(5): 1513-7.
3. Kumada M, Kihara S, Sumitsuji S, Kawamoto T, Matsumoto S, Ouchi N, Arita Y, Okamoto Y, Shimomura I, Hiraoka H, Nakamura T, Funahashi T, Matsuzawa Y; Association of hypoadiponectinemia with coronary artery disease in men. Arterioscler Thromb Vasc Biol. 2003; 23(1): 85-9.
4. Bugianesi E, Leone N, Vanni E, Marchesini G, Brunello F, Carucci P, Musso A, De Paolis P, Capussotti L, Salizzoni M, Rizzetto M. Expanding the natural history of non-alcoholic steatohepatitis: from cryptogenic cirrhosis to hepatocellular carcinoma. Gastroenterology. 2002; 123(1): 134–140.
5. Singh SP, Nayak S, Swain M, Rout N, Mallik RN, Agrawal O, Meher C, Rao M. Prevalence of nonalcoholic fatty liver disease in coastal eastern India: a preliminary ultrasonographic survey. Trop Gastroenterol 2004; 25(2): 76-79.
6. Tsochatzis EA, Manolakopoulos S, Papatheodoridis GV, Archimandritis AJ. Insulin resistance and metabolic syndrome in chronic liver diseases: old entities with new implications. Scand J Gastroenterol. 2009; 44(1): 6-14.
7. Adams LA, Sanderson S, Lindor KD, Angilo P. The histological course of non alcoholic fatty liver disease. A longitudinal study of 103 patients with sequential liver biopsies, J hepatol 2005; 42 : 132-8.
8. Agrawal R, Mishra S, Dixit VK, Rai S. Association of non-alcoholic fatty liver disorder with obesity. Indian J. Prev. Soc. Med. 2009; 40(3&4): 126-129.
9. Browning JD, Szczepaniak LS, Dobbins R, Nuremberg P, Horton JD, Cohen JC, Grundy SM, Hobbs HH. Prevalence of hepatic steatosis in an urban population in the United States: Impact of ethnicity. Hepatology 2004; 40: 1387-1395.
10. Verma S, Jensen D, Hart J, Mohanty SR. Predictive value of ALT levels for non-alcoholic steatohepatitis (NASH) and advanced fibrosis in non-alcoholic fatty liver disease (NAFLD). Liver Int. 2013; 33(9): 1398-405
11. Kim EJ, Kim B-h, Seo HS, Lee YJ, Kim HH, Son H-H, Choi Mh. (2014) Cholesterol-Induced Non-Alcoholic Fatty Liver Disease and Atherosclerosis Aggravated by Systemic Inflammation. PLOS ONE 2014; 9(6): e97841.
12. Carter-Kent C, Zein NN, Feldstein AE. Cytokines in the pathogenesis of fatty liver and disease progression to steatohepatitis:

implications for treatment. Am J Gastroenterol. 2008; 103: 1036-1042.

13. Sanyal AJ, Campbell Sargent C, Mirshahi F, Rizzo WB, Contos MJ, Sterling RK, Luketic VA Shiffman ML, Clore JN. Nonalcoholic steatohepatitis: association of insulin resistance and mitocohondrial abnormalities. Gastroenterology 2001; 120(5): 1183-92.