Original Article

Effects of OMEGA 3 PUFA Treatment on Alanine Aminotransferase in Patients with Nonalcoholic Fatty Liver Disease

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ABSTRACT

Objective: To determine the efficacy of omega 3 PUFA in lowering Alanine Aminotransferase (ALT) levels in Nonalcoholic fatty liver disease (NAFLD).

Study Design: Prospective interventional study

Place and Duration of Study: This study was conducted at the Department of Medicine of Al- Nafees Medical College & Hospital, Islamabad from April, 2018 to September, 2018.

Materials and Methods: After hospital ethical committee approval the study was conducted and informed written consent was taken. Patients with evidence of fatty liver were selected by ultrasonography after fulfilling of inclusion criteria and sub categorized on the basis of gender and age. Alanine Aminotransferase levels and fasting lipid profile were performed. Omega 3 PUFA were given to these subjects for 6 months, ALT and fasting lipid profile were checked at 3rd month and 6th month. Collected information was analyzed by using SPSS 23 version.

Results: Total 40 patients were selected in which 25 (62.5 %) were female in our study and 15 (37.5 %) were male. The mean age of patients in our study was 45.98 ± 9.13. Primary outcome of the study was the mean value of Alanine Aminotransferase ALT before treatment was 114.95 ± 33.47, after 3rd month was 67.23 ± 27.86 and after 6th month was 47.95 ± 14.98. Secondary outcome was serum lipid profile. The mean value of cholesterol before treatment was 195.45 ± 30.37, after 3rd month was 187.38 ± 25.34 and after 6th month was 180.35 ± 14.53. The mean value of triglycerides before treatment was 235.35 ± 67.52, after 3rd month was 212.68 ± 53.92 and after 6th month was 201.88 ± 42.33.The mean value of HDL before treatment was 49.80 ± 5.77, after 3rd month was 52.75 ± 5.62 and after 6th month was 55.93 ± 4.98.

Conclusion: Omega 3 PUFA is effective in reduction of liver enzymes Alanine Aminotransferase (ALT), liver fat, levels of blood cholesterol and triglycerides with elevation of HDL in Non-Alcoholic Fatty Liver Disease (NAFLD) patients.

Key Words: Alanine Aminotransferase, Cholesterol, Non-alcoholic fatty liver disease, Omega 3 PUFA, Triglycerides.

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INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is defined as the presence of triglycerides ≥ 5% into the hepatic tissue (*i.e.* steatosis), without alcohol abuse and other liver disorders like chronic viral hepatitis B and C or use of steatogenic drugs.[1]

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The incidence of the NAFLD will continue to rise due to increase in obesity in epidemic proportion.[2] NAFLD encompasses a wide range of disease manifestations, ranging from simple steatosis to the non-alcoholic steatohepatitis (NASH).[3] NASH can develop to advanced fibrosis, hepatocellular carcinoma and cirrhosis. Simple steatosis is a benign and actually treatable condition; however, NASH can progress to advanced fibrosis, cirrhosis, and hepatocellular carcinoma.[2, 3]

NAFLD is often underdiagnosed since most patients are asymptomatic until late in the disease progression. The gold standard for diagnosing NAFLD and the most accurate technique for grading fibrosis is a liver biopsy, while it is invasive and can cause complications.[2, 3] Ultrasounds, a non-invasive and widely available technology, are critical in the diagnosis of NAFLD.[4]

NAFLD development risks are type 2 diabetes mellitus, obesity, hypertension and dyslipidemia.[5]

NAFLD affects 30% to 34% of people in developed countries, and it can affect up to 80% of obese people. The frequency of around 14% is in Pakistan, but no community-based study has been carried out in the country.[6]

In the coming years, the worldwide burden of NAFLD will rise. The mainstay of management is weight loss by lifestyle modification, with a target weight loss of at least 7 to 10% which improves liver fat, inflammation, hepatocyte ballooning, and fibrosis.[7]

Inappropriate intake of fats in diet beyond the capacity of the liver leads to an abnormal buildup of toxic fats in the liver resulting in malfunctioning of mitochondria, cellular injury, inflammation, and development of NAFLD. There is decreased life span and increased need of liver transplant due to NAFLD.[8]

Omega-3 reduces cardiovascular disease, endothelial dysfunction, hyperlipidemia and hypertension through acting as negative regulators of hepatic lipogenesis and the inflammatory response. [9]

In this study, we aimed to assess the effect of Omega 3 PUFA supplementation in lowering liver fat, ALT level and blood lipid levels (Cholesterol, Triglycerides) with an increase in HDL level in patients with NAFLD.

MATERIALS AND METHODS

This prospective study was conducted at the outpatient department, Department of Medicine, Al- Nafees Medical College & Hospital Islamabad for six months from 2nd April 2018 to 3rd September 2018 after approval from the hospital's ethical committee. The sample size was calculated (n=40) with a mean in population was 9, variance was 5, confidence level was 95 % and power test was 80 %.

Detailed history regarding the illness was obtained from each patient. A complete clinical examination was performed by the trainee researcher. Informed consent was taken from the patients. Patients with evidence of fatty liver on ultrasonography after fulfilling inclusion criteria of age more than 18 years, Hepatitis B and C negative and no history of alcohol intake were advised for levels of serum ALT and Fasting Lipids at the start of the 3rd and 6th month.

Data was analyzed by SPSS version 23. Quantitative variables like age, gender, mean and SD was calculated. Following the therapy by Omega 3 PUFA supplement, ALT levels were documented at the start of 3rd and 6th month and levels were compared for statistical significance with the help of chi-square value of less than or equal to 0.05 was considered statistically significant.

RESULTS

Total 40 patients were selected in which 25 (62.5 %) were female in our study and 15 (37.5 %) were male as shown in Figure-1.The mean age of patients in our study was 45.98 ± 9.13. In male the mean age was 48.53 ± 9.13 and in female the mean age was 44.44 ± 11.53.

ALT (IU/L) in our study before start of treatment was 114.95 ± 33.47 IU/L, after 3 month treatment was 67.23 ± 27.86 IU/L and after 6 month treatment was 47.95 ± 14.98 IU/L as shown in Figure-2.

In study the grades of fatty liver on ultrasound before treatment out of 40 patients were 5 (12.5 %) had Grade 1 fatty liver, 21 (52.5 %) had Grade 2 fatty liver and 14 (35.0 %) had Grade 3 fatty liver. The grades of fatty liver on ultrasound after 3 month treatment were 14 (35.0 %) had no evidence of fatty liver, 20 (50.0 %) had Grade 1 fatty liver, 5 (12.5 %) had Grade 2 fatty liver and 1 (2.5 %) had Grade 3 fatty liver. The grades of fatty liver on ultrasound after 6 month treatment were 32 (80.0 %) had no evidence of fatty liver, 6 (15.0 %) had Grade 1 fatty liver and 2 (5.0 %) had Grade 2 fatty liver and none had Grade 3 fatty liver.

Serum lipids which were our secondary outcome were as follow,

The results of cholesterol before treatment was 195.45 ± 30.37 g, after 3 months treatment was 187.38 ± 25.34 g and after 6 months treatment was 180.35 ± 14.53 g as shown in Table-1.

The results of Triglycerides before treatment was 235.35 ± 67.52 mg/dL, after 3 months treatment was 212.68 ± 53.92 mg/dL and after 6 months treatment was 201.88 ± 42.33 mg/dL as shown in Table-2.

The results of HDL before treatment was 49.80 ± 5.77 mg/dL, after 3 months treatment was 52.75 ± 5.62 mg/dL and after 6 months treatment was 55.93 ± 4.98 mg/dL as shown in Table-3.

The use of omega 3 PUFA caused decrease in a the value of ALT, cholesterol and triglycerides with increase in HDL level.

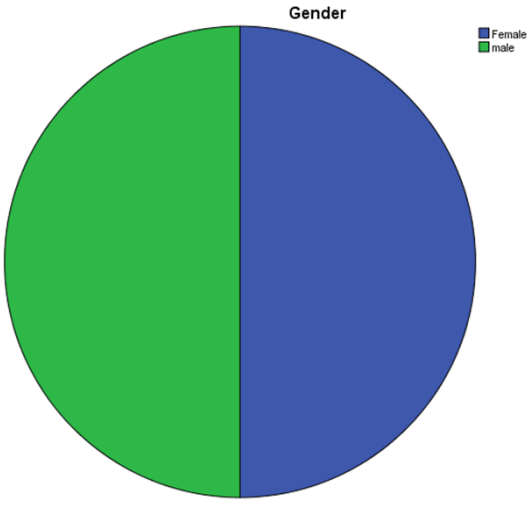

Figure No.1: Frequency distribution of gender patients with deranged ALT levels (n=40)

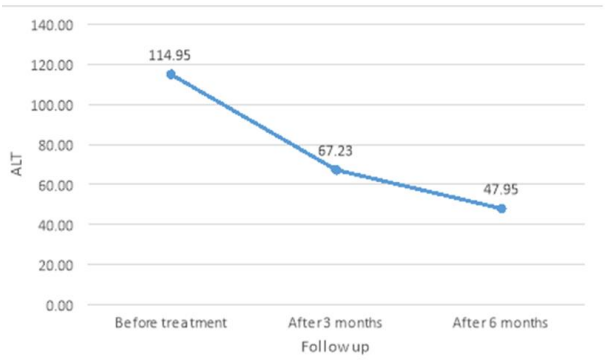

Figure No.2: Mean plot of comparison of ALT results with follow-up

Table No.1: Comparison of Cholesterol results with follow-up (n=40)

Cholesterol	N	Mean	SD	F test	p value
Before treatment	40.00	195.45	30.37	3.86	0.024
After 3 months	40.00	187.38	25.34		
After 6 months	40.00	180.35	14.53		
Total	120.00	187.73	24.91		

Table No.2: Comparison of Triglyceride results with follow-up (n=40).

Triglyceride	N	Mean	SD	F test	p value
Before treatment	40.00	235.35	67.52	3.78	0.026
After 3 months	40.00	212.68	53.92		
After 6 months	40.00	201.88	42.33		
Total	120.00	216.63	56.84		

Table No.3: Comparison of HDL results with follow-up (n=40).

HDL	N	Mean	SD	F test	p value
Before treatment	40.00	49.80	5.77	12.56	0.000
After 3 months	40.00	52.75	5.62		
After 6 months	40.00	55.93	4.98		
Total	120.00	52.83	5.97		

DISCUSSION

Escalation in the incidence of NAFLD has become a public health concern globally due to alterations in living standards, lifestyle changes, and the high prevalence of metabolic syndrome, diabetes and obesity.[10]

Because of its high prevalence and the risk of liver-related complications, NAFLD is becoming a grave public health concern across the world due to liver cirrhosis and hepatocellular carcinoma.[11] The omega 3 PUFA supplement is gaining popularity in the management of NAFLD. There is a marked decrease in inflammation, increase in insulin sensitivity and optimization of lipid profile especially triglycerides.[12] Now a days NASH is becoming more common cause of the end-stage liver disease and hepatocellular cancer.[13] There is a need for safe and effective therapies to prevent and treat NAFLD and NASH. There is still no approved medications for treatment of the NAFLD.[14]

Omega-3 PUFA supplements helps to decrease plasma TG. It has been demonstrated that n-3 PUFAs activate the peroxisome proliferator-activated receptor (PPAR) alpha, which stimulates fatty acid oxidation, and PPAR gamma increases insulin sensitivity, inhibits hepatic lipogenesis, and reduces hepatic reactive oxygen species. Besides, patients with NAFLD have been shown to have a greater deficiency of n-3 PUFAs in the diet than healthy controls, and a higher n-6/n-3 ratio in NAFLD patients increased lipogenesis leads to steatosis.[15] Omega-3 PUFAs supplementation also significantly improved the levels of triglyceride, total cholesterol, high-density lipoprotein which was also supported by other studies.[16]

In summary, the results of this study support the beneficial effect of n-3 PUFAs in optimizing liver fat, ALT level, and blood lipid levels (TG, cholesterol and HDL) in patients with NAFLD.

CONCLUSION

Omega 3 PUFA is effective in the reduction of ALT, fat contents in the liver and lipid levels of blood cholesterol and TG with an increase in HDL level in NAFLD patients.

Recommendation: We recommend more studies with large sample size to be conducted for the therapeutic effect of Omega 3 PUFA on ALT, Fatty liver and Lipid levels.

Author's Contribution:

Concept & Design of Study:	Rehan Sarwar
Drafting:	Syed Saif Ur Rehman, Abida Mateen
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Final Approval of version:	Syed Saif Ur Rehman

Conflict of Interest: The study has no conflict of interest to declare by any author.

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