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ORIGINAL RESEARCH

Evaluation and Comparison of Biochemical Parameters in the Study of Non-Alcoholic Fatty Liver Disease (NAFLD)

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Abstract

Background: Non-alcoholic fatty liver disease (NAFLD) has become the most prevalent liver issue in the world. Examining various biochemical parameters often provides valuable insights into the disease's cause.This study aimed to assess the biochemical markers in NAFLD patients.

Material and method: This study involved 80 subjects, comprising 60 individuals diagnosed with NAFLD through ultrasound and 20 healthy, age and gender-matched controls. Both groups were evaluated for levels of 25-hydroxyvitamin D and biochemical parameters like blood Urea, serum creatinine, Fasting blood glucose, and serum triglycerides, and the results were then statistically analyzed.

Result: Our results indicated that all biochemical parameters were elevated in NAFLD patients compared to the healthy control group, with statistically significant differences (P value < 0.005).In the present study,female predominance is present in the study group (71.7%) and control group (85%); amaximum number of patients were in the age group of 51-60 years in both the study and control group. The Mean ± SD of Vitamin D levels was 12.2±6.8 (ng/ml) and 30.1±17.9 in the study and control group respectively. A statistically significant association was found between the two groups with (p-value = 0.01). we found that Vitamin D Insufficiency, abnormal SGPT, and Triglycerides are significant predictors of NAFLD.

Conclusion: Vitamin D supplementation could be a potential tool to prevent the progression of NAFLD in metabolically high-risk individuals.NAFLD is associated with changes in biochemical parameters. Early detection can help modify the disease course and delay complications.

Keywords: NAFLD, vitamin D, serum Transaminases

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Introduction

Non-alcoholic fatty liver disease (NAFLD) is considered one of the most prevalent liver diseases among adults, affecting approximately 32.4% of the global population [1]. Its incidence has surged significantly in recent decades. NAFLD serves as a broad category that includes a range of conditions from harmless fat accumulation in the liver to more serious issues like progressive steatosis accompanied by hepatitis, fibrosis, cirrhosis, and in rare cases, hepatocellular carcinoma (HCC). NAFLD is characterized by the buildup of fat in the liver without the presence of other contributing factors like viral hepatitis, alcohol abuse, and similar conditions. NAFLD is acknowledged as an important aspect of metabolic syndrome [2] and has become an emerging clinical entity. Various interconnected pathways play a role in the development of NAFLD. Several potential risk factors have been identified, including metabolic syndrome, insulin resistance, and obesity [3]. NAFLD is diagnosed through abnormal liver tests, imaging studies, and liver biopsy. It has the potential to become the leading cause of liver transplantation in the future [4]. Ultrasonography is the most commonly used method for screening fatty liver in the general population.[5]

Additionally, numerous studies have indicated that there is an inverse relationship between vitamin D levels and NAFLD in adults. [3]The elevated levels of glucose and free fatty acids (FFA) in the blood collectively lead to the excessive buildup of neutral lipids in the liver, which causes an increase in serum transaminase levels. In patients with Non-Alcoholic Fatty Liver Disease (NAFLD), elevated serum ALT and AST levels are the main abnormalities observed. These levels are generally higher in patients with Non-Alcoholic Steatohepatitis (NASH) compared to those with simple NAFL. However, liver aminotransferase levels rarely exceed five times the upper limit of normal and tend to fluctuate. It is common to see normal levels in over two-thirds of NASH patients at any given time.[6] Hence, the study aims to find out the association between biochemical parameters and vitamin D in NAFLD patients as well as to identify individuals at risk of NAFLD.

Material and Method

This hospital-based, observational, and comparative study was conducted in the Department of Biochemistry on 80 ultrasonographically diagnosed cases reported in the Department of Medicine and Radiology, Rajindra Hospital, Patiala. Cases were divided into a study group – comprising 60 ultrasonographically diagnosed patients and a Control group – comprising 20 healthy, age and gender-matched individuals. Alcoholic subjects, Infectious hepatitis, and autoimmune hepatitis were excluded from the study. Written consent was taken from all subjects, and approval of the Institutional Ethics Committee was procured. Blood samples under all aseptic precautions will be conducted by venipuncture and allowed to clot. The serum was then separated by ultracentrifugation of samples at room temperature. Biochemical investigations evaluated serum transaminases, blood urea, serum creatinine, fasting blood glucose, and serum triglycerides were performed the same day on a fully automated analyzerand the rest of the sampleswere evaluated serum 25- Hydroxy Vitamin D in batch (ELISA).

Statistical analysis

The results were expressed as mean±SD of each variable. The comparison was done by student 't' test on the number of variables of each parameter. An odd ratio was calculated. Patients were analyzed for clinical significance ($p<0.05$).

Result and Discussion

A comparative study was conducted on 60 ultrasonographically diagnosed cases of NAFLD and 20 healthy age and gender-matched controls. They were subjected to evaluation of

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Vitamin D, serum transaminases, and serum triglycerides. The Statistical analysis was done to assess the Vitamin D, Transaminases, and Triglycerides in NAFLD patients and the results were compiled and analyzed as follows:

Table no.1 Age distribution in both groups

Group	N	Age (Years) Mean ± SD	't' value	p-value
Control Group	20	48.25 ± 9.68	0.167	0.868^{NS}
Study Group	60	48.72 ± 11.14		

NS: p > 0.05; Not Significant; * p < 0.05; Significant

As shown in table no.1 The mean age in the study group was 48.7 ± 11.14 years and 48.2 ± 9.68 years in the control group. The two groups had no significant difference regarding age parameters (p = 0.868). Thus, the age parameter in the study group was comparable to that of the control group.

Table No. 2 Distribution of study and control groups according to gender

Gender	Groups		Total
	Controls	Study group	
Male	3(15.0%)	17(28.3%)	20(25.0%)
Female	17(85.0%)	43(71.7%)	60(75.0%)

As per table no.2 number of males in the study group was 17(28.3%) and females as 43(71.7%). In the control group, the number of males in the study group was 3(15%) and females 17(85%). In both study and control groups, there was female predominance.In their research, Lonardo and Suzuki observed a gender disparity [7], noting that NAFLD was significantly more prevalent among women. This difference in prevalence may be attributed to variations in fat distribution between men and women. In contrast, this sex distribution was not in concordance with a study done by Barchetta et al. (2011) which reported male predominance[8].

Table No. 3 Biochemical investigations in both groups

Parameters	Case (Mean ±SD)	Control (Mean ±SD)	P< value
Aspartate aminotransferase (IU/L)	41.2±10.2	31±7.6	0.01
Alanine transaminase (IU/L)	49.8±18.6	33.6±11.5	0.01
Vitamin D	12.2±6.8	30.1±17.9	0.01
Urea (mg/dL)	27.2±13.4	25.9±3.8	0.68
FBS (mg/dL)	105.8±23.2	85.4±22.0	0.001
Serum Creatinine	1±0.2	1.0±0.3	.61
TG	180.4±34.1	117.6±28.7	0.001

The mean SGOT and SGPT levels in the study and control group were statistically significant between the two groups. Numerous previous studies have demonstrated a significant association between NAFLD and levels of AST, ALT, and ALP. [9] Vitamin D was found to be deficient in 25(41.7%), insufficient in 32(53.3%), and sufficient in 3(5%) cases in the study group. It was found to be deficient in 1(5%), insufficient in 11(55%), and sufficient in 8(40%) cases in the healthy control group**.**The mean Vitamin D level in the study and control group was 12.2±6.8 ng/ml and 30.1±17.9 ng/ml respectively, the p-value was 0.01 which was

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statistically significant between the two groups, in Table no. 3. The mean blood creatinine levels in the study and control group were 1±0.2 mg% and 1.0±0.3 mg% respectively as per table. As per the table above, the p-value was 0.61 which was statistically non-significant between the two groups.

The mean blood urea levels in the study and control group were 27.2 mg±13.4% and 25.9±3.8mg% respectively,and the p-value was 0.68 which was statistically non-significant between the two groups. the mean fasting plasma glucose levels in the study and control group were 105.8±23.2 mg% and 85.4±22.0 mg% respectively. the p-value was <0.01 which was statistically significant between the two groups. Research by Jain et al. [10] also confirmed this finding.The findings of our study regarding hypovitaminosis D'sassociation with NAFLD were in concordance with studies by Hao YP et al 2014[11]**.**

Table No. 4 Multiple logistic regression analysis

Variables	p-value	Odds Ratio (OR)
Vitamin D	0.02	119.26
SGPT	0.004	13.537
TG	0.003	55.992

As per Table No.4, on applying multiple logistic regression analysis, we found Vitamin D insufficiency, abnormal SGPT, and abnormal Triglycerides. They are significant predictors of NAFLD.

Conclusion

The predictive and prognostic value of these parameters may be helpful in the early diagnosis and improvement of the management of NAFLD. vitamin D supplementation could be a potential tool to prevent the progression of NAFLD in metabolically high-risk individuals.

Conflicts of interest: - No conflicts of interest.
Authors funding: - None

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