

THE IMPACT OF VITAMIN D ON HEPATIC ENZYMES AND NON-ALCOHOLIC FATTY LIVER DISEASE ACROSS-SECTIONAL STUDY

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Abstract: *Non-Alcoholic Fatty Liver Disease (NAFLD) has become increasingly common globally, raising serious concerns for public health. NAFLD is a complex and multifaceted disease that includes a range of liver diseases, such as cirrhosis, non-alcoholic steatohepatitis (NASH), and simple hepatic steatosis. A combination of environmental, metabolic, and genetic factors causes it. Recent data suggests that vitamin D, a fat-soluble vitamin with various physiological roles, may be crucial for liver health and the development of NAFLD. This cross-sectional study aimed to investigate vitamin D's potential impact on liver function and the development of NAFLD. A Cross-Sectional Study was conducted at the Department of Medicine, MTI, LRH, Peshawar, from August 2019 to January 2020. Participants for this study were selected from the Department of Medicine at MTI, LRH, Peshawar, between August 2019 and January 2020. The study population included individuals with NAFLD identified by laboratory, radiographic, and clinical criteria. Blood samples were taken to measure the serum levels of vitamin D and liver enzymes, such as aspartate aminotransferase (AST) and alanine aminotransferase (ALT). Additional clinical and demographic information was also collected. The average age of the participants in this study was forty years, and there was an equal distribution of genders. Following treatment, the severity of NAFLD significantly decreased. At the beginning of the study, 12.3% of participants had severe steatosis, 40.3% had moderate, and 48.4% had mild steatosis. After treatment, 40.3% of patients had no steatosis, 47.8% had mild steatosis, and 17% had significant steatosis. ALT, ALP, and bilirubin levels showed significant improvements in liver function, with p-values <0.05. While an increase in ALP indicated improved liver function, decreased ALT levels demonstrated reduced liver inflammation. Lower bilirubin levels indicated improved liver health. These findings suggest that treatment, possibly involving vitamin D supplementation, improved liver function and reduced the severity of NAFLD, highlighting the need for further research. This study indicates that vitamin D supplementation may benefit liver function and non-alcoholic fatty liver disease severity. The findings suggest that vitamin D may be a helpful treatment option for managing NAFLD, calling for further investigation and clinical testing.*

Keywords: Vitamin D, NAFLD, Liver Function

Introduction

Non-alcoholic fatty Liver Disease (NAFLD) is an increasingly prevalent worldwide health issue that is defined by the build-up of excess fat in hepatocytes in people who do not drink excessive amounts of alcohol. It covers a range of diseases of the liver, from non-alcoholic steatohepatitis (NASH), which may cause cirrhosis and hepatocellular carcinoma (HCC), to simple hepatic steatosis (Younossi et al., 2016). Estimates indicate that NAFLD affects around 25% of the world's population, and its prevalence has been rising gradually (Younossi et al., 2019). NAFLD has a complicated etiology that combines metabolic, genetic, and environmental variables. Obesity, dyslipidemia, and insulin resistance play significant roles in its development (Angulo, 2002). However, recent studies have shown possible connections between NAFLD and other variables, such as vitamin D deficiency. Investigations exploring vitamin D's possible role in liver function and the advancement of non-alcoholic fatty liver disease have focused on this fat-soluble vitamin, mainly recognized for its role in calcium homeostasis and bone health. Hepatocytes have vitamin D receptors (VDRs), and new

research indicates that vitamin D may have both direct and indirect effects on the liver (Vitamin, 2007). According to some research, vitamin D insufficiency is common in people with non-alcoholic fatty liver disease (Targher et al., 2007).

Moreover, vitamin D has been linked to several liver processes, including fibrosis, hepatocyte death, and inflammation (Bjelakovic et al., 2007). Research is still being done to determine the specific pathways by which vitamin D may affect NAFLD. This research was carried out between August 2019 and January 2020 at the Department of Medicine, Medical Teaching Institution (MTI), Lady Reading Hospital (LRH) in Peshawar, Pakistan, to contribute to the body of information already in existence. The objective was to do a cross-sectional study to evaluate the effect of vitamin D on NAFLD and liver function. This study's results may lighten the therapeutic function that vitamin D may have in managing non-alcoholic fatty liver disease (NAFLD), which might have significant ramifications for clinical practice and public health.

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Methodology

The Department of Medicine, MTI, and LRH Peshawar conducted a cross-sectional study from August 2019 to January 2020. Based on clinical, radiographic, and laboratory criteria, the study included people with NAFLD. Serum levels of vitamin D and liver enzymes, such as aspartate aminotransferase (AST) and alanine aminotransferase (ALT), were measured in blood samples taken from the study population. Demographic and clinical information was also acquired. The degree of NAFLD and liver function were evaluated at the start of the study and after therapy. Changes in liver health indicators were assessed for significance using statistical analysis, including p-values.

Results

NAFLD volunteers were included in the study; their average age was forty, and their gender distribution was balanced. The severity of NAFLD was significantly reduced after the therapy intervention. In the beginning, 12.3%, 40.3%, and 48.4% of participants, respectively, had moderate, severe, and mild steatosis. Following treatment, steatosis was absent in 40.3% of patients, moderate in 47.8%, and considerable in 17% of cases. There were significant

improvements in liver function indicators, such as ALT, ALP, and bilirubin, with p-values less than 0.05. These findings suggest the need for more research since they imply that the treatment, which may include vitamin D supplementation, improved liver function and lessened the severity of NAFLD.

Table 1: Demographic Characteristics of Study Participants

Demographic Variable	Mean (±SD) or Percentage
Age	40.0 ± 5.2 years
Gender	50% male, 50% female
NAFLD Severity	12.3% severe, 40.3% moderate, 48.4% mild

Table 2: Grade of Fatty Liver Before Percentage of Participants

Fatty Liver Grade Before	Percentage of Participants
Severe Steatosis	12.3%
Moderate Steatosis	40.3%
Mild Steatosis	48.4%

Table 3: Paired Samples Statistics

Pair	Mean	N	Std. Deviation	Std. Error Mean
1	.88333	60	.52373	.06761
2	24.61667	60	26.44219	3.41367
3	35.70000	60	36.78398	4.74879
4	.36667	60	.33882	.04374

Table 4: Descriptive Statistics after Treatment

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Std. Error
Fatty Liver Grade After	60	0.00	2.00	.7667	.69786	
ALT2	60	20.00	130.00	58.5333	24.36061	3.14494
ALP2	60	121.00	340.00	239.7833	59.21953	7.64521
BIL2	60	.50	1.70	.9033	.29913	.03862

Table 5: Paired Samples Test

Paired Differences	Mean	Std. Deviation	95% CI Lower	95% CI Upper	t-value	df	Sig. (2-tailed)
Fatty liver grade before – fatty liver grade after	.88333	.52373	.74804	1.01863	13.064	59	0.000
ALT1 - ALT2	24.61667	26.44219	17.78592	31.44741	7.211	59	0.000
ALP1 - ALP2	35.70000	36.78398	26.19769	45.20231	7.518	59	0.000
BIL1 - BIL2	.36667	.33882	.27914	.45419	8.382	59	0.000

Discussion

This research provides strong evidence that vitamin D supplementation may be beneficial in treating non-alcoholic fatty liver disease (NAFLD). After therapy, the distribution

of fatty liver grades showed a significant movement in the resolution direction, consistent with other studies showing that NAFLD is a modifiable condition (Malham et al., 2011). The mean fatty liver grade significantly decreased, as shown by descriptive statistics, indicating a noticeable

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improvement in the severity of the condition. These results support the hypothesis that therapies, such as vitamin D, may slow the development of non-alcoholic fatty liver disease (NAFLD) (Xu et al., 2017).

Essential markers of the state of the liver, liver enzymes, showed significant improvements. While lower ALP and bilirubin levels indicated improved liver function and health, lower ALT levels indicated less inflammation. This is consistent with research highlighting vitamin D's pleiotropic effects on liver enzymes and anti-inflammatory qualities (Eslam et al., 2020). The paired samples test further reinforced the study's internal validity, which showed statistically significant changes between the pre and post-intervention periods. The observed improvements in liver enzymes and decreases in fatty liver grade highlight vitamin D's potential as a treatment option for non-alcoholic fatty liver disease (NAFLD). Given the prevalence of NAFLD worldwide, these results have significant therapeutic implications (Xu et al., 2013; Younossi et al., 2016). Given its accessibility and relative safety, vitamin D supplementation may be a useful adjuvant treatment for NAFLD.

However, recognizing the study's shortcomings, such as its cross-sectional design, highlights the need to conduct strong randomized controlled trials to prove long-term effectiveness and causation. To sum up, this work lays the groundwork for further clinical research and possible therapeutic uses by providing insightful new information to the expanding body of research demonstrating the importance of vitamin D in treating non-alcoholic fatty liver disease (NAFLD). Its cross-sectional design is among the study's shortcomings, which makes causal inference difficult. The single-center design and small sample size might limit generalizability. Dietary practices and other potential variables were not thoroughly investigated. The brief duration might make it challenging to record long-term impacts. Future studies should investigate these limitations to provide a more thorough knowledge of vitamin D's effect on NAFLD.

Conclusion

According to this research, vitamin D supplementation may lessen the severity of non-alcoholic fatty liver disease (NAFLD) and enhance liver function. The noteworthy decreases in fatty liver grade and enhancements in liver enzyme levels highlight the possible medicinal function of vitamin D. To prove causation and long-term effectiveness. However, further research is required, including randomized controlled trials with more significant, more varied populations, given the cross-sectional design and short length of the study. These results highlight the need for further studies into the possible advantages of vitamin D supplementation and add to the growing conversation about managing NAFLD.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

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Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

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Data entry and Data analysis, drafting of article

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Conception of Study, Development of Research Methodology Design, Review of Literature, Drafting article, Review of manuscript, final approval of manuscript

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assessment of prevalence, incidence, and outcomes.
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