

To study the prevalence of Vitamin D deficiency in patients of NAFLD in a tertiary care hospital in Northern India

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Abstract:

Background: Vitamin D deficiency is a condition widespread throughout the world. Recent studies have suggested that vitamin D deficiency was associated with obesity and metabolic syndrome. The purpose of the study was to examine the relationship between vitamin D deficiency and nonalcoholic fatty liver disease (NAFLD).

Materials and methods : This study was a prospective observational and one point analysis . The study group comprised of patients of NAFLD attending OPD and admitted patients in GMC Jammu.

Results : The present prospective study was conducted on 70 patients of NAFLD. 47.18 % patients had Grade I fatty liver , Grade II fatty liver was found in 42.18 % patients and 10% patients had Grade III fatty liver. Mean value of vitamin D in grade I fatty liver patients was 31.7 ng/dl , in grade II fatty liver patients was 29.14 ng/dl and in grade III fatty liver patients was 14.37 ng/dl .

In our study, deficiency of vitamin D was found in 55 (78.57%) patients and 15 (21.43%) patients had vitamin D levels within the normal range.

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I. Introduction

Nonalcoholic fatty liver disease (NAFLD) is the most common hepatic disease in adolescents and its prevalence has risen substantially in recent decades (1). Several different parallel processes participate in the development of NAFLD (2) and many potential risk factors for NAFLD, including obesity, insulin resistance, and metabolic syndrome, have been identified. Vitamin D deficiency has been investigated as a risk factor for the development of NAFLD and several studies have suggested that vitamin D levels were inversely associated with NAFLD in adults (3,4,5,6)

Vitamin D plays a vital role in calcium and phosphorus homeostasis and is implicated in the modulation of immunologic function, hormone secretion, and cellular proliferation and differentiation .Vitamin D is a fat-soluble vitamin that is synthesized in the skin by UV sunlight from 7-dehydrocholesterol. In the liver, vitamin D is metabolized by 25-hydroxylase (CYP2R1) being converted into 25-hydroxyvitamin D [25(OH)D], which is typically used to assess an individual's vitamin D status . 25(OH)D is transported to the kidney, where it is metabolized by 1 α -hydroxylase converting to the biologically active form 1,25(OH)2D. (7)

Vitamin D mediates its intracellular signals via its receptor VDR which is constitutively expressed in the liver. It has been estimated that VDR regulates over 200 genes involved in glucose and lipid metabolism inflammation, cellular proliferation and differentiation and apoptosis

At the initial stage of lipogenesis, 1,25(OH)2D acts on adipocytes and inhibits NF- κ B transcription, known as the pro-inflammatory "master switch", and thus inhibits expression of the inflammatory cytokines IL-6, TNF- α and IL-1 β . It increases adiponectin secretion from adipocytes and enhances GLUT-4 receptor expression in myocytes, both of which improve insulin resistance. Increased gut permeability allows translocation of bacterial pathogens which can activate Toll like receptors on Kupffer cells. 1,25(OH)2D downregulates the expression of TLR-2, TLR-4 and TLR-9 in these cells and thus ameliorates inflammation. 1,25(OH)2D acts on hepatic stellate cells by binding to VDR and reduces proliferation of these cells that play a major role in inducing fibrosis. (8).

Understanding the complex interplay between vitamin D signal and lipid/glucose metabolism and differentiating specific metabolic effects from nonspecific anti-inflammatory properties in fatty liver disease may open new therapeutic interventions for the future in this constantly increasing threat to public health. The first confirmation of therapeutic potency of sunlight therapy and vitamin D in an animal model of fatty liver

disease clearly builds the basis for subsequent human therapeutic trials in NAFLD. Vitamin D substitution represents a simple, cheap and almost side effect-free candidate approach to reduce the burden of end-stage liver failure. (9)

II. Materials And Methods

This study was a prospective observational and one point analysis which conducted patients of NAFLD attending OPD and admitted patients in GMC Jammu from nov 2017 to oct 2018 .

INCLUSION CRITERIA

- Age more than or equal to 18 yrs
- Ultrasound abdomen proven fatty liver cases without hepatitis

EXCLUSION CRITERIA

- Hypertension
- Diabetes
- Patients on lipid lowering drugs
- Liver cirrhosis
- Pancreatitis
- Pregnancy
- Renal failure

ASSESSMENT OF NAFLD

Grading of NAFLD was done by ultrasound of abdomen.

- Grade I: echogenicity is just increased.
- Grade II: echogenic liver obscure the echogenic walls of portal vein.
- Grade III: echogenic liver obscures the diaphragmatic outlines .

CLINICAL ASSESSMENT PARAMETERS

- Vitamin D levels

METHODS USED

- Vitamin D3 level done by Electrochemiluminescence by using ADVIA Centaur kit.

DATA COLLECTION

1. Demographic profile of all the patients.
2. Detail history.
3. Detailed examination of the patients.
4. USG abdomen and labatory investigations were done in hospital.

STATISTICAL EVALUATION

All the data obtained from the patients of the study group was noted down on a proforma especially designed for this purpose. The data collected was analysed using appropriate statistical tests.

NORMAL PARAMETERS

Vitamin D levels : 30- 100 ng/ml

III. Results And Discussion :

TABLE 1 Age group and number of patients

Age group (yrs)	Number of patients
<30	5
30-39	11
40-49	21
50-59	18
60-69	8
>70	7

TABLE 2 Number of patients according to grade of fatty liver

Grade of NAFLD	Number of patients	Percentage
I	33	47.1 %
II	30	42.8 %
III	7	10 %

TABLE 3 Mean Vitamin D level in patients of NAFLD

	Mean ± SD (ng/ml)
Vitamin D levels	28.88 ± 26.7

TABLE 4 Number of patients having normal vitamin D levels vs Number of patients deficient in vitamin D

Vitamin D levels	Number of patients	% of total
Normal (30-100)	15	21.43 %
Deficient (<30)	55	78.57 %

TABLE 5 Number of males having normal vitamin D levels vs number of males deficient in vitamin D

	Normal (30-100)	Deficient (<30)
Number of males	8	25
% of total males	24.24 %	75.75 %

TABLE 6 Number of females having normal vitamin D levels vs number of females deficient in vitamin D

	Normal (30-100)	Deficient (<30)
Number of females	7	30
% of total females	18.92 %	81.08 %

TABLE 7 Mean values of vitamin D according to the grade of fatty liver

GRADE OF FATTY LIVER	GRADE I	GRADE II	GRADE III
VITAMIN D	31.7	29.14	14.37

NAFLD is increasingly recognized as a major cause of liver related morbidity and mortality, because of its potential to progress to cirrhosis and liver failure. It is the most common chronic liver disease worldwide representing the hepatic manifestation of metabolic syndrome. Our study was a prospective one point analysis study to study the prevalence of vitamin D deficiency in a patient of NAFLD.

The study group compromised 70 patients attending OPD and admitted patients in Government Medical College Jammu. Mean Vitamin D level of patients in our study was 28.88 ± 26.77 ng/ml.

In our study, deficiency of vitamin D was found in 55 (78.57%) patients and 15 (21.43%) patients have vitamin D levels within the normal range

Our findings are consistent with the studies conducted by:

Jablonski et al , 2013(10) who investigated the role of vit D in NAFLD patients in an integrated healthcare delivery system in the U.S. They found a strong inverse relationship between NAFLD and vitamin D levels.

Rhee et al ,2013(11) who found a minor but significant difference in vitamin D levels between patients with and without NAFLD (38.7±9.0 vs. 39.7±9.7 nmol/l).

Barchetta I. et al , 2011(12) who studied 262 subjects referred to the diabetic and metabolic disease clinics for metabolic evaluation . Patients with NAFLD (n=162, 61.8%) had reduced serum vitamin D level compared to without NAFLD 14.8 vs 20.05 ng/ml , p value <0.0001.

Targher et al ,2007(13) who studied 60 patients with NAFLD and 60 clinically healthy volunteers , found significantly lower levels of serum vitamin D in NAFLD patients than in controls.

Xiang et al.2015 (14) which showed the NAFLD patients had significantly lower levels of vitamin D and were 1.26 times more likely to be vitamin D deficient (OR 1.26, 95% CI: 1.15 to 1.38).

Kucukazman M. et al ,2014(15) who studied vitamin D in NAFLD. Patients with NAFLD had significantly lower vitamin D levels (12.3 ± 8.9 ng/dl, $p<0.001$) compared with those of the control group (20 ± 13.6 ng/dl).

IV. Conclusion

The present prospective study was conducted on patients of NAFLD presented to OPD and admitted in Department of Internal Medicine ,GMC Jammu over a period of 1 year.

- Total 70 patients were enrolled , 33 were male and 37 were female. Maximum patients were in the age group of 40-49. USG abdomen was done and patients were labeled according to the grade of fatty liver.
- 33 patients were found to have Grade I fatty liver , 30 patients had Grade II fatty liver and 7 patients had Grade III fatty liver.
- Mean vitamin D level of patient in our study was 28.88 ± 26.77 .
- Mean value of vitamin D in grade I fatty liver patients was 31.7 ng/dl , in grade II fatty liver patients was 29.14 ng/dl and in grade III fatty liver patients was 14.37 ng/dl .
- In our study, deficiency of vitamin D was found in 55 (78.57%) patients and 15 (21.43%) patients had vitamin D levels within the normal range.
- Among 33 male patients of NAFLD, 75.75% males were deficient in vitamin D.
- Among 37 females patients 81.1% were found to be vitamin D deficient.
- Our study has shown that lower serum vitamin D levels are prevalent in NAFLD patients, which suggests that hypovitaminosis D could play a role in the management of NAFLD. These findings provide the need for evaluating the role of vitamin D supplementation in the progression of NAFLD

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