

Vitamin D Deficiency in Patients Having Chronic Liver Disease: A Cross-Sectional Study

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ABSTRACT

Aim: To determine the frequency of vitamin D deficiency in patients having chronic liver disease

Study design: A cross-sectional research

Place and Duration: Medical department, People's University of Medical and Health Sciences for Women Nawabshah from 28th January to 27th July 2017.

Methodology: A total of 191 diagnosed cases of chronic liver diseases with sun exposure of at least 15 minutes per day were included. Patients were assessed to diagnose vitamin D deficiency. Descriptive statistics were used to analyse the data. The post-stratification chi-square test was used after stratification. P-value of < 0.05 was considered significant

Results: The mean age of the participants was 40.16±8.02 years. Mean sun exposure was 29.76±24.48 minutes per day. Mean serum SGPT level was 4.44±1.20 mg/dl. The mean vitamin D level was 14.28±8.50 ng/mL. A total of 74.3% of study subjects were found with vitamin D deficiency. There was a significant association between vitamin D deficiency with

gender, age, and sun exposure while no significant association was found with religion, occupation and cause of chronic liver disease.

Conclusion: The patients with chronic liver disease were significantly found as vitamin D deficient. Vitamin D insufficiency and the degree of liver function may be linked, suggesting that it might be used as a diagnostic tool.

Keywords: Frequency, Vitamin D Deficiency, Chronic Liver Disease.

Introduction:

In individuals with chronic liver disease of diverse etiologies, vitamin D deficiency has been linked to increased death, infections, portal hypertension consequences, and liver cirrhosis¹. Because the liver is involved in vitamin D metabolism and pleiotropic processes, the question is whether vitamin D insufficiency is a result of liver disease or a contributor to liver dysfunction². Vitamin D insufficiency is especially common among people with chronic liver disease (CLD). Vitamin D deficiency affects up to 92 percent of individuals with CLD, with over one-third of these suffering from severe deficiency³.

In Pakistan, more than 92 percent of non-cirrhotic, chronic viral hepatitis, and NAFLD patients have vitamin D deficiency or insufficiency⁴. The study included 400 patients, with 110 (27%) having chronic hepatitis B, 190 (48%) having chronic hepatitis C, and 100 (25%) having NAFLD. A total of 154 people (39%) had vitamin D deficiency⁵.

The study's goal was to find out how common vitamin D deficiency is in people with CLD. Because the sample size of my study is substantial, it will provide the most up-to-date and local statistics on chronic liver illnesses caused by vitamin D insufficiency. Furthermore, this research will serve to emphasize the importance of this test for individuals with chronic liver disease. This will aid in the early detection, as well as the development of measures to combat its effects.

Methodology

The ethical review committee of the institute granted authorization. Vitamin D deficiency was defined as a blood level of 25-hydroxy vitamin D less than 20 ng/mL

The sample size was determined using the WHO sample size calculator, with a prevalence of vitamin D deficiency in patients with CLD of 92%, a margin of error of 5%, and a confidence

interval of 95%, yielding a sample size of $n= 191$. The study employed a non-probability consecutive sampling technique.

People between the ages of 18 to 50 years of either gender, who were already diagnosed with chronic liver diseases as per operational definition and had sun exposure of at least 15 minutes per day were included in the study. Chronic liver disease patients who were taking vitamin D supplementation, anti-epileptic drugs, pregnant women and patients with chronic kidney diseases were excluded from the study.

Informed written consent was taken. The patient was assessed to diagnose vitamin D deficiency by vitamin D levels done from PMC diagnostic laboratory by taking blood samples following all aseptic measures by a pathologist. Levels of vitamin D in blood reports were recorded along with all the demographic data (age, sex, occupation) in predesigned proforma.

SPSS version 20.0 was used to examine the data. For gender and vitamin D insufficiency, frequency and percentage were computed. Age and vitamin D levels were given a mean and standard deviation. Stratification was used to control effect modifiers such as age, gender, sun exposure, and religion. P-value of less than or equal to 0.05 was considered significant. The Chi-square test was used after stratification.

Results

The overall mean age of participants was 40.16 ± 8.02 years. The mean sun exposure of study subjects was 29.76 ± 24.48 minutes. The mean serum SGPT level of study subjects was 4.44 ± 1.20 mg/dl. The mean vitamin D level of study subjects was 14.28 ± 8.50 ng/mL (As shown in Table 1). Among 191 study subjects, the religion of 97.9% of patients was Islam. Out of the total study subjects, 34% were doing office jobs. It was observed that 39.3% of chronic liver disease was caused by HBV, 54.5% by HCV and the rest of 6.3% were caused by alcohol. In our study, 74.3% of study subjects were found with vitamin D deficiency.

Stratification with respect to gender, age, religion, occupation, and sun exposure was done to observe the effect of these modifiers on vitamin D deficiency. The results showed that there was a significant association of vitamin D deficiency with gender ($p=0.023$), age ($p=0.043$) and sun exposure ($p=0.000$) while no significant association was found with religion ($p=0.574$), occupation ($p=0.873$)

The frequency and association of vitamin D deficiency according to gender are described in Table 2. The frequency and association of vitamin D deficiency according to age are shown in Table 3. The frequency and association of vitamin D deficiency according to occupation are shown in Table 4. The frequency and association of vitamin D deficiency according to cause of the chronic liver disease (CLD) are shown in Table 5. The frequency and association of vitamin D deficiency according to sun exposure are shown in Table 6.

Table 1: Mean of various parameters and Vitamin D status of study participants

Parameters	Mean
Age	40.16±8.02
Sun Exposure	29.76±24.48
Serum SGPT Levels	4.44±1.20
Serum Vitamin D Levels	14.28±8.50
Vitamin D Deficiency	
Yes	142 (74.3%)
No	49 (25.7%)

Table 2: Vitamin D deficiency according to gender

(n=191)

	VITAMIN D DEFICIENCY		TOTAL	P-Value
	Yes (n=142)	No (n=49)		
Male (n=98)	66	32	98	0.023*
Female (n=93)	76	17	93	
TOTAL	142	49	191	

*Significant at 0.05 levels.

Table 3: Vitamin D deficiency according to age

(n=191)

	VITAMIN D DEFICIENCY		TOTAL	P-Value
	Yes (n=142)	No (n=49)		
≤40 years (n=90)	73	17	90	0.043*
>40 years (n=101)	69	32	101	
TOTAL	142	49	191	

Table 4: Vitamin D deficiency according to occupation

(n=191)

	VITAMIN D DEFICIENCY		TOTAL	P-Value
	Yes (n=142)	No (n=49)		
Banker (n=8)	7	1	8	0.873**
Beautician (n=9)	7	2	9	
Businessman (n=16)	10	6	16	

Carpenter (n=3)	2	1	3	
Dentist (n=8)	5	3	8	
House wife (n=31)	23	8	31	
Office work (n=65)	50	15	65	
Other (n=51)	38	13	51	
TOTAL	142	49	191	

Table 5: Vitamin D deficiency according to cause of the chronic liver disease (CLD)

(n=191)

	VITAMIN D DEFICIENCY		TOTAL	P-Value
	Yes (n=142)	No (n=49)		
HBV (n=75)	56	19	75	0.414**
HCV (n=104)	79	25	104	

Alcohol (n=12)	7	5	12	
TOTAL	142	49	191	

Table 6: Vitamin D deficiency according to sun exposure

(n=191)

	VITAMIN D DEFICIENCY		TOTAL	P-Value
	Yes (n=142)	No (n=49)		
≤30 minutes (n=148)	141	7	148	0.000*
>30 minutes (n=43)	1	42	43	
TOTAL	142	49	191	

Discussion

In this study, 74.3% of individuals with chronic liver disease were vitamin D deficient.

In 54.5% of cases, it was due to the hepatitis C virus.

In the Arteh et al study, 109/118 (92.4%) of the patients showed vitamin D insufficiency. In the cirrhosis group with hepatitis C, 16.3 percent (7/43) had mild vitamin D deficit, 48.8%

(21/43) had moderate vitamin D deficiency, and 30.2 percent (13/43) had severe vitamin D deficiency.⁶

Cirrhotic patients had a higher rate of severe vitamin D deficiency (7 ng/ml) than non-cirrhotic patients (29.5 percent versus 14.1 percent, P value=0.05)⁷.

The bulk of investigations on cirrhotic patients agrees that vitamin D insufficiency is common in this population⁸. The question of whether liver injury causes vitamin D homeostasis disturbances or the other way around remains unanswered, creating a "chicken or the egg" causality quandary.

There is growing evidence that vitamin D level affects mortality in individuals with chronic liver disorders. In an international study, during follow-up of 338 study participants, 51 patients (15%) were admitted to the hospital due to hepatic decompensation. 72 patients (21%), on average, had significant vitamin D insufficiency⁹.

Data was taken from 6 trials covering 974 NAFLD patients in another investigation. There was no difference in 25-hydroxyvitamin D levels between NAFLD patients¹⁰. Patients with significant vitamin D deficiency had a higher rate of treatment non-response than those without (59 percent vs 41 percent, P = 0.04)¹¹.

In a local study, mean Vitamin-D levels in HCV patients were significantly lower than healthy controls (30.41 ng/mL) in both compensated and decompensated cirrhotic patients (26.85 ng/mL and 20.65 ng/mL, respectively).

Study Limitations

The present study has some limitations, including a single-center experience and a nonrandomized study design. Because the study was conducted with a small sample size, the findings may not be applicable to larger groups. As a result, a bigger sample size investigation is required.

Conclusion

Vitamin D deficiency was observed in 74.3 percent of study individuals with chronic liver disease, according to the findings. The conclusion was that the link between vitamin D and liver cirrhosis had a lot of clinical promise. The link between vitamin D insufficiency and

liver function and fibrosis severity may support its usage as a prognostic index and diagnostic tool.

Permission

Ethical review committee of the institute gave the permission

Funding source

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Conflict of interest

No conflict

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