

Vitamin-D Deficiency in Patients with Chronic Liver Disease: A Single Center Cross-Sectional Study

Vitamin-D
Deficiency with
Chronic Liver
Disease

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ABSTRACT

Objective: To assess the level of (vitamin-D) in patients having chronic liver disease.

Study Design: A descriptive cross-sectional study

Place and Duration of Study: This study was conducted at the department of Gastroenterology, Muhammad Medical College Peshawar from 1st November 2022 to 1st May 2023.

Methods: The institutional review board approved a descriptive cross-sectional research at the department of gastroenterology, Muhammad Medical College Peshawar, from November 2022 to May 2023 to assess (vitamin-D) individuals with chronic liver disease and elevated) levels. A easy sampling approach identified 127 male and female participants. A well-designed questionnaire was used to collect information from the participants. SPSS 24 was used to adequately analyse the data.

Results: The present study includes 127 patients. Participants' average age was 49.33, with a standard deviation of 10.33. 14.33. 93 (73.22 %) of them were males and 34 (26.77 %) were female participants. 54.33 % of them had hepatitis C, while hepatitis B 19.68 % of patients. 91(71.65 %) individuals have a deficiency of (vitamin-D).

Conclusion: The study concluded that most of the patients having chronic liver disease were from hepatitis B and C. 71.65 % of the patients were deficient in (vitamin-D), with which more women were (vitamin-D) deficient than males, however, more males had a chronic liver disease. Therefore, further study over a large area needed to be conducted to find out the exact and more precise level of (vitamin-D) in CLD patients, in order to treat them accordingly.

Key Words: hepatitis B,C, Chronic liver disease, Non-Alcoholic Fatty-Liver-Disease

Citation of article: Daud M, Shaheen F, Nauman, Jawad. **Vitamin-D Deficiency in Patients with Chronic Liver Disease: A Single Center Cross-Sectional Study.** *Med Forum* 2023;34(11):71-74. doi:10.60110/medforum.341116.

INTRODUCTION

Vitamin-D is a kind of (hormone) that's helpful in regulating the procedures of calcium homeostasis along with the condition of the bone. Initially considered that it is limited to individuals who have long-term cholestatic liver conditions at first, it recently became understood that (vitamin-D) deficiency and inadequacy occur frequently in every form of chronic liver disorder^[1].

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Received: June, 2023

Accepted: July, 2023

Printed: November, 2023

Vitamin-D is now very common in liver cirrhosis, regardless of the cause of the disease. The seriousness of (vitamin-D) insufficiency increases when liver biosynthetic malfunction worsens ^[2,3]. Previous research has linked inadequate 25-hydroxyvitamin-D levels to (NAFLD) and its level of severity^[4,5].CLD involves a deficiency in nutrients. Individuals suffering from CLD are at increased risk of both micro as well as macronutrient deficits which include vitamin and protein inadequacies to micronutrients such as selenium, and zinc. (Inadequacy of lipid-soluble substances) additionally becomes a common occurrence^[6]. In 2017, CLD (chronic liver disease) killed 1.32 million individuals, roughly two-thirds of whom were male as well as three-quarters of whom were females^[7]. A shortage of (vitamin-D) is prevalent among individuals who have serious ongoing liver damage, however, individuals who suffer from mild persistent liver disease might additionally be insufficient^[8]. Having insufficient (vitamin-D) promotes death, disability, and CLD (chronic liver disease) complications that include repeated infections caused by bacteria and hypertension of the portal vein complications^[9]. Individuals having chronic liver disease can develop inadequate levels of (vitamin-D) as a result of changes in hepatocellular (vitamin-D)

synthesis^[10]. Inactive vitamins D2 as well as D3 are produced by the human skin in ultraviolet radiation, and the liver subsequently transforms through the process of hydroxylation, during CLD the liver gradually lost its ability to hydroxylate the inactive component of the (vitamin-D) compound in the presence of fibrosis, those suffering from C-Pugh Class C show a significant risk of deficiencies in (vitamin-D) amounts^[11]. The D vitamin's inadequate eating habits, poor vitamin-D absorption through the intestinal tract, and insufficient amount of sunlight exacerbate the situation^[12]. The degree of severity of fibrosis affects (vitamin-D) inadequacy among individuals suffering from CLD. Falak et al. reported 55.2% of (vitamin-D) deficiencies in degenerative cirrhotic individuals and 13.6% of the individuals who were compensated¹³.

92% of individuals having CLD had inadequate levels of (vitamin-D), with the majority being from the Afro-American race. Additionally, there have been limited studies in our area to explore the deficiency of (vitamin-D) in patients with CLD and how it's associated with hepatic diseases^[14].

METHODS

Between November 1, 2022, and May 1, 2023, with approval from the hospital's institutional review board, the study was conducted in the department of gastroenterology at (Muhammad Medical College Peshawar) to determine the level of (vitamin-D) in patients with chronic liver disease. There were 127 total participants, including both sexes, and their ages ranged from 20 to 80, with a mean of 49.33 and a standard deviation of 14.33. Participants were included in the research if they had laboratory evidence of CLD, such as a report of a liver biopsy, or other symptoms of CLD, as documented in their medical records. Class A included children with a Child-Pugh score of 6 or less, Class B included children with a score of 7 to 9, and Class C included children with a score of 10 or more. Patients with preexisting renal illness or who were already taking steroids regularly were not included. All participants were given clear instructions and explanations of the study's purpose. Each willing participant gave their informed permission, and they were all given assurances that their privacy would be protected. The information was gathered by having each participant fill out a thorough and organised questionnaire. The most recent release of SPSS (version 24) was used to correctly analyse all of the data.

RESULTS

The present study includes a total of 127 patients, moreover, both males and females were selected. The ratio of males and females was 2.73: 1. The age of the participants was from 20-80 years. 51. 18 % of the participants were aged from 41-60 years, however, the mean age of the participants was 49.33 49.33 with a

standard deviation of 14.33. 93 (73.22 %) of them were males and 34 (26.77 %) were female participants.

Table No. 1: Demographic Characteristics

Age in years	Number	Percentage
20-40	27	21.25 %
41-60	65	51.18 %
61-80	35	27.55 %
Mean and STD		49.33 ± 14.23
Gender		
Male	93	73.22 %
Female	34	26.77 %

Table 2 shows that hepatitis C (54.33%) was the most prevalent cause of chronic liver illness in individuals, followed by hepatitis B (19.68%). Hepatitis B and C were 9.40%, Wilson's disease and NAFLD 10.23%. Table 3 demonstrates that 60.62 % of patients had class C, 11.81 % class B, and 9.44 % class A child-PUGH scores.

Table No. 2: Causes of CLD

Hepatitis B	25	19.68 %
Hepatitis C	69	54.33 %
Hepatitis B and C (both)	12	9.40 %
Biliary cirrhosis	8	6.29 %
Other causes	13	10.23 %

Table No. 3: Child-PUGH Score

Class C	77	60.62 %
Class B	15	11.81 %
Class A	12	9.44 %

This research found that 91 (71.65%) people had vitamin-D insufficiency, whereas 36 (28.34%) did not. Table 4 shows vitamin-D insufficiency by chronic liver disease cause. The most common cause of vitamin-D deficiency was hepatitis B, followed by Wilson's disease and NAFLD at 76.1 % and 81.51 %, respectively. Hepatitis C patients had 59.5 % CLD, and biliary cirrhosis patients had 71%. In Table 5, vitamin-D insufficiency was more prevalent in female patients (82.35 %) with chronic liver disease than in male patients (67.74 %).

Table No. 4: Vitamin-D deficiency based on the cause of CLD

	Percentage
Hepatitis B	76.1 %
Hepatitis C	59.5 %
Hepatitis B and C (both)	68.2 %
Biliary cirrhosis	71 %
Other causes	81.51 %

Table No. 5: Vitamin-D deficiency in terms of Gender

	Number	Percentage
Male	63	67.74 %
Female	28	82.35 %

DISCUSSION

Chronic liver disease is one of the most serious health conditions, and over the last few years, the prevalence of chronic liver disease goes up day by day. The liver had the main function in the body such as detoxification of harmful and foreign body particles during the hepatic first-pass reaction, moreover, it also activates the beneficial hormone of to the active form such as (vitamin-D) undergoes three steps through the liver enzyme called CYP-450 to change into active form and further progress hydroxylation. The human body gets its (vitamin-D) through nutrients in food, that the body gets from the intestines. Furthermore, this compound is mostly produced internally in the epidermal tissues of the outer layer of the skin, and the skin gets it from UV exposition^[15]. The present study concluded that the most common cause of chronic liver disease was hepatitis C 54.33 % and 19.68 % of the patients had hepatitis C and B, moreover, 60.62 % of the patients had child PUGH scores and 76.1 % of hepatitis B patients had (vitamin-D) deficiency, while the study conducted by Islam Shah WA et al indicated that 58.9 % of the patients had child PUGH score, 56.7 % of the had a hepatitis C, and total 67.4 % of the individuals have a deficiency of (vitamin-D)^[16]. Arteh et al In the research they conducted, reported 92.4% of participants had (vitamin-D) insufficiency^[17]. In a comparable manner to Falak et al.'s research, 76.5% of the study participants lacked inadequate (vitamin-D), however, the current study shows 71.65 % of the individuals have a deficiency of (vitamin-D)^[14]. The present study indicates that 82.35 % of the females were deficient in (vitamin-D) and 67.64 % of the males were deficient in (vitamin-D), similarly, While the ratio of females as compared to males involved in these types of research, deficient levels of (vitamin-D) may be prevalent. In overall, gender is associated with (vitamin-D) inadequacy and persistent liver disease. Individuals with diseases usually do not have an exemption. Johnson and colleagues reported that women suffering from chronic liver disease have a higher likelihood of being (vitamin-D) insufficient^[18]. In the present study, the results indicated that more omens were deficient in vitamins than males and 60.62 % of the patients have class C Child-Pugh score, therefore the overall deficiency of (vitamin-D) was 71.65 %, moreover, similar results were shown by other studies that are the community consumes primarily protein-rich foods, and this could result in (vitamin-D) insufficiency. Women receive less regularly exposed to daylight because of their religious as well as cultural and socioeconomic principles, therefore leading to (vitamin-D) deficiency. The lack of (vitamin-D) has been demonstrated to be negatively associated with individual Child-Pugh scores. The amount of (vitamin-D) deficiency rose when fibrosis began to Class A towards B and C. As

fibrosis grows, the liver biosynthesis ability turns it down, dropping (vitamin-D) binding protein and consequently, activation of the (vitamin-D) receptors decreases^[19]. The study conducted by Cho YH et al reported that 78.9 % of the patients were deficient in (vitamin-D), while the current study concluded that 71.65 % of the patients were deficient in (vitamin-D)^[20].

CONCLUSION

The study concluded that most of the patients having chronic liver disease were from hepatitis B and C. 71.65 % of the patients were deficient in (vitamin-D), with which more women were (vitamin-D) deficient than males, however, more males had a chronic liver disease. Therefore, further study over a large area needed to be conducted to find out the exact and more precise level of (vitamin-D) in CLD patients, in order to treat them accordingly.

Author's Contribution:

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 Revisiting Critically: Muhammad Daud, Fahad Shaheen
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Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No. IRB 540/2022 dated 21.10.2021

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