

The Influence of Viral Hepatitis C Infection on Some Biochemical Markers in Patients with Chronic Renal Failure in Najaf Province, Iraq

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ABSTRACT

Background: The objective of this study was to assess the impact of HCV on various biochemical markers, including Vit-D, PTH, CA, and iron, and to compare these effects with individuals with chronic kidney disease (CKD) but without HCV. **Methods:** 80 patients with chronic kidney disease (CKD) who were undergoing dialysis were enlisted for this study. Among them, 37 patients tested positive for HCV, while 43 patients tested negative for HCV. Their sera were collected and subjected to the necessary biochemical marker tests. Statistical analysis was performed using SPSS. **Results:** The levels of Vitamin D, iron, calcium, and phosphorus did not show any notable disparity between the two groups. The only significant difference seen was in PTH levels, with greater results observed in CKD with HCV infection. **Implications:** : The possibility exists for the Hepatitis C virus (HCV) to worsen the status of patients diagnosed with chronic kidney disease (CKD). Nevertheless, the intervention did not yield a substantial effect on the concentrations of specific pivotal indicators associated with mineral metabolism, except parathyroid hormone.

Keywords: Calcium, Chronic Kidney Disease, Hepatitis B virus, Parathyroid hormone, Vitamin D.

Article Information

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INTRODUCTION

Chronic HCV infection can lead to various renal complications. The most commonly observed renal symptoms of HCV infection include essential mixed cryoglobulinemia with membranoproliferative glomerulonephritis (MPGN), MPGN without cryoglobulinemia, and membrane MPGN. Chronic HCV infection poses a higher risk to end-stage kidney disease patients due to their frequent exposure to potentially contaminated dialysis devices and long-term vascular access. Furthermore, HCV infection is associated with increased mortality rates among individuals undergoing dialysis and renal transplantation (Latt et al., 2012).

Vitamin D plays a crucial role in patients with chronic kidney disease (CKD) by regulating the renin-angiotensin system (RAS) and the nuclear factor (NF) κ B pathway, going beyond its usual function. These pathways play a significant role in several pathological processes.(Li, 2010). It is common to find vitamin D deficiency or insufficiency in people with chronic kidney disease (CKD). Serum vitamin D levels are inversely related to kidney function. An increasing amount of research is pointing to vitamin D deficiency as a possible cause of renal function decline and increased illness and mortality in CKD patients. New evidence suggests that active vitamin D or its derivatives can reduce inflammation, fibrosis, and apoptosis in animal models of renal injury. Additionally, this therapeutic intervention has been found to reduce proteinuria and death rates among individuals diagnosed with chronic kidney disease (CKD) (Kim & Kim, 2014). There is a correlation between increased bone mineral indices and death among those undergoing dialysis treatment. There exists a lack of consensus about the relationship between calcium, parathyroid hormone (PTH), and mortality, as well as limited data about the temporal variations in bone mineral parameters.(Melamed et al., 2006).

This study was to assess the impact of HCV on various biochemical markers, including Vit-D, PTH, CA, and iron, and to compare these effects with individuals with chronic kidney disease (CKD) but without HCV to conclude whether the alterations in the biochemical are due to the viral infection or not.

METHODS

Eighty patients with CKD who were on dialysis and attended to the specialized center of kidney diseases and transplantation in Al-Najaf city, 37 of them had HCV infection while the rest hadn't.

Their blood samples were obtained from all of them and centrifuged then tested for viral hepatitis c using ELISA(Biotek / USA), after that the levels of some biochemical (Phosphorus, vitamin D, calcium, iron and PTH hormone) were assessed using a biochemical analyzer(neochem100) from NEOMEDICA. Statistical analysis was performed using the 26th version of the Statistical Program for social sciences (SPSS) (Chicago, USA) with P value <0.05 considered significant. Mann-Whitney U and krauskal wallis tests were utilized.

RESULTS

Out of the total number of CKD patients, females were more than males in the number and percentage of being infected with HCV. As shown in figure 1.

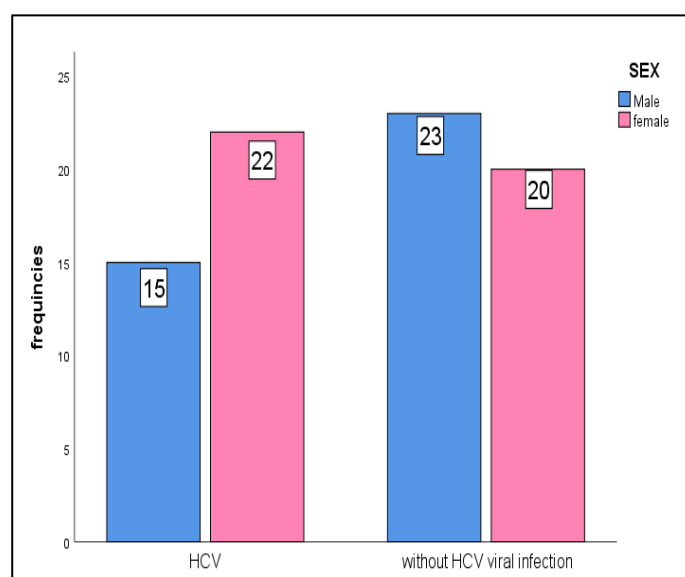


Figure 1: the distribution of the state of HCV infection between the study groups.

There was a significant difference in the levels of iron between the two groups (HCV-infected and HCV non-infected) where those without the viral infection had higher results as shown in the table.2, while there were no significant differences regarding the levels of other biochemical tests as shown in the table.1

Table 1: association between some biochemical tests and viral infection among CKD patients using Mann-Whitney U test.

	PH	CA	IRON	VIT.D	PTH
Mann-Whitney U	769.000	762.000	405.000	677.500	424.000
P value	.937	.746	.387	.658	.001

Patients without HCV infection had higher results for PH, CA, iron, Vit-D but lower results of PTH than the HCV infected group.

Table 2: Frequencies and ranks difference between the two groups of the study.

	Patients type	N	Mean Rank
PH	With HCV	37	39.78
	without HCV	43	40.19
CA	With HCV	37	41.41
	without HCV	43	39.72
IRON	With HCV	37	29.00
	without HCV	43	32.94
VIT.D	With HCV	37	37.32
	without HCV	423	39.56
PTH	With HCV	37	47.72
	without HCV	43	31.34

DISCUSSION

This section is also a significant part of the research articles and is usually the longest part of an article. A discussion of the research presented in this section is the result—data analysis, such as statistical calculations or other methods for the achievement of its study. Please present the discussion narratively.

Chronic renal disease often leads to the development of renal hyperparathyroidism (rHPT), a condition characterized by elevated levels of parathyroid hormone due to

disturbances in the control of calcium, phosphate, and vitamin D.(Yuen et al., 2016)

The drop in 1,25-dihydroxyvitamin D levels observed in individuals with chronic renal disease can be attributed to many mechanisms that restrict the kidney's capacity to sustain 1,25-dihydroxyvitamin D levels, even when parathyroid hormone levels are elevated.(Al-Badr & Martin, 2008)

The short life expectancy of people with end-stage renal disease (ESRD) is linked to a shortage in vitamin D. The administration of active vitamin D and its analogs has been shown to enhance survival rates among individuals undergoing hemodialysis. (Kalantar-Zadeh et al., 2006; Melamed et al., 2006; Teng et al., 2005)

Increasing evidence indicates that a deficiency in vitamin D is associated with the progression of LC caused by several factors, mainly owing to HBV and HCV infection. (Barchetta et al., 2017; Hoan et al., 2016; Targher et al., 2007)

The majority of the present study cohort exhibited inadequate levels of vitamin D, however, there was no statistically significant distinction observed between those with HCV and those without HCV.

Elevated levels of phosphate, both at the onset and during subsequent monitoring, have been found to be associated with mortality in patients undergoing their initial dialysis treatment. A positive link has been shown between increased levels of calcium, calcium phosphate (CaP), and parathyroid hormone (PTH) and mortality in the immediate aftermath of an incident.(Melamed et al., 2006)

The presence of hypocalcemia and hyperphosphatemia is only observed in advanced CKD due to the development of adaptations. (Felsenfeld et al., 2015).

Elevated secretion of parathyroid hormone (PTH) serves to regulate serum calcium levels by promoting calcium efflux from the skeletal system, facilitating renal calcium reabsorption,

and facilitating phosphate excretion. In chronic kidney disease (CKD), the excretion of phosphate in the kidneys is sustained through heightened secretion of fibroblast growth factor 23 (FGF23) and parathyroid hormone (PTH). Nevertheless, the phosphaturic impact of FGF23 is diminished when the cofactor Klotho, which is essential for the binding of FGF23 to FGF receptors, is downregulated. In chronic kidney disease (CKD), the absorption of phosphate in the intestines is reduced, partly because of decreased levels of 1,25 dihydroxyvitamin D.(Felsenfeld et al., 2015).

In the present investigation, it was shown that patients infected with HCV exhibited elevated levels of PTH, potentially serving as a compensatory mechanism for the reduced levels of calcium.

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CONCLUSION

Hepatitis C viral infection can negatively impact the health of individuals with chronic kidney disease (CKD) and elevate their susceptibility to infecting other patients. However, this investigation revealed no significant changes in the levels of many biochemical tests, with the exception of parathyroid hormone (PTH) levels.

Limitation

The limited availability of patients on a daily basis posed a significant obstacle. Additionally, the absence of medical history recording hindered the identification of whether HCV preceded CKD or vice versa.

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