

## Frequency of Vitamin D Deficiency among Patients with Newly Diagnosed Chronic Kidney Disease

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### ABSTRACT

**Background:** Chronic Kidney Disease is a condition which is frequently caused by long standing diabetes, hypertension, renal calculus disease and glomerulonephritis. The term End Stage Renal Disease usually means the final stage of Chronic Kidney Disease with a decline in Glomerular Filtration Rate below 15 ml/min. Recently a great deal of interest has been created world over in the correction of native vitamin D levels in CKD patients and its ability to slow the progression of CKD patients.

**Objective:** To determine the frequency of vitamin D deficiency among patients with newly diagnoses of chronic kidney disease.

**Material & Methods:** This descriptive and cross-sectional study was conducted at Department of Nephrology, Institute of Kidney Disease (IKD), Peshawar. It was conducted for the period of 06 months from 01 May, 2018 to 30 October, 2018. The sample size was 190 patients and consecutive non-probability sampling was carried out. All patients newly diagnosed CKD in the age range of 18-60 years and both gender were included, while all the patients having CKD 5 (HD dependent and non-HD dependent) were excluded. Patients already diagnosed with osteomalacia and vitamin D deficiency, patients having hepatic diseases (as diagnosed by specific investigations or medical records) and patients on vitamin D supplementation were also excluded from this study. Vitamin D deficiency was considered positive if the serum vitamin D level was less than 20ng/ml. All the data was analysed in SPSS 22.

**Results:** In this study, the mean age was 40.6 years with standard deviation  $\pm$  14.15. 65% patients were male and 35% were female. Forty percent patients had vitamin D deficiency.

**Conclusion:** Our study shows that the frequency of vitamin D deficiency is 40% among patients with newly diagnoses of CKD at our center.

**KEYWORDS:** *vitamin D deficiency, chronic kidney disease*

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### INTRODUCTION

Chronic Kidney Disease (CKD) is defined as structural or functional abnormality in the renal function for more than 03 months duration. Chronic Kidney Disease (CKD) is a condition which is frequently caused by long standing diabetes, hypertension, renal calculus disease and glomerulonephritis. Its frequency and incidence is gradually rising and has become an economic and public health burden both locally and globally<sup>1</sup>. The term End Stage Renal Disease (ESRD) usually means the final stage of Chronic Kidney Disease (CKD) with a decline in Glomerular Filtration Rate (GFR) below 15 ml/min. CKD is a worldwide serious health and economic issue, because of high expenses on Dialysis and Transplantation, with an increasing

incidence and prevalence<sup>3</sup>. Diabetes and Hypertension are the two most important risk factors for cardiovascular and renal diseases worldwide<sup>4</sup>. Currently, approximately 1 billion adults worldwide have hypertension, and the prevalence is increasing. Effective Blood Pressure (BP) control delays the progression of renal disease in adults with CKD<sup>5</sup>.

Cardiovascular (CV) events are common in patients with CKD but inadequately explained by traditional risk factors. Vitamin D deficiency is significantly prevalent in CKD population and has been proposed to be a non-traditional risk factor, but its relationship with vascular function is unknown<sup>6</sup>. Vitamin D may promote cardiovascular health in general population as well as in CKD patients through inhibition of the renin-angiotensin system and its anti-inflammatory effects<sup>7</sup>.

Although primarily recommended for bone health, vitamin D has been linked to decreasing cardiovascular diseases, but the mechanisms involved remain unknown<sup>8,9</sup>. Vitamin D deficiency is found in the majority of patients with CKD and may contribute to various chronic diseases.

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Current guidelines suggest correcting reduced 25-hydroxyvitamin D [25(OH) D] concentrations in CKD patients with an estimated Glomerular Filtration Rate (eGFR) <60<sup>10</sup>. Natural vitamin D supplementation in CKD patients has been shown to improve some surrogate markers of cardiovascular risk and CKD-MBD including suppression of Parathyroid Hormone (PTH) levels<sup>11</sup>. Among individuals with chronic kidney disease (CKD), Vitamin D deficiency prevalence has been reported to be as high as 70% in some studies. Vitamin D plays a pivotal role in calcium and phosphorus homeostasis<sup>11-16</sup>.

The clinical significance of vitamin D deficiency (VDD) is emphasised by experimental and epidemiological data indicating that vitamin D deficiency itself may contribute to progression of CKD<sup>17</sup>. In one study, only 17 % of patients with CKD had serum 25(OH) vitamin D concentration in the recommended range, 42 % suffered from vitamin D insufficiency and 41% had moderate vitamin D deficiency.<sup>18</sup>

The rationale of doing this study was that it will give us the magnitude of vitamin D deficiency in our local adult population of newly diagnosed CKD. Our study was purely descriptive and provided us with fresh local descriptive statistics about vitamin D in our local population of newly diagnosed CKD. If our study shows significant vitamin D deficiency in this population, we can suggest further studies before we can finally advise regular screening of CKD population for vitamin D deficiency and its supplementation.

**MATERIAL AND METHODS**

This study was conducted at Department of Nephrology at Institute of Kidney Disease (IKD), Peshawar. The study design was descriptive and cross sectional. It was conducted for the period of 06 months from 01 May, 2018 to 30 October, 2018. In this study a total sample size was 190 patients which was calculated according to WHO formula for sample size keeping 41%<sup>13</sup> proportion of vitamin D deficiency in CKD patients, 95%

confidence interval and 7% margin of error. More over non-probability consecutive sampling technique was considered for sample collection. In this study all patients with newly diagnosed CKD in age range 18-60 years and both gender were included.

All patients having CKD 5 (HD dependent and non-HD dependent ) were excluded. Patients already diagnosed with osteomalacia and vitamin D deficiency, patients having hepatic diseases (as diagnosed by specific investigations or medical records) and patients on vitamin D supplementation were also excluded from this study.

All patients presenting to OPD, meeting the inclusion criteria were enrolled in this study. From all the patients, 10cc of blood was obtained under strict aseptic technique and was immediately sent to hospital laboratory to detect vitamin D deficiency. Vitamin D deficiency was considered present if the serum vitamin D level was less than 20ng/ml. The data was analysed in SPSS 22. Mean and standard deviation were computed for quantitative variables like age and serum vitamin D level while frequency and percentages were calculated for categorical variables like gender and vitamin D deficiency.

**RESULTS**

Age distribution among 190 patients was analysed as 27(14%) patients were in age range less then 30 years, 47(25%) patients were in age range 31-40 years, 57(30%) patients were in age range 41-50 years, and 59 (31%) patients were in age range more then 50 years. Mean age was 40.6 years with standard deviation ± 14.15. One hundred six (65%) patients were male and 84(35%) patients were female. More over the frequency of vitamin D deficiency was found in 76(40%) patients, while 114(60%) patients did not have vitamin D deficiency. (Table No 1). Stratification of vitamin D deficiency with respect to age and gender is given in table no 2&3

**TABLE NO 1. VITAMIN D DEFICIENCY (n=190)**

VITAMIN D DEFICIENCY	FREQUENCY	PERCENTAGE
Yes	76	40%
No	114	60%
Total	190	100%

**TABLE NO 2. STRATIFICATION OF VITAMIN D DEFICIENCY W.R.T AGE DISTRIBUTION (n=190)**

VITAMIN D DEFICIENCY	Less than 30 years	31-40 Years	41-50 years	More than 50 years	TOTAL
Yes	11	19	23	23	76
No	16	28	34	36	114
Total	27	47	57	59	190

**DISCUSSION**

Chronic Kidney Disease (CKD) is a condition which is frequently caused by long standing diabetes, hypertension, renal calculus disease and glomerulonephritis. Its frequency and incidence is gradually rising and has become an economic and public health burden both locally and globally<sup>1</sup>. The term End Stage Renal Disease (ESRD) means the final stage of Chronic Kidney Disease (CKD) with a decline in Glomerular Filtration Rate (GFR) below 15 ml/min<sup>2</sup>.

Our study shows that the mean age was 40.6 years with standard deviation  $\pm$  14.15. Sixty five percent patients were male and 35% patients were female. Forty percent patients in our study had vitamin D deficiency while 60% patients didn't have vitamin D deficiency.

The clinical significance of vitamin D deficiency is emphasised by experimental and epidemiological data indicating that vitamin D deficiency itself may contribute to the progression of chronic kidney disease<sup>17</sup>. In one study, only 17 % of patients with CKD had serum 25(OH) vitamin D concentration in the recommended range, 42% suffered from vitamin D insufficiency and 41% had moderate vitamin D deficiency<sup>18,19</sup>.

Similar results were observed in another study conducted by Bansal B et al<sup>20</sup> in which the mean age of patients was  $55 \pm 13$  years. The mean level of vitamin D was  $10.14 \pm 8.7$  ng/ml. Majority of the patients (95.5%) were either vitamin D deficient or had insufficient levels. There was, however, no correlation with duration of dialysis or PTH levels.<sup>15</sup>

Our study showed the frequency lesser than one of the previous data from Chandigarh which reported 77% prevalence of vitamin D deficiency and insufficiency in male patients with newly diagnosed CKD patients.<sup>21</sup>

In CKD 45 stages, NHANES III data reported vitamin D deficiency to be 17% and insufficiency to be 27%. Other data from various countries reported vitamin D deficiency or insufficiency ranging from 70-90%.<sup>22</sup>

Similar results were observed in another study conducted by de Boer IH et al<sup>23</sup> in which the prevalence rates of vitamin D insufficiency & deficiency increased from 62% and 25% in stage 2 CKD, to 88% and 56% in stage 5 CKD. Similarly, a cross sectional study of 15,068 adults participating in the Third National Health and Nutrition Examination Survey (NHANES) reported a strong inverse association between albuminuria and serum 25 hydroxy vitamin D concentrations.

**CONCLUSION**

Our study shows that vitamin D deficiency was present in a significant percentage (40%) of patients, newly diagnosed chronic kidney disease in Peshawar. We recommend a more comprehensive studies, which should be multi-center and case-control, so that proper recommendation are made for treatment protocol of vitamin D replacement in early stages of CKD patients.

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