

Different Age, Ethnic Groups, Serum Vitamin D, Calcium and Phosphorus in Nepalese Patient with Chronic Kidney Diseases

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Abstract: *Background:* Chronic kidney disease (CKD) is a growing health issue worldwide and nearly 1 million people have deficiency of vitamin D. Due to greater sun exposure and increased production of Vitamin D, sufficient level of Serum Vitamin D is expected in the people of tropics regions to the inhabitants of non-tropical regions. In Nepal, CKD patients are increasing and difficult to management due to different factors. We explored the status of socio-cultural and vitamin D levels in the Nepalese chronic kidney disease patients. *Materials and Methods:* In a cross sectional study of 217 CKD patients was enrolled and compared with age, sex, ethnic groups, vitamin D, calcium, phosphorus, and albumin from January 2015 to September 2018. We analysed these variables by using SPSS. A 25 hydroxy vitamin D deficiency was defined as less than 10ng/ml and insufficiency as 10 to 30 ng/ml. *Result:* Out of 217 chronic kidney disease (CKD) patients, 42.9% (93) male and 57.1% (124) female. Majority ethnic groups of 217 CKD patients, were 54 (25%) Chhetri and 110 (51%), whereas education level of CKD patients were 25% illiterate and 42% primary level. And in case of majority of Occupation level of CKD patients were 29% business, 25% farming and 25% housewife. Out of 217 chronic kidney disease (CKD) patients, 94 were age between (41 to 60) and 47 were age between (61 to 80). Mean of variables were age (48.29± 15.46), Vitamin D (20.49± 12.08), Phosphorus (4.36± 1.09), Albumin (4.07± 0.43). Out of 217 patients, 25 (OH) Vitamin D deficiency (<10 ng/ml) and Insufficiency (10-30 ng/ml) were diagnosed as 38 (18%) patients and 144 (66%) patients respectively. Significant correlation between vitamin D with Calcium (r value 0.156; P<0.05), Phosphorus (r value -0.025; P<0.05) Creatinine (r value -0.155; P< 0.05) and Urea (r value -0.165; P<0.05) was found. *Conclusion:* Result of our study indicated that Nepalese population having age 48 years and female were majority of patients in CKD and Low vitamin D levels observed in Nepalese CKD patients.

Keywords: Ethnic group, 25 (OH) Vitamin D, Vitamin D deficiency, Chronic Kidney Disease (CKD)

1. Introduction

Non-communicable diseases (NCDs) like chronic kidney disease (CKD) is a global burden and leading cause of death in the world wide [1-3]. The burden is in a peak level in the developing country of south Asia like Nepal. Nepal is a developing country and land of Terai, Hilly and Himalaya region. Lower socioeconomic conditions, unmanaged safe drinking water supply, environmental factors, Diabetes mellitus, and hypertension may be the predisposing factors for the chronic kidney disease in developing country like Nepal. As Nepal being low income country, there is a scarcity of infrastructure and professional, which limits high-quality screening for prior identification and treatment of chronic kidney disease. Since chronic kidney disease is a one of the most burden and associated with high degree of morbidity and mortality, a better plan to address this area of health issue may be important for developing countries like Nepal. Vitamin D is synthesised endogenously by skin (approximately 80%) when exposed to UV light and exogenously from Nutrients. Though role of the Vitamin D is to maintain calcium and phosphorus metabolism, recent studies revealed that it may play an important role in non-skeletal disease also. More than 50% of the older people are low vitamin D status. [4].

In kidney, hydroxylation of 25-hydroxyvitamin D to 1, 25 (OH) 2 D₃ (calcitriol) is catalysed by kidney 1 α hydroxylase [5]. Chronic kidney disease, calcitriol deficiency occur and development of secondary hyperthyroidism, as calcitriol deficiency trigger parathyroid gland hyperplasia and rises

the level of parathyroid hormone through loss the capacity to control expression of Vitamin D receptor within parathyroid cells [6]. Which leads to increase PTH level, and abnormal calcium (Ca) and phosphorus (P) balance. Hyperphosphatemia and increased level of PTH were the risk factors for mortality in chronic kidney disease patient maintaining dialysis [7]. However, other a study indicate that vitamin D treatment may reduce the effects of hyperphosphatemia and secondary hyperparathyroidism on cardiovascular mortality in CKD patients [8]. Overall objective of this study was to explore the status of different ethnic groups and prevalence of vitamin D, calcium and phosphorus in Nepalese chronic kidney Diseases patients.

2. Material and Methods

A Descriptive cross sectional study was designed. On this multicentre study, enrolled two hundred and Seventeen chronic kidney disease patients from National Kidney centre, Sumeru Hospital and Golden Hospital, from January 2015 to September 2018 in Nepal. Ethical approval was taken by Nepal Health Research Council (NHRC) Nepal, and all centres. All participants were explained about the study and were taken consent. Demographic characteristics were obtained by using Questionnaires. 5ml blood samples were collected and analysed the samples for variables like calcium, phosphorus, urea, creatinine and 25 (OH) Vitamin D. Serum Calcium, Phosphorus, Urea, and Creatinine were measured by ERBA XL 200. We excluded the participant taken history of thyroidectomy, vitamin D supplement before being enrolled, malignancy and refusing

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written ethical consent. Serum 25-hydroxyl Vitamin D concentrations were analysed by ECL (electrochemiluminescence) method. A 25-hydroxy vitamin D deficiency was defined as less than 10 ng/ml and insufficiency as 10 to 30 ng/ml.

3. Statistical Analysis

All data of variables were analysed by SPSS version 16 for windows. Results were presented as mean \pm SD for continuous variables. One-way analysis of Variance (ANOVA) was used to compare Age groups and 25(OH) vitamin D levels of Chronic Kidney Disease (CKD). Chi-square test was used to analyse the age groups and vitamin D deficiency and insufficiency in CKD patients.

4. Results

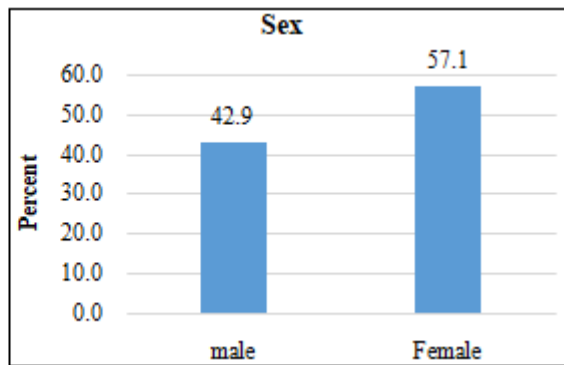
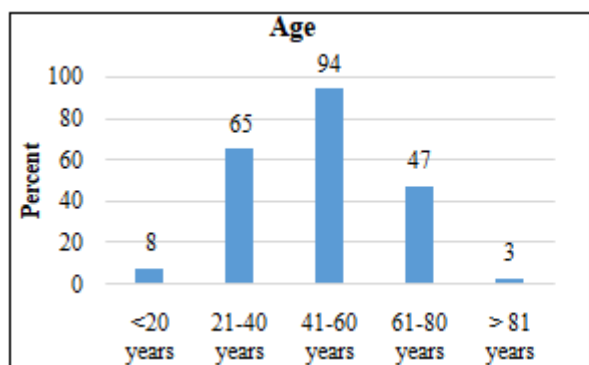
Chronic kidney disease Patient's characteristics like Age, sex, 25(OH) Vitamin D, albumin, calcium, phosphorus, Urea, and Creatinine were demonstrated. All Nepalese two hundred and seventeen chronic kidney patients were enrolled in this study whereas 42.9% (93) male and 57.1% (124) female. Ethnic groups of 217 CKD patients, were 33 (15%) Brahmin, 54 (25%) Chhetri, 20 (9%) Newar, and 110 (51%) other whereas education level of CKD patients were 25% illiterate, 13% Bachelor or higher, 20% certificate and 42% primary level. Occupation level of CKD patients were 29% business, 25% farming, 25% housewife, 4% students and 17% others. Out of 217 Chronic kidney disease (CKD) patients, 8 patients were below 20 years age, 65 patients were age between (21 to 40 years), 94 were age between (41 to 60), 47 were age between (61 to 80) and 3 patients were above 81 years age. Mean of variables were calculated as: age was 48.29 ± 15.46 , Vitamin D was 20.49 ± 12.08 , Phosphorus was 4.36 ± 1.09 , Albumin was 4.07 ± 0.43 . Out of 217 patients, 25 (OH) Vitamin D deficiency (<10 ng/ml) and insufficiency (10-30 ng/ml) were diagnosed as 38 (18%) patients (17 male and 21 female) and 144 (66%) patients (62 male and 82 female) respectively. By using one-way ANOVA analysis, there were no significant difference in vitamin D level CKD patients under different age groups. ($P > 0.05$). Correlation between 25 (OH) vitamin D with albumin (r value 0.018; $p > 0.05$) was insignificant, and significant with others like Calcium (r value 0.156; $P < 0.05$), Phosphorus (r value -0.025; $P < 0.05$)

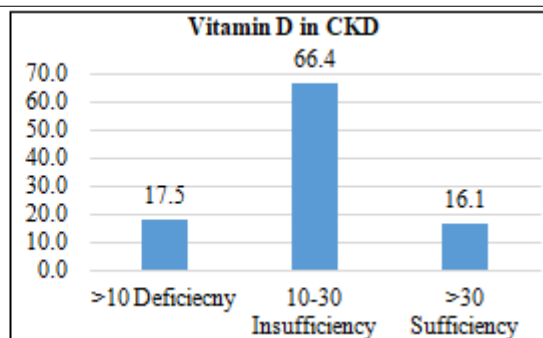
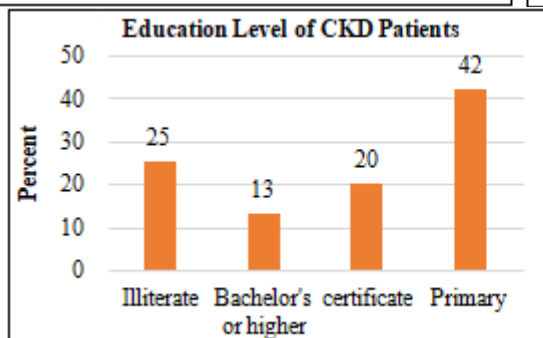
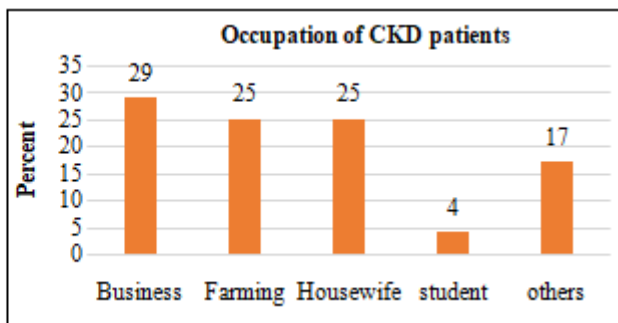
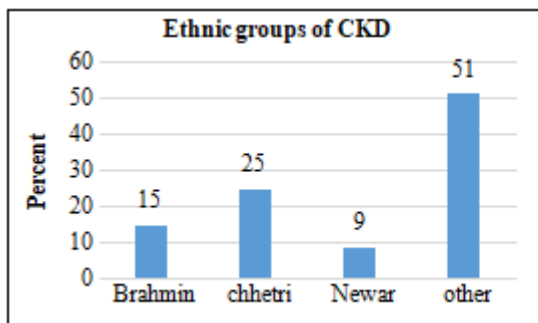
Creatinine (r value -0.155; $P < 0.05$) and Urea (r value -0.165; $P < 0.05$)

5. Discussion

In this study we found females were more having vitamin D deficiency in chronic kidney disease than male and also in some study revealed that female sex were associated with vitamin D deficiency in chronic kidney disease.^[9, 10, 11] Students and graduate people were less likely to have Chronic Kidney Disease whereas majority of illiterate (25%) and primary education (42%) were more Chronic Kidney Disease. By increasing education level may be a significant role to reduce the CKD patient. Among the different ethnic groups of Chronic Kidney Disease patients, maximum Chhetri and other ethnic groups were suffered. Average age of Chronic Kidney Disease patients was around forty-eight years which is supported by the study in India where median age was forty-three years.^[12, 13] This reflects the poor management and lack of early diagnosis of disease which lead to Chronic Kidney Disease. Age group (41 to 60) years have more prone to have Chronic Kidney Disease than other age groups.

Among 217 Chronic Kidney Disease patients, majority (66%) had vitamin D insufficiency. Another study revealed that $>80\%$ non-transplant Chronic Kidney Disease patients had low serum 25(OH) D levels.^[11] Further a study showed that deficiency of vitamin D in Chronic Kidney Disease patients as well as general population.^[14] So that large sample size should be designed to clear this finding. Correlation between 25 (OH) vitamin D and albumin was insignificant whereas significant negative correlation with phosphorus, urea and creatinine in Chronic Kidney Disease patients. Mean Vitamin D in CKD patients was 20.49 ± 12.08 whereas Ngai et al. finding was 20.8 ± 9.3 ^[15]. Despite Nepal having a tropical and subtropical region, Nepalese populations were 25(OH) Vitamin D insufficiency and deficiency, and were common in chronic kidney disease of Nepalese patients and also this finding is supported by the study in Brazilian population.^[16, 17, 18] Finally the output of this study revealed prevalence and correlation. Limitation of our study as sample size is limited. Therefore large sample size may reflect the National scenario. Despite these limitations, this study explored the prevalence of 25(OH) Vitamin D and ethnic groups in chronic kidney disease in Nepalese patients, disdain of tropical region of Nepal.





No of CKD Patients 217	Mean	Std. Deviation
Age	48.29	15.46
Vitamin D	20.49	12.08
Calcium	9.13	0.79
Phosphorus	4.36	1.09
Urea	53.92	42.31
Creatinine	2.53	3.08
Albumin	4.07	0.43

6. Conclusion

In Summary, We found that even though Nepalese population live in tropical and sub-tropical region, most female patients had low level of 25(OH) Vitamin D in CKD .To obtain clinically meaningful outcome, future study in large population and cohort studies should be warranted to reveal relationship between 25(OH) Vitamin D and chronic kidney disease.

Competing interests: The authors state no conflict of interest

7. Acknowledgement

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