



Prevalence of Vitamin D Deficiency and Its Associated Disorders at a Tertiary Care Hospital of The Al Qassim Region of Saudi Arabia

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ABSTRACT

Introduction: Vitamin D is a fat-soluble vitamins which is very important for maintaining healthy bone and essential for calcium and phosphorus homeostasis. This study was conducted to find out the prevalence of vitamin D deficiency and associated disorders among patients admitted in the medical ward and associated diseases/disorders if any.

Methods: It was a hospital based retrospective study.

Results: Total 144 (75%) of patients had vitamin D deficiency. The most common symptom among patients due to vitamin D deficiency was joint pain (46%). The common disease associated with vitamin D deficiency patients was diabetes (28%) which was significantly associated ($p < 0.05$). Vitamin D level and patient's height were significantly associated with each other ($t = 126.36$, $P < 0.0001$). Linear regression model shows significant relationship between the body mass index of the patients and their serum cholecalciferol (Vitamin-D₃) level ($t = 10.37$, $P < 0.05$) and 95% (Constant 15.64) confidence interval level of coefficient 12.6 -18.6.

Conclusion: The study showed vitamin D deficiency was the major problem of the area, more in younger age group and common among female patients. The obesity also one of the major problem of the patients of study group and Vitamin D and calcium deficiency significantly associated with obesity.

Keywords: Vitamin D deficiency, Hospitalized patient, Associated Symptom, Associated Diseases, BMI

INTRODUCTION:

Vitamin D is a fat-soluble vitamins which is very important for maintaining healthy bone and essential for calcium and phosphorus homeostasis. Vitamin D works in association with parathyroid hormone PTH and calcitonin to regulate serum calcium and phosphorus levels in the body. The major source of vitamin D is the body skin, where it is produced by the action of ultraviolet rays on steroid precursors called 7-dehydrocholesterol (7-DHC).¹ A variety of endogenous and environmental factors also play crucial role and can alter the skin's production of vi-

tamin D, including skin pigmentation, use of sun-screen products, clothing, latitude, season, time of day, and aging.² The second source for vitamin D is dietary intake and it is present in a limited number of foods such as fish oil, and oils from the liver of cod and tuna fish. In country such as Saudi Arabia where there is good sunlight and many food products are fortified with vitamin D, it would be expected that the vitamin D level would be adequate in the majority of the population, but Around 30 to 50% of population (children and adults) in the middle east countries such as United Arab Emirates, Saudi Arabia, and Lebanon have vitamin

D levels below 20 ng/ml.^{3,4} The high prevalence of vitamin D deficiency primary may be due to low exposure of the body skin to ultraviolet radiation.⁵ Other factors associated with vitamin D deficiency include vitamin D receptor (VDR) polymorphism, low daily calcium intake by the person, obesity and low social status.^{7,8} Previous study on vitamin D level in Saudi Arabia was shown that, vitamin D deficiency is common among Saudi children also.⁹ Other study conducted upon female population concludes that there was a high prevalence of vitamin D deficiency among Saudi female. Vitamin D deficiency is linked to several diseases, including hypertension, cardiovascular disease, impaired immune function, and malignancies. The aim of this study was to determine the prevalence and associated symptoms of vitamin D deficiency in a sample of Saudi patients attending general hospital.^{10,11,12} Objectives to find out the distribution of vitamin D deficiency and associated disorders among patients admitted in the medical ward and know the association if any

METHODOLOGY

The present observational retrospective study was carried out in the Internal Medicine department of Al Rass general hospital of Al Qassim region from January 2014- December 16 to find out the vitamin D deficiency among admitted patients and associated diseases and symptom among them. No sampling techniques were applied the sample was collected on the basis of all patients 15years and above age admitted in the wards during study period and confirmed by laboratory test were taken as a sample size (191) . The retrospective data was collected from electronic medical records and entered in excelsheet and analyzed from the electronic medical records and various variables were studied such as demographic , Serum Vitamin D level, Serum Calcium level, BMI and Associated Symptoms/Diseases and their association if any .The serum vitamin D and Calcium level estimation done by using immunochemistry with Cobat 4011 Series by Hitachi and Unipall from Dimension. This study was carried out among patients to find out hospital based distribution of vitamin D deficiency and their association with any other disease. The ethical approval was taken from institutional ethical committee, no written consent were taken from patients because this study was retrospective medical record based study and confidentially were also maintained by not mentioning the name of any participant in the study.

The data was analyzed by using SPSS version 20 and data is presented in the form of tables , graphs and appropriate statistical test applied such as Chi-Square , Mean, SD and Linear regression.P value

less than or equal to 0.05 was considered to be significant.

OBSERVATIONS

The present study was carried out to know the distribution of vitamin D deficiency among patients of medical wards and associated diseases/symptoms, according to age more than 60% of patients below 45 years of age, female were four time higher than male 151(79%) and 40 (21%) respectively. In the present study more than 144 (75%) of patients had vitamin D deficiency (Normal 20-50 NG).The most common symptom among patients due to vitamin D deficiency was joint pain 87 (46%) followed by fatigue 47 (25%). The common disease associated with vitamin D deficiency patients was diabetes 53(28%) followed by hypothyroidism 17(9%), the statistically significant difference was observed ($\chi^2=22.7, P<0.05$) between two. The mean height of the peoples were 122 cm and SD 4.75cm were observed among study group , the fifty percentile of patients height are under 155cm. The mean vitamin D level among study group was 15.04 Nano Gram (NG) with standard deviation of 10.69NG. The relationship between vitamin D level of the patients and their height is statistically highly significant($t = 126.36, P<0.0001, 5\%$ confidence interval of this difference: From 105.29 to 108.62). In the study group fifty percentile of peoples had severe vitamin D deficiency and more than seventy five percentile patients had vitamin D level less than normal limit that was 19 NG(Normal range 20-50 NG).The mean serum calcium level also very low in studied population that was 1.49 mmol /L with SD of 1.08 mmol/L, the normal range of calcium for adult population is 2.2 to 2.7 mmol/L. The association between serum calcium level and height was studied and found to be a statistically significant ($t= 341.90, P<0.0001, 95\%$ confidence interval of this difference: From 119.81 to 121.20 .Linear regression model shows significant relationship between the body mass index of the patients and their serum cholecalciferol (Vitamin- D3) level ($t=10.37, P<0.05$) and 95% (Constant 15.64) confidence interval level of coefficient 12.6 -18.6.

Table: 1 Distribution of Vitamin D deficiency cases according to Age groups and gender

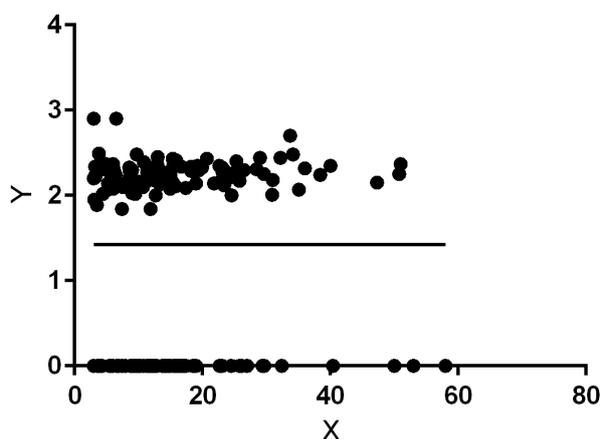
Demographic Variables	Cases (n=191) (%)
Age group (Years)	
15-30	45 (23.57)
31-45	72 (37.69)
46-60	50 (26.17)
61-75	21 (11)
Above 75	3 (1.57)
Gender	
Female	151 (79)
Male	40 (21)

Table: 2 Distribution of Vitamin D deficiency cases according to their associated symptoms

Associated symptoms	Cases (n=191) (%)
Symptoms	
Joint Pain	87 (45.54)
Fatigue	47 (24.6)
Dizziness	27 (14.13)
Palpitation	11 (5.75)
Chest pain	8 (4.18)
Others	11 (5.75)
Associated diseases	
Diabetes Mellitus	61 (30.65)
Hypothyroidism	17 (8.9)
Diabetes with Hypertension	8 (4.18)
Cardio Vascular disease	8 (4.18)
Neurological	5 (2.61)
Anaemia	1 (0.53)
Shortness of breath	7 (3.14)
Any other(Anaemia, Muscles weakness, hair fall, CVA)	22 (11.51)
No other disease	70 (36.64)

Table: 3 Distribution of vitamin D deficient patients according to their BMI

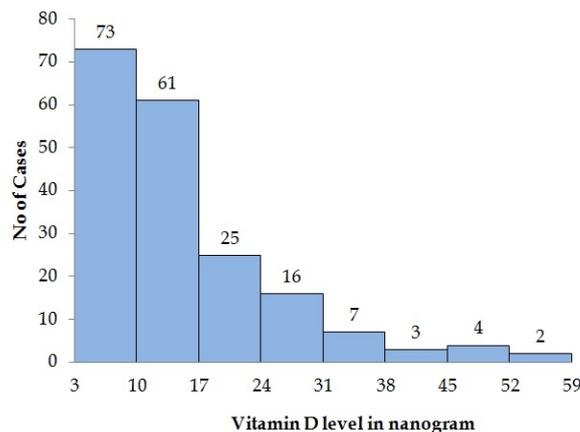
BMI (Kg/M ²)	Cases (n=191) (%)
< 18.5 Under weight	6 (3.14)
18.5-24.99 Normal Range	23 (12.04)
25-29.99 Pre Obese	49 (25.65)
30-34.99 Obese class I	36 (18.85)
35-39.99 Obese class II	22 (11.52)
>40 Obese class III	13 (6.81)
No record found	42 (21.99)



P value 0.9968; Slope 95%CI -0.01458 to 0.01452

Graph 1: Relationship of vitamin D level and serum calcium level (Linear regression model)

Linear regression model also shows significant relationship between the Body Mass Index of the patients and their serum calcium level (t=9.81, P<0.05) and 95% (Constant 1.50) confidence interval level of coefficient 1.20 -1.81.



Graph:2 Distribution of cases according to their Serum Vitamin D level in NG/ML

DISCUSSION

The present study was done to find out the vitamin D deficiency and associated disorder in the patients attending general hospital of Al Qassim region of Saudi Arabia. The study conducted by Abdul kareem O et.al regarding prevalence of vitamin D deficiency in Saudi adults they found 29% adults with Vit D deficiency that is lower than present study may be due to they did in general population and present study done in patients⁷. Another study conducted by Hirani V about predictor of 25 hydroxy vitamin D study among two British national survey they found significant difference⁸. The study conducted by Al-Othman A et.al they concluded all the subjects are vitamin D deficient and most of them (72%) moderate deficient in the present study also same type of finding reported⁹. The study done by DeLuca HF about general physiological features of Vit D.¹⁰ The study conducted by Martins DS about prevalence of cardio vascular risk factors and the serum level of Vit d and they found diabetes , hypertension and triglyceride level significantly related to Vit D level.¹¹ The study conducted by Giovannucci E regarding cancer incidence, mortality and Vit D they found increase risk among subjects those who hypovitaminosis D.¹²The study done by Elsammak MY in Saudi Arabia Sunny region they found after the good exposure of sunlight still more than 65% healthy adults had vitamin D deficiency, similar type of findings also reported in present study 75% , this difference may be due to difference in setting.¹³

The study done by Naeem Z in Qassim region of Saudi Arabia they found around 29% of subjects Vit D deficient and 40% Vit D insufficient and commonest symptom bone pain 20%, in the present study Vit D deficient 75% and joint pain 46% higher may be due to this study done among hospital patients.¹⁴ The another study conducted by

Ardawi MS about prevalence of Vit D deficiency and relationship with lifestyle they observed around 87% of subjects Vit D deficient and common among older age , obese with sedentary life style, similar type of finding also reported in present study.¹⁵ The study conducted by Sadat -Ali M about Vit D level in healthy men in eastern Saudi Arabia they also observed similar kind of findings.¹⁶ Study conducted by Mahdy S about Vit D status in health professionals in Qatar they found around 87% had deficiency ,in the present study also 75% of patients are deficient of Vit D.¹⁷ Ginde AA studied about role of Vit D in pregnancy and given recommendation about same in present study we not observed same.¹⁸ Study conducted by Sim JJ about Vit D deficiency and Anaemia relationship in the present study we observed less than 1% Anaemia among Vit d deficient subjects.¹⁹ Another study conducted by Yoon JW regarding Prevalence and risk factors for vitamin D deficiency among children in reference to iron deficiency anemia they observed 58% of children had subnormal level of Vit D, in present study we not observed pediatrics subjects.²⁰

Conclusion: The study showed vitamin D deficiency was the major problem of the area, more in younger age group and common among female patients. The obesity also one of the major problems of the patients of study group and Vitamin D and calcium deficiency significantly associated with obesity.

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