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ORIGINAL ARTICLE

ASSESSMENT OF PATHOPHYSIOLOGY OF VITAMIN D DEFICIENT PATIENTS: A TERTIARY CARE CENTRE STUDY

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ABSTRACT:

Background: There are two forms of vitamin D i.e. vitamin D1 and Vitamin D2. Vitamin D1 is obtained from dietary sources and vitamin D2 is synthesized on the exposure to UV light. Serum hydroxylated forms of vitamin D i.e. 25 OHD are the most reliable indicator of vitamin D status of a person. Even though India is a tropical country, receiving ample amount of sunlight, still deficiency has been reported by international osteoporosis foundation amongst all age groups. The aim of present study is to evaluate the levels of Vitamin D amongst patients of a tertiary care hospital and to estimate the impact of age and gender. Material And Methods: The present study was conducted among 1004 subjects over a period of 15 months. The test for estimation of vitamin D was a competitive test, where vitamin D of patient's serum competes with biotin Vitamin D conjugate (that was added simultaneously) for antivitamin D antibodies binding sites. In the end streptavidin HRP conjugate was added and then addition of TMB reagent detected the reaction. A duplicate test was run alongside with the controls provided by the kit, which acted as a quality control measure. The data collected was arranged in tabulated and graphical form. The results are expressed as mean+/- standard deviation. Results: Out of the total of 1004 subjects, females were in majority. The number of males was 455 and number of females was 549. Maximum levels of vitamin D were seen amongst 11-20 years of age i.e. 39.11 which were followed by 41-50 years of age. Conclusion: Majority of the subjects were deficient of Vitamin D. Only 26% subjects had sufficient levels of vitamin D. The mean levels of vitamin D were highest between 11-20 years of age.

Key Words: Fat soluble vitamin; Osteoporosis; Vitamin D.

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INTRODUCTION

Vitamin D is a fat soluble secosteroid responsible for increasing intestinal absorption of calcium, iron, magnesium and zinc. There are two forms of vitamin D i.e. vitamin D1 and Vitamin D2. Vitamin D1 is obtained from dietary sources and vitamin D2 is synthesized on the exposure to UV light. Serum hydroxylated forms of vitamin D i.e. 25 OHD are the most reliable indicator of vitamin D status of a person. Indubitably high prevalence of vitamin D deficiency has been found by recent epidemiological studies. This can be threat to health and a major health issue in near future.[1,2] Deficiency of vitamin D is responsible for various skeletal disorders like rickets, osteomalacia and osteoporosis.[3] Vitamin D is important for decreasing the risk of many diseases like cardiovascular disorders,[4] cancer,[5-8] diabetes mellitus and autoimmune diseases.[9]

Even though India is a tropical country, receiving ample amount of sunlight, still deficiency has been reported by international osteoporosis foundation amongst all age groups. In northern India, 91% of healthy school girls, 96% of neonates, 78% of hospital staff suffers from Vitamin D deficiency.[10-12] In southern India, 40% of males and 70% of females have variable levels of Vitamin D with respect to their residence.[13] Lifestyle changes of the population, not allowing adequate exposure to sun and consuming food not fortified with vitamin D are the factors responsible for deficiency of vitamin D amongst Indian population. There have been various clinical and epidemiological studies that have shown the possible relationship between low levels of Vitamin D and progression of chronic diseases like obesity, diabetes etc.[14,15] The aim of present study is to evaluate the levels of Vitamin D amongst patients of a tertiary care hospital and to estimate the impact of age and gender.

MATERIALS AND METHODS

The present hospital based observational study was conducted among 1004 subjects in the Institute, during a period of 15 months. This cross sectional study was conducted from January2014- May 2015. Patients

reporting to the hospital for any other reason, other than Vitamin D deficiency were enrolled in the study. Any patient of chronic liver disease, kidney disease, any congenital abnormality or malabsorption syndrome were excluded from the study.

Informed consent was obtained from all the patients and their blood samples were collected serum was analysed for 25(OH) vitamin D levels. The test for estimation of vitamin D was a competitive test, where vitamin D of patient's serum competes with biotin Vitamin D conjugate (that was added simultaneously) for antivitamin D antibodies binding sites. In the end streptavidin HRP conjugate was added and then addition of TMB reagent detected the reaction. A duplicate test was run alongside with the controls provided by the kit, which acted as a quality control measure. Levels of vitamin D in an individual can be classified by Lips and Hillock MF as:[16-18]

<20ng/ml = Deficient

> 20-30ng/ml = Insufficient

>30-100ng/ml = Sufficient

>100ng/ml = Intoxication

The data collected was arranged in tabulated and graphical form. The results are expressed as mean+/- standard deviation.

RESULTS

Out of the total of 1004 subjects, females were in majority. The number of males was 455 and number of females was 549. The age of the patients ranged from 1 year to 94 years. There was no significant difference between male and female ages. Mean age of men was 37.45+/- 25.3 years and mean female age in our study was 37.77+/- 21.9 years. Majority of the subjects were aged between 41-50 years. The data is illustrated in Graph 1.

Table 1 shows the mean levels of vitamin D amongst individuals of various age groups. Maximum levels of vitamin D were seen amongst 11-20 years of age i.e. 39.11 which were followed by 41-50 years of age. The general trend that was seen was that with increasing age, there was a decrease in the level of vitamin D amongst individuals. In extremes of age, the level of vitamin D was not at par with the standardized values.

Graph 2 demonstrates the percentage distribution of the candidates according to Lips and Hillok classification. There were 26% candidates in whom mean level was up to sufficient mark i.e. >30-1000ng/ml. In 8% of the patients, levels of vitamin D was extremely high i.e. >1000ng/ml.

Graph 1: Gender distribution of Subjects according to age

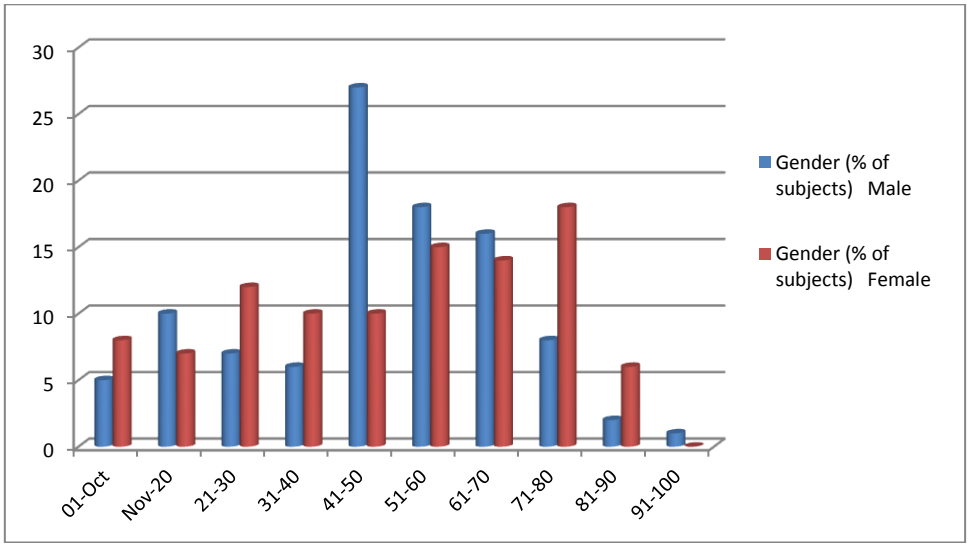
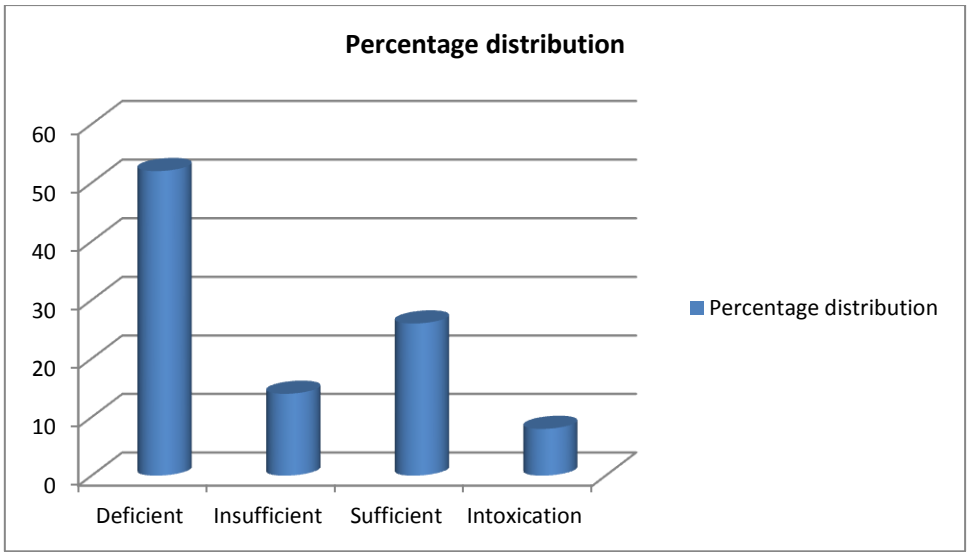


Table 1: Age wise distribution of Vitamin D levels

AGE	MEAN LEVELS OF VITAMIN D	SD
1-10	26.23	13.52
11-20	39.11	22.64
21-30	33.94	14.25
31-40	28.37	22.73
41-50	36.92	26.27
51-60	29.18	30.08
61-70	31.07	25.11
71-80	36.78	22.90
81-90	15.02	10.22
91-100	10.42	-

Graph 2: Categorization according to deficiency state



DISCUSSION

The levels of vitamin D according to the present observational study were found to be variable amongst people of different age groups. As per the present study it was seen that 52% of subjects were deficient of vitamin D according to national osteoporosis society classification. According to a study conducted by Rudrajit P et al[19] amongst eastern Indian population, the percentage subjects deficient of Vitamin D were 47.5% and according to Manan Alfawaz et al in a retrospective study on Saudi Arabia population, 78.1% females and 72.4% males were vitamin D deficient. According to him vitamin D deficiency was significantly related to increasing age and weight. They also found that levels of vitamin D were inversely related to levels of circulating PTH, alkaline phosphatise levels in our body.[20] According to a study by Marwah et al[21] on adults greater than 50 years of age, vitamin D deficiency was found in 91% of subjects. According to a study conducted by Harinarayan CV et al[13] on rural and urban population, it was seen that 62% of males and 75% of females in urban population and 44% of males and 70% females in rural population were vitamin D deficient.

The mean level of vitamin D according to our present study was 50.57+/- 22.72. This level was high when compared to the study conducted by Vishal R et al[22] and Sheikh Adil et al.[23]Level of vitamin D were insufficient in 68% individuals according to Marawah et al.[10] According to our present study, 14% individuals had insufficient levels of vitamin D. According to Sarwat F et al,[24] insufficient levels were found in 10.9% subjects. According to Vishal R et al,[22] insufficient levels were found in 19.48% subjects.

There were 26% of individuals who had sufficient levels of vitamin D according to our study. In a study conducted by Sarwat Fet al[24] and Vishal R,[22] sufficient levels of vitamin D were found in 28% and 26.83% subjects respectively. In a study by Rachna B et al,[25] only 10% subjects had sufficient levels of vitamin D.

There were few limitations of our present study. Those are there was no specific criterion for sample selection. Patients with any underlying disease were included in the study. Levels of PTH, calcium and bone mineral density were not taken into consideration. All these factors greatly determine the levels of vitamin D in an individual. The sample size was also small. The study needs to be carried upon a large number of individuals to know the exact deficiency states.

CONCLUSION

According to our study, majority of the subjects were deficient of Vitamin D. Only 26% subjects had sufficient levels of vitamin D. The mean levels of vitamin D were highest between 11-20 years of age. Use of refined diets and minimal exposure to sun in modern era might be the reasons responsible for such results.

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