OPEN ACCESS
Scholars International Journal of Biochemistry
Abbreviated Key Title: Sch Int J Biochem
ISSN 2616-8650 (Print) |ISSN 2617-3476 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com/sijb

Original Research Article

Comparison of Vitamin D Levels between Genders, Age Groups and Geographical Locations in a Tertiary Care Hospital of Dakshina Kannada: A Cross Sectional Study

Mahalaxmi S Petimani[1], Adarsh Aithal[2], Prabhakar Adake[3*]

[1]Assistant Professor of Biochemistry, Yenepoya Medical College, Yenepoya (Deemed to be University), Deralakatte, Mangalore-575018, Karnataka, India
[2]Third Year Medical Scholar, Yenepoya Medical College, Yenepoya (Deemed to be University), Deralakatte, Mangalore-575018, Karnataka, India
[3]Associate Professor of Pharmacology, Yenepoya Medical College, Yenepoya (Deemed to be University), Deralakatte, Mangalore-575018, Karnataka, India

DOI: 10.36348/sijb.2020.v03i02.003 | **Received:** 04.02.2020 | **Accepted:** 11.02.2020 | **Published:** 15.02.2020

***Corresponding author:** Dr. Prabhakar Adake
Email: dradake82@gmail.com

Abstract

Objectives: To compare the vitamin D levels between genders, age groups and geographical locations in a tertiary care hospital of Dakshina Kannada**.** ***Materials and Methods:*** A total of 208 (n=208) reports containing vitamin D levels were collected from Central laboratory, which were reported between January 2015 to December 2015. The values are tabulated in Microsoft excel sheet. Student't' test was applied to compare the vitamin D levels between males and females. Whereas, ANOVA was applied for comparing vitamin D levels between different age groups and geographical locations. ***Results:*** Out of 208 vitamin D reports, 86 (41.3%) reports were from male and 122 (58.7%) from females. The mean values of vitamin D in males and females were 32.9±14.7 and 31.1±21.4 respectively. Even though females have low levels of vitamin D when compared to males but statistically it was not significant (p=0.512). The mean value of vitamin D from different geographical locations ranged from 20.9 ng/ml (from Ankola) to 78.6 ng/ml (from Dharwad) and 27.3±11.1 being noted from Dakshina Kannada. The intergroup comparison of vitamin D levels of individuals from different locations didn't show any statistical significance (f =1.33 & p= 0.191).Similarly, there is no statistical significant difference in the vitamin D levels of different age groups. ***Conclusion:*** The present study concludes that there is no statistical significant difference in the vitamin D levels of males with females and also no significant difference was found in the vitamin D levels of different age groups and different geographical locations.

Keywords: Vitamin D, Geographical location, ANOVA.

INTRODUCTION

Vitamin D is a fat soluble hormone that plays essential role in calcium homeostasis and mineralization of bones [1]. Vitamin D helps in absorption of calcium from the gut. Calcium is required for repair of aging bones or formation of bone. Decreased calcium levels can lead to condition known as osteoporosis due to decreased bone density. Source of vitamin D can be exogenous or endogenous. Endogenous vitamin D is synthesized due to exposure to ultraviolet lights and exogenous is supplemented by dietary sources [2, 3]. Vitamins D3 (Cholecalciferol) and D2 (Ergocalciferol) are metabolized in an identical manner in the liver to 25-hydroxyvitamin D [4]. Further 25-hydroxyvitamin D is converted to 1,25-hydroxyvitamin D (active vitamin D) in the kidney by the enzyme 1α-hydroxylase [5]. 25-hydroxyvitamin D has approximately 10-15 days of half-life, which makes it ideal for the measurement of vitamin D [6]. Biochemically, levels <20 ng/mL are defined as 'deficiency' and levels of 25(OH)vitamin D >30 ng/mL are considered as 'normal'. Levels between 20 and 30 ng/mL are defined as 'insufficiency'. The prevalence of vitamin D deficiency in India ranges from 80%-90% [7-9].

Many studies have revealed that decreased vitamin D levels can cause negative bone mineralization leading to rickets in children and osteomalacia in adults [10]. Moreover, vitamin D insufficiency can be associated with other diseases like chronic kidney disease (CKD) which in turn leads to secondary hyperparathyroidism leading to loss of bone

density and higher incidence fractures. Hypovitaminosis D is also associated with cancers, autoimmune diseases, multiple sclerosis and asthma [11].

Hence, this present research topic is selected to evaluate which gender and age group of patients belonging to different geographical location has hypovitaminosis D.

OBJECTIVES

To compare the vitamin D levels between genders, age groups and geographical locations in a tertiary care hospital of Dakshina Kannada

METHODOLOGY

The present cross-sectional study was conducted in Department of Biochemistry, Yenepoya Medical College, Mangalore, Karnataka after Institutional Ethics Committee approval. The study duration was five months starting from August 2019 to December 2019.

The sample size was calculated based on the previous study done by Randip Chowdhary [14].In this study the prevalence rate of Vitamin D deficiency found to be 34.5%. ie p= 0.345. Considering standard normal variate with 5% level of significance and 10% sample size missing response, the final sample size was found to be 200. So in this study we collected 208 (n=208) blood reports containing vitamin D levels of patients (reported between January 2015 to December 2015) from Central Laboratory of Yenepoya Medical College Hospital, Deralakatte, Mangalore. Patient name was anonymized and only gender, age, geographic area and vitamin D values were entered in the excel sheet. Following table shows reference values of vitamin D level in central laboratory, Yenepoya Medical College Hospital, Mangalore.

Variables	Source	Vitamin D Reference Values in our setting
Socio demographic data (Age/Gender/ Geographical location)	Vitamin D levels	Sufficiency: 30-100 ng/ml Insufficiency: 20-30 ng/ml Deficiency: < 20 ng/ml Toxicity: >100 ng/ml

STATISTICAL ANALYSIS

Data entry and analysis were done using IBM SPSS 23 software. Continuous variables are expressed as mean±sd and categorical variables as frequency and percentages. Student 't' test was applied to compare the vitamin D levels between males and females. Whereas, ANOVA was applied for comparing vitamin D levels between different age groups and geographical locations.

RESULTS

Table-1 shows the details of study participants. Out of 208 vitamin D reports, 86 (41.3%) reports were from male and 122 (58.7%) from females. The mean values of vitamin D in males and females were 32.9±14.7 and 31.1±21.4 respectively. Even though females have low levels of vitamin D when compared to males but statistically it was not significant (p=0.512). Least level of vitamin D was observed in the age group of 50-60 years i.e. 28.4±21.1ng/dl and highest in 60-70 years of age i.e. 36.5±23.9 (Table-2). However, they are statistically insignificant (p=0.34.) The mean value of vitamin D from different geographical locations ranged from 20.9 ng/ml (from Ankola) to 78.6 ng/ml (from Dharwad) and 27.3±11.1 being noted from Dakshina Kannada (Table-3). The intergroup comparison of vitamin D levels of individuals from different locations didn't show any statistical significance (f =1.33 & p= 0.191). Our study also showed that around 41.8% of participants have sufficient vitamin D levels, 31.7% have insufficiency, 25% have deficiency and 1.4% of participants have toxic vitamin D levels (Figure-1).

Table-1: Table showing the details of study participants

Gender	Number	Percentage	Vitamin D level (mean±sd)	Student t test p value
Male	86	41.3	32.9±14.7	t test=0.657
Female	122	58.7	31.1±21.4	p = 0.512
Total	208	100		

Table-2: Table showing age wise distribution of study participants

Age	Number	Percentage	Vitamin D level (mean±sd)	f and p value
Less than 10 Years	1	.5	33.2	f = 1.12
10-20 Years	7	3.4	31.0±11.3	p = 0.34
20-30 Years	33	15.9	33.5±15.3	
30-40 Years	40	19.2	29.1±12.2	
40-50 Years	35	16.8	33.6±19.7	
50-60 Years	46	22.1	28.4±21.1	
60-70 Years	43	20.7	36.5±23.9	

More than 70 Years	3	1.4	15.0±7.7	
Total	208	100.0		

Table-3: Table showing Vitamin-D levels among all the different geographical location

Location	Number	Percentage	Vitamin D level (mean±sd)	f and p value
Ankola	1	.5	20.9	f = 1.33
Chikamangalore	7	3.4	31.9±14.3	p = 0.191
Chitradurga	3	1.4	26.9±5.8	
Dakshina Kannada	72	34.6	27.3±11.1	
Davangere	43	20.7	30.5±13.9	
Dharwad	1	.5	78.6	
Haveri	7	3.4	43.2±33.2	
Kannur	40	19.2	36.9±28.7	
Kasargod	17	8.2	33.0±17.6	
Karwar	1	.5	44.2	
Kundapura	1	.5	40.9	
Raichur	1	.5	35.9	
Shimoga	12	5.8	33.3±22.7	
Sirsi	1	.5	51.0	
Uttar Kannada	1	.5	36.2	
Total	208	100.0		

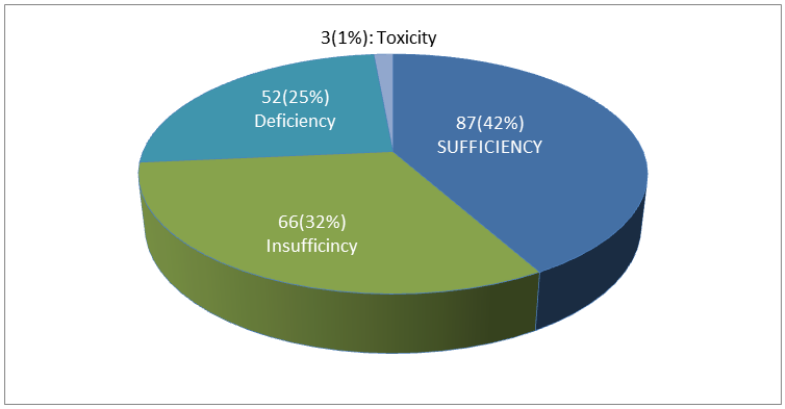

Fig-1: Pie diagram showing participants details based on laboratory reference values

DISCUSSION

Most of us are neglecting the importance of vitamin D until we come across the deficiency symptoms. Hypovitaminosis is not only causes osteoporosis but also a risk factor for diabetes, cancers of breast, colon, prostate and ovaries. It was found that vitamin D supplementation reduces the risk of heart attacks, rheumatoid arthritis and multiple sclerosis.

Previous study conducted by Sandhiya Selvarajan *et al*., was found that Vitamin D level was higher in males compared to females. Vitamin D was found to be higher among middle-aged people compared to that of adolescents and those above 50 years of age [12]. One more study conducted by Mohan Kumaratne *et al.*, in Hispanic American obese/overweight adolescents found that around 33.9% were vitamin D deficient [13].

In a study conducted by Ranadip Chowdhury *et al*., in young north Indian children, a total of 1000 children were included in the main trial. Of these, 331 (34.5%) children were Vitamin D deficient (<10 ng/ml) [14]. Similarly a study by Venugopal G *et al*., in Kancheepuram district, Tamil Nadu, fifty nine (13.9%) of the 424 participants had 25(OH) D levels below 12 ng/mL (vitamin D deficient) and 175 (41.3%) had 25(OH)D levels between 12 to 20 ng/mL (vitamin D insufficiency) [15].

Even though many previous studies have revealed that females have low vitamin D levels than males (which is statistically significant). Our study results are not matching with these studies [7, 8].

In our study, we found low levels of vitamin D in females when compared to males but statistically it was not significant (p=0.512). The intergroup comparison of vitamin D levels of individuals from different locations didn't show any statistical significance (f =1.33 & p= 0.191).Similarly, there is no statistical significant difference in the vitamin D levels of different age groups.

The main limitation of this study is that we did not exclude patients who are on vitamin D

supplementation and who are suffering from thyroid disorders which might have affected the results. However, in future efforts will be made to consider these limitations while continuing this study.

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