Research Article

INTERNATIONAL JOURNAL OF CURRENT ADVANCED RESEARCH
ISSN: O: 2319-6475, ISSN: P: 2319-6505
Available Online at www.journalijcar.org
Volume 14; Issue 07; July 2025; Page No.315-317
DOI: http://dx.doi.org/10.24327/ijcar.2025.0317.0067

Subject Area : Prosthodontics

COMPARATIVE EVALUATION OF DEMOGRAPHIC AND BIOCHEMICAL PARAMETERS BETWEEN VITAMIN D-DEFICIENT AND NORMAL GROUPS

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ARTICLE INFO

Received 12th June 2025
Received in revised form 23rd June, 2025
Accepted 16th July 2025
Published online 28th July, 2025

Key words:

HbA1C level, Vitamin D, Age

ABSTRACT

Background: We aimed to determine if there were any significant differences between individuals with vitamin D deficiency and those with normal vitamin D levels in terms of age, gender, and a key blood sugar indicator, HbA1c. Our goal was to ascertain whether these differences were statistically significant. **Material and Methods:** The study was conducted at King George's Medical University in Lucknow at the Department of Prosthodontics, Crown and Bridges. Vitamin D Deficient and Vitamin D Normal were the two groups in this cross-sectional study. Using chi-square tests, we examined information on age, gender, serum vitamin D, and HbA1c levels. **Results:** All groups had a balanced gender distribution ($p = 0.860$). The vitamin D-deficient group was the youngest, but we did find a significant difference in mean age ($p = 0.017$). Vitamin D levels were significantly different between the groups, as was to be expected ($p < 0.001$). The groups' HbA1c levels did not differ statistically significantly ($p = 0.520$). **Conclusion:** Age and vitamin D levels differed between our groups, but HbA1c and gender did not. This implies that, although overall blood sugar control appears to be constant regardless of vitamin D status, age may be a significant factor in relation to vitamin D deficiency.

INTRODUCTION

Vitamin D is essential for our bodies. It impacts bone health, immunological system performance, and calcium processing. Health issues like diabetes, heart disease, and osteoporosis are associated with low vitamin D levels (1). Many people still suffer from a vitamin D deficiency, even in sunny locations. Poor diets and modern lifestyles are frequently to blame for this (2). Although the evidence is not totally clear, there has been much discussion regarding a possible link between vitamin D levels and our capacity to control blood sugar, especially in type 2 diabetes (3). We conducted this study to examine and compare demographic characteristics, such as age and gender, vitamin D levels in the blood, and markers of blood sugar control (HbA1c) among people in the vitamin D-deficient and vitamin D-normal groups.

MATERIAL AND METHODS

The study was conducted at King George's Medical University's Crown and Bridges Department of Prosthodontics in Lucknow. Two groups were included in our cross-sectional study: those with normal vitamin D levels and those with vitamin D deficiency. Using chi-square tests, we examined data on HbA1c levels, age, gender, and serum vitamin D. Based on their serum vitamin D levels, participants were divided into two groups: those with levels below 20 ng/ml were considered deficient, and those with levels between 30 and 100 ng/ml were considered normal. To ensure a fair comparison, we made every effort to match participants by sex and age. Serum vitamin D levels (ng/ml), HbA1c levels, gender, and age (in years) were among the variables collected. In order to assess our data, we performed statistical analysis. The chi-square test was one of the statistical tests we employed to evaluate the gender distribution among the groups. Age, vitamin D levels, and HbA1c were compared between the groups using the chi-square test. We considered a p-value of less than 0.05 to be statistically significant.

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RESULTS

Table 1. Distribution of Cases by Sex

Gender	Vitamin D deficient (%)	Vitamin D normal (%)
Male	50	40

Female	50	60
Significance	Chi sq = 0.30, P = 0.860	

The distribution of cases by gender was fairly balanced. Among males, 50% were in the vitamin D-deficient group, and 40% were in the vitamin D-normal group. For females, 50% were in the vitamin D-deficient group, and 60% were in the vitamin D-normal group. Statistical analysis using the chi-square test (χ^2 = 0.30, p = 0.860) indicated no significant association between gender and distribution of cases, suggesting that sex did not influence vitamin D deficiency or normal levels in this study population.

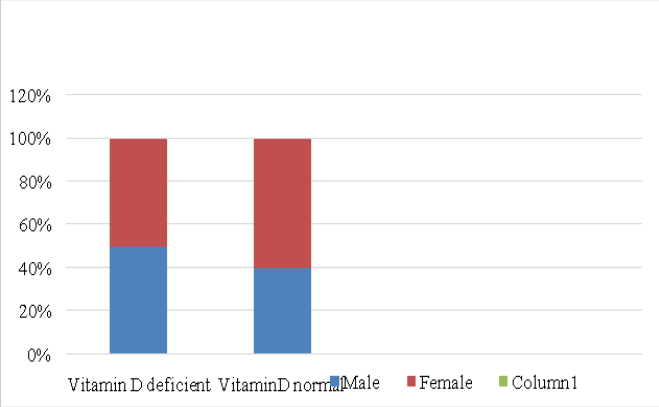

Figure 1. Distribution of Cases by Sex

Table 2. Distribution of Cases by Age			
Groups	Age in years		Chi-square test
	Mean	SD	P value
Vitamin D deficient	31.00	12.50	0.017
Vitamin D normal	40.50		
	0.017		

Participants' mean age varied significantly across groups. The statistically significant p-value indicates a meaningful difference in age distribution, suggesting that age may relate to Vitamin D status.

Table 3. Vitamin-D levels among Study Groups			
Groups	Vitamin D level(ng/ml)		Chi-square test
	Mean	SD	P value
Vitamin D deficient	9.30	3.60	< 0.001
Vitamin D normal	46.62	11.29	

The mean Vitamin D levels differed significantly across groups, as shown by the highly significant p-value. This suggests a strong link between group classification and Vitamin D levels.

Table 4. HbA1c levels among Study Groups			
Groups	HbA1C		Chi-square test
	Mean	SD	P value
Vitamin D deficient	5.09	0.48	0.520
Vitamin D normal	5.28	0.42	

The mean HbA1c levels showed no significant differences among groups, according to the chi-square test (p = 0.520). The Vitamin D Deficient group had a mean HbA1c level of 5.09 (SD = 0.48), while the Vitamin D Normal group had a slightly higher mean of 5.28 (SD = 0.42). The non-significant p-value indicates that HbA1c levels were similar across groups.

DISCUSSION

One interesting trend that our study found was that people who didn't get enough vitamin D were, on average, younger. This result is in line with earlier studies that showed that more and more younger adults are not getting enough vitamin D (2). There may be a number of modern lifestyle factors that have led to this change in demographics. Younger people, especially those who live in cities, tend to stay inside more. They use digital devices, do hobbies indoors, or work in offices, which means they get a lot less sun, which is the main natural source of vitamin D. Also, younger people may be more at risk if they don't eat foods high in vitamin D, like fatty fish or fortified dairy. This situation shows how important it is to have public health campaigns that target this group of people. Educational programs on safe sun exposure or dietary supplements could be beneficial, even in areas with abundant sunshine. The levels of vitamin D in our groups were very different from each other, and this was directly related to how we grouped them. This result backs up the clinical guidelines for vitamin D thresholds (1, 4). The clear differences in average vitamin D levels between the deficient, normal groups show that our classification of participants works. This also gives us a good way to compare other health measures. Our study found no significant differences in HbA1c levels between the groups, even though previous theories suggested that vitamin D might affect how the body handles glucose and responds to insulin (3, 5). Researchers have suggested that vitamin D may help with glucose metabolism by making insulin more effective and supporting the function of pancreatic beta cells, since these cells have vitamin D receptors. However, the fact that there wasn't much difference in HbA1c levels among the people in our group, who were mostly healthy and not diabetic (as shown by their low average HbA1c levels, which usually mean good glycemic control), suggests that vitamin D levels may not have a big effect on glycemic control in this group. This result is in line with some meta-analyses and big observational studies that found weak or no links between vitamin D levels and blood sugar control in people who don't have metabolic disorders. It implies that other powerful factors, such as nutrition, exercise, and genetic predisposition, probably have a greater influence on healthy people. It's important to keep in mind that in at-risk groups, such as those with pre-diabetes, metabolic syndrome, or type 2 diabetes, where metabolic problems are already present, the connection between vitamin D and glucose metabolism may be more obvious or clinically significant. Additionally, our cross-sectional design limits our capacity to infer causality, so we are unable to ascertain whether vitamin D deficiency causes changes in HbA1c, the other way around, or whether outside factors affect both. (6)

CONCLUSION

Vitamin D levels showed significant differences that supported how we grouped participants. The vitamin D-deficient group was younger, suggesting a potential link between lifestyle and risk among younger individuals. Gender distribution was balanced and did not appear related to vitamin D status. HbA1c levels were similar across groups, indicating that vitamin D status might not affect blood sugar control in healthy individuals. Future studies should be larger and last longer to examine cause-and-effect relationships, particularly in diabetic populations.

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How to cite this article:

Ruby Singh, Jitendra Rao, Shweta Singh and Alok. (2025). Comparative Evaluation of Demographic and Biochemical Parameters between Vitamin D-Deficient and Normal Groups, International Journal of Current Advanced Research, 14(07), pp.315-317.

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