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RELATIONSHIP BETWEEN VITAMIN D DEFICIENCY AND THE PREVALENCE OF CARIES

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ABSTRACT

Vitamin D Deficiency is highly prevalent in Saudi Arabia. Previous studies suggested that vitamin D might be an important factor for the prevalence of periodontitis, caries, and tooth loss. The propose of this study is to evaluate the relationship between vitamin D Deficiency and prevalence of caries on Riyadh region among adults, also the effect of several dietary and lifestyle habits was also evaluated. The study was a cross-sectional involving clinic examination and questionnaires. Clinical examination was done on (464) patients above 18 years in Riyadh city, regarding the level of Vitamin D as well as the number of active caries , restored , crowned or missing teeth(DMF was calculated), Bad habits ,General health and the Level of education in both Genders in order to measure the prevalence of caries among the patients. There is significant negative correlation between Vitamin D level and Decayed (D) and Filled (F) teeth. However, there is statistically not significant correlation between Vitamin D level and missing teeth(M).

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INTRODUCTION

- Vitamin D is essential for life as it is the most important biological regulators of calcium metabolism.
- Vitamin D deficiency is an unrecognized epidemic and a common health problem throughout the world, including Saudi Arabia
- A high prevalence of vitamin D deficiency in Saudi children has been reported, with 25(OH)D levels of <20 ng/mL considered a relative deficiency and, <7 ng/ mL considered a severe vitamin D deficiency. Many healthy Saudi adults also suffer from severe vitamin D deficiency. A study on healthy Saudi adults revealed that vitamin D deficiency is common among the Saudi population.
- Good nutrition plays an important role in oral health, Vitamin D is important vitamin for our body health, Episodes of malnutrition and vitamin D deficiency during periods of primary and permanent tooth formation can result in enamel hypoplasia and dental caries (Purvis et al. 1973; Alvarez et al. 1993). Recently, low prenatal 25(OH)D levels have been reported to be associated with early childhood caries (ECC) in infants (Schroth et al. 2014) one of the function of V-D is calcium absorption , Vitamin D also influences enamel and dentin formation (Berdal et al. 2005

Aim

- Evaluate the relationship between vitamin D Deficiency and prevalence of caries on Riyadh region among adults. The effect of several dietary and lifestyle habits was also evaluated.

MATERIALS AND METHODS

A clinical examination was performed on (464) patients in RCsDP campuses in Olaya and Namuthajiah as well as several private clinics. Questionnaires were conducted regarding the patients' age, gender, vitamin D level as well as Bad habits, General health and the Level of education in both Genders. The questions were close-ended. The clinical examination was performed to measure the number of active caries, restored,

crowned or missing teeth, then the DMF was measured to know the prevalence of caries among the patients. Statistics were calculated using SPSS software. The 25-hydroxy vitamin D test was used since it is the most accurate way to measure how much vitamin D is in your body. The normal range of vitamin D is measured as nanograms per milliliter (ng/mL). Many experts recommend a level between 30 and 50 ng/mL.

RESULTS

The results of the study showed that the majority (44%, n=202) of the patients were aged between 18-24 years, (30.4%, n=138) were males and (69.6%, n=316) patients were females. The male-female ratio was 1:2.3. The majority (69%, n=310) reported high level of education.

Table 1. Demographics

		Frequency (n)	Percent (%)
Age (n=459)	18-24 years	202	44.0
	25-29 years	146	31.8
	30-39 years	48	10.5
	40-49 years	38	8.3
	50-59 years	19	4.1
	≥ 60 years	6	1.3
Gender (n=454)	Male	138	30.4
	Female	316	69.6
Education level (n=449)	High	310	69.0
	Low	129	28.7
	None	10	2.2

The distribution of patients' health characteristics. The majority had good oral hygiene (85.1%, n=387), excellent general health (68.4%, n=314), and 43.8% (n=202) had no bad habits. Figure 1 shows the distribution of Vitamin D level. One hundred and ninety (41.4%) reported between 0-10, followed by 29.8% (n=137) between 11-20, 17.9% (n=82) between 21-30, 8.7% (n=40) between 31-40, and 2.2% (n=10) between 41-50. The mean (±SD) decayed (D), missed (D), filled (M), and DMF was 4.05±3.01, 0.98±0.64, 4.71±3.33, and 9.75±5.21 respectively (Figure 2).

Table 2. Health characteristics

		Frequency (n)	Percent (%)
Oral hygiene (n=455)	Good	387	85.1
	Fair	46	10.1
	Poor	22	4.8
General health (n=459)	Excellent	314	68.4
	Very good	104	22.7
	Good	34	7.4
	Fair	6	1.3
	Poor	1	0.2
Bad habits (n=461)	Smoking	77	16.7
	Drinking soda	112	24.3
	Grinding	16	3.5
	Nail biting	30	6.5
	Other	24	5.2
	None	202	43.8

Pearson Chi-square test showed a statistically significant association between Vitamin D level and gender. Two-way cross-tabulation showed females were more likely to have Vitamin D deficiency than males ($p<0.05$). On the other hand, Pearson Chi-square test showed no statistically significant association between Vitamin D level and age, education level, oral hygiene, general health, and bad habits ($p>0.05$).

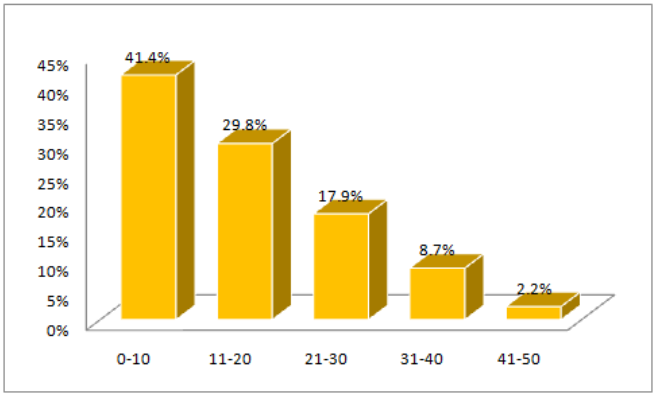

Figure 1. Vitamin D level (n=459)

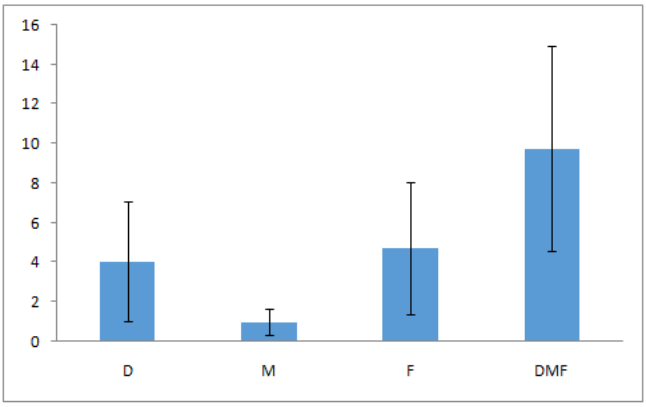

Figure 2. Mean (±SD) D, M, F, and DMF scores (n=461)

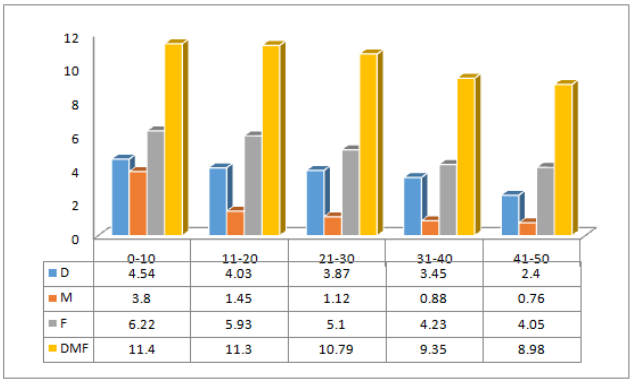

Figure 3. Mean (±SD) caries indices by Vitamin D level

Table 3. Comparison of mean (±SD) caries indices by Vitamin D level

Vitamin D Level	Decayed (D)		Missing (M)		Filled (F)		DMF	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
0-10	4.54	2.97	3.80	0.05	6.22	4.03	11.40	6.66
11-20	4.03	2.68	1.45	0.12	5.93	4.17	11.30	5.71
21-30	3.87	2.83	1.12	0.95	5.10	3.35	10.79	7.19
31-40	3.45	3.41	0.88	0.40	4.23	3.00	9.35	3.84
41-50	2.40	2.46	0.76	0.12	4.05	2.61	8.98	4.67

Table 3 and Figure 3 shows the mean (±SD) Decayed (D), Missing (M), Filled (F), and DMF score by Vitamin D level. The mean DMF index score increased as the Vitamin D level decreased. Spearman's rho correlation showed a statistically significant negative correlation between Vitamin D level and Decayed (D) ($p<0.05$) and Filled (F) teeth ($p<0.05$). Furthermore, there was negative correlation between Vitamin D level and Missing (M) ($p>0.05$) teeth and DMF ($p>0.05$). However, this correlation was statistically not significant.

DISCUSSION

There is a statistically significant association between Vitamin D level and gender. Females were more likely to have Vitamin D deficiency than males. Moreover, no statistically significant association between Vitamin D level and age, education level, oral hygiene, general health, and bad habits. There is a statistically significant inverse relationship between Vitamin D level and Decayed and Filled teeth. In accordance with the results, a study conducted by Zhan *et al. suggested that* those higher serum 25OHD concentrations are independently associated with a lower risk of tooth loss. However, our study showed statistically not significant correlation between Vitamin D level and tooth loss. Kühnisch J. concluded that lower vitamin D serum concentrations were associated with a higher probability for caries related restorations in 10-year-old children. Vice versa, it can be argued that higher vitamin D levels were related to better oral health outcomes. Anyway, our study concluded that the lower the Vitamin D level the higher the Decayed and Filled teeth among adults as well.

Conclusion

Within the limitation of this study, it showed significant inverse correlation between Vitamin D level and Decayed (D) and Filled (F) teeth. However, there is statistically not significant correlation between Vitamin D level and tooth loss.

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