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Original Research

Assessment of relation of low serum vitamin D and dental implant failure

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ABSTRACT:
Background: Dental protein rearrangement is determined by bone metabolism, low levels of vitamin D can negatively impact the process of repair and new bone formation on the implant surface. The present study was conducted to assess relation of low serum vitamin D and dental implant failure. **Materials & Methods:** 64 patients who received 150 dental implants of both genders were included. Parameters such as smoking habit, history of periodontal disease and serum levels of vitamin D was assessed. Serum level of 25(OH)D or 25-hydroxyvitamin D less than 10 ng/ml is considered severe deficiency; 24-10 ng/ml, deficiency; and 25-80 ng/ml, normal. Dental implant failure rate was recorded. **Results:** Out of 64 patients, males were 34 with 80 implants and females were 30 with 75 implants. There were 60 cases of early failure and 42 cases of late failure. Heavy smokers had 42 early and 30 late failure and light smokers had 18 early and 12 late failures. Generalized periodontitis had 28 early and 26late failures and localized periodontitis had 22early and 10 late failures. Vitamin D serum level<10 ng/mlhad 34early and 30 late failures, 10-30 ng/ml had 20 early and 8 late failures and >30 ng/ml had 6 early and 4 late failures. The difference was significant (P< 0.05). **Conclusion:** Authors failed to demonstrate a significant relationship between low serum levels of vitamin D and increased risk of dental implant failure.
Key words: Dental implant, osseointegration, Vitamin D

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INTRODUCTION

Dental implant failure usually refers to implant failure to osseointegrate accurately with the bone, or vice versa, also when it is lost and mobile or indicates peri-implant bone loss of more than 1 mm in the first year and more than 0.2 mm in the second year.[1] Based on time criteria, failures can be classified as Early Dental Implant Failures (EDIFs) and Late Dental Implant Failures (LDIFs).[2] EDIFs are due to unsuccessful reabsorption representing impairment in the bone repair, while LDIFs are due to loss of osseointegration. Factors causing EDIFs include diabetes, tobacco use, history of periodontitis, length and diameter of the implant, foreign body reaction, and localized bone necrosis due to heat production during bone preparation or implant replacement.[3]

It is well known that vitamin D deficiency can impair the correct immune response to oral microbial infections, increasing the risk of periodontitis. Moreover, vitamin D plays an important role in the metabolism of bone.[4] In the bone, vitamin D stimulates the activity of osteoclasts and increases the production of extracellular matrix proteins by osteoblasts.Since dental protein rearrangement is determined by bone metabolism, low levels of vitamin D can negatively impact the process of repair and new bone formation on the implant surface. Low vitamin D levels are associated with an increased risk of peripheral joint infections.[5]The present study was conducted to assess relation of low serum vitamin D and dental implant failure.

MATERIALS & METHODS

The present study comprised of 64 patients who received 150 dental implants of both genders.

All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Parameters such as smoking habit, history of periodontal disease and serum levels of vitamin D was assessed. Serum level of 25(OH)D or 25-hydroxyvitamin D less than 10 ng/ml is considered severe deficiency; 24-10 ng/ml, deficiency; and 25-80 ng/ml, normal. Dental implant failure rate was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Gender	Males	Females
Number	34	30
Implants	80	75

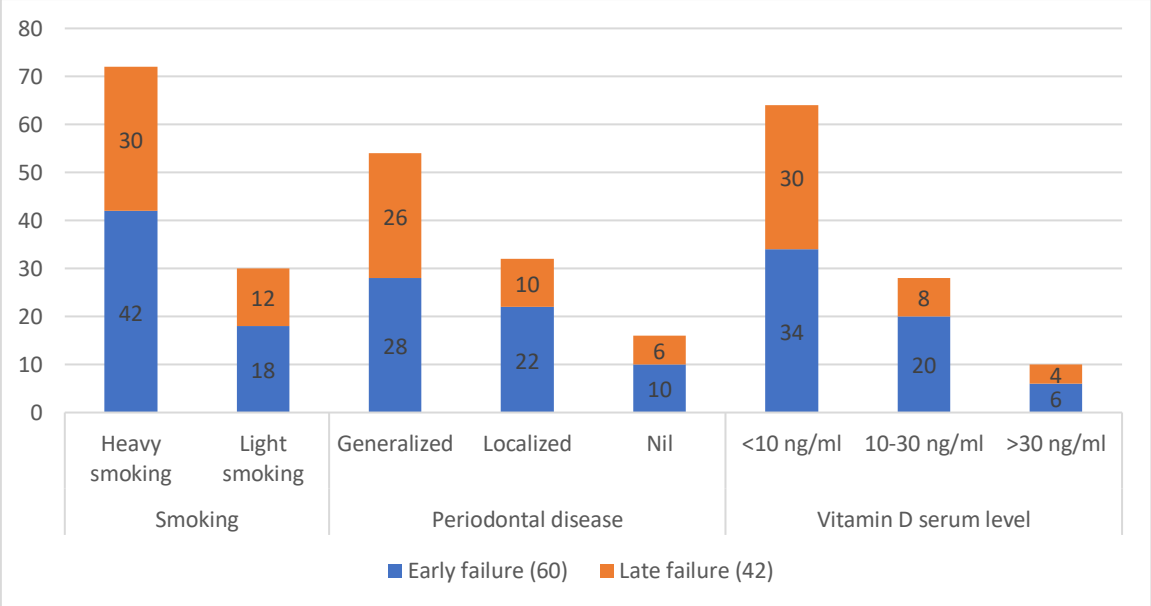
Table I shows that out of 64 patients, males were 34 with 80 implants and females were 30 with 75 implants.

Table II Assessment of dental implant failure

Parameters	Variables	Early failure (60)	Late failure(42)	P value
Smoking	Heavy smoking	42	30	0.02
	Light smoking	18	12	
Periodontal disease	Generalized	28	26	0.01
	Localized	22	10	
	Nil	10	6	
Vitamin D serum level	<10 ng/ml	34	30	0.05
	10-30 ng/ml	20	8	
	>30 ng/ml	6	4	

Table II, graph I shows that there were 60 cases of early failure and 42 cases of late failure. Heavy smokers had 42 early and 30 late failure and light smokers had 18 early and 12late failures.Generalized periodontitis had 28 early and 26late failures and localized periodontitis had 22 early and 10 late failures. Vitamin D serum level<10 ng/ml had 34 early and 30late failures, 10-30 ng/ml had 20 early and 8 late failures and >30 ng/ml had 6 early and 4late failures. The difference was significant (P< 0.05).

Graph I Assessment of dental implant failure



DISCUSSION

Dental implants are today considered a successful treatment for restoring function and aesthetics. In fact, dental implant treatment has proven to be a predictable modality for replacing missing and failing teeth with various types of fixed and removable dental prostheses, with high survival rates even in the long term.[6]Osseointegration, i.e. the formation of a direct interface between implant and bone, is key for the success of a dental implant.[7] It is important that the implant be integrated into the bone during the initial healing period; this results in a clinically

asymptomatic fixation under functional load, and this integration has to be maintained over time.[8]The present study was conducted to assess relation of low serum vitamin D and dental implant failure.

We found that out of 64 patients, males were 34 with 80 implants and females were 30 with 75 implants. Mangano et al[9]investigated whether there is a relationship between low serum levels of vitamin D and EDIF. Originally, 885 patients treated with 1,740 fixtures were enrolled in this study. Overall, 35 EDIFs (3.9%) were reported. No correlation was found between EDIF and the patients' gender (P=0.998), age (P=0.832), smoking habit or history of periodontal disease (P=0.386). Three EDIFs (11.1%) were reported in 27 patients with serum levels of vitamin D 30 ng/mL. Although there was a clear trend toward an increased incidence of EDIF with lowering of serum vitamin D levels, no statistically significant difference (P=0.105) was found among these three groups.

We observed that there were 60 cases of early failure and 42 cases of late failure. Heavy smokers had 42 early and 30 late failure and light smokers had 18 early and 12 late failures. Generalized periodontitis had 28 early and 26late failures and localized periodontitis had 22early and 10 late failures. Vitamin D serum level<10 ng/ml had 34 early and 30 late failures, 10-30 ng/ml had 20 early and 8 late failures and >30 ng/ml had 6 early and 4 late failures. Hakim et al[10]studied the possible role of vitamin D in early implant failure. Finally, twelve studies were selected from five different countries. In 6 studies (2 animal studies and four human studies), there was no significant relationship between vitamin D deficiency and dental implant failure. In the other six studies (1 animal study and five human studies), there was a significant relationship in this regard.

Schulze-Spate et al[11], in a randomized, double blind, controlled clinical trial, investigated the association between vitamin D supplementation and local bone formation after maxillary sinus augmentation. They histologically compared bone samples from a group of patients who took vitamin D3 (5,000 IU) and calcium (600 mg) to another group of patients who received only calcium, six to eight months after surgery. Nevertheless, no statistically significant difference at ahistological level was demonstrated.Bryce et al[12] studied the relation between vitamin D deficiency and immediate dental implant placement. In this case report, it was revealed that the patient was severely vitamin D deficient and that this might have contributed to the implant failure.

The limitation the study is small sample size.

CONCLUSION

Authorsfailed to demonstrate a significant relationship between low serum levels of vitamin D and increased risk of dental implant failure.

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