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Original Article

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Influence of Crown Height of Dental Implant on Marginal Bone Loss: A Retrospective Study

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ABSTRACT

Bone loss around implant necks has traditionally been regarded as an indicator of implant success over the long term. Both surgical and prosthetic variables have been linked to premature marginal bone loss. Early marginal bone loss (MBL) >0.44 mm in the first six months following prosthetic loading is a risk indication for peri-implant bone loss development, according to new research on crystal-level implants. To determine the effect of crown height of dental implant on marginal bone loss. This is a retrospective study conducted using the patients' records. The sample size was 50 teeth. Patients' age, gender, and medical status were recorded as well as the implant's location, diameter, and type of opposing tooth, guided bone regeneration, crown height, implant length, crown-to-implant ratios, and type of platforms. Patients having had dental implants before 3 to 5 years at Riyadh Elm University (REU) hospitals and aged above 18 years old were included in this study. Pearson's correlation test findings between crown height and the follow-up MBL. It can be noted that Pearson's correlation value was .116, which indicates that there is a positive correlation between crown height and the follow-up MBL. However, this positive correlation was not statistically significant as the P-value was observed to be .422. There is no evidence of implant crown height affecting marginal bone loss.

Key words: *Crown height, Marginal bone loss, Dental implant, Restrospective study*

INTRODUCTION

Early marginal bone loss (MBL) is a frequent and non-progressive condition [1-3]. It was generally agreed upon in the 1980s and 1990s that less than 2 mm of MBL may be anticipated in the first year following implant placement, with an average of 0.1 to 0.2 mm of MBL occurring subsequently. Bone levels were also considered constant for years following the first year. Thus, bone loss around implant necks has traditionally been regarded as an indicator of implant success over the long term. Although the molecular processes behind MBL remain poorly known, a complex etiology has been proposed to explain the disease [4].

Preventing marginal bone loss (MBL) around implant necks has long been considered a crucial factor in ensuring the long-term viability of implants. However, the complex etiology of MBL remains poorly understood despite the many proposed causes. Both surgical and prosthetic variables have been linked to premature marginal bone loss. Individual risk factors for MBL have been evaluated and examined; they include cigarette

use, poor plaque management, periodontal disease in the past or present, endocrine-metabolic variables (diabetes mellitus), and specific genetic variants. However, there are still some discrepancies in the information presented on aspects connected to the implant itself, particularly those related to its intermediate prosthodontic components. There are sometimes significant gaps in the specific literature [5].

Early MBL has significant prognostic value for predicting long-term implant effectiveness because it indicates an adaptive response of peri-implant marginal bone to the combined influence of these variables. Early marginal bone loss (MBL) >0.44 mm in the first six months following prosthetic loading is a risk indication for peri-implant bone loss development, according to new research on crystal-level implants [6].

MATERIALS AND METHODS

This is a retrospective study conducted using the patients' records. The sample size was 50 teeth. Patients' age, gender, and medical status were recorded as well as the implant's location, diameter, and type of opposing tooth, guided bone regeneration, crown height, implant length, crown-to-implant ratios, and type of platforms. In addition, mesial, distal, and average marginal bone-loss values were collected at each patient's follow-up appointment. With a bisecting approach, periapical and bite-wing radiographs were acquired to assess the crown height and the degree of change in the marginal bone level. Each image was subjected to a computer-assisted calibration by comparing it to a database of known values (e.g., fixture length).

Inclusion and exclusion criteria

Patients having had dental implants before 3 to 5 years at Riyadh Elm University (REU) hospitals and aged above 18 years old were included in this study. Patients with systemic diseases who were contraindicated for oral surgical treatment were excluded. Moreover, patients under Chemo or Radiation therapies, with a history of trauma to the area of the implant, or previously diagnosed with Osteoporosis, and patients who suffered from any oral pathologies around the site of the implant were excluded from this study.

Statistical analysis

Mean and standard deviations were calculated, and data were analyzed for statistical significance at ($p<0.05$). Pearson's correlation test was conducted to determine the correlation between crown height and MBL. Pearson's correlation was also carried out to assess the correlation between medical status, type of prosthesis, type of opposing teeth, guided bone regeneration, and type of platform with the actual MBL using SPSS version 22.

RESULTS AND DISCUSSION

Table 1 shows the descriptive analysis of the data, with the mean age of the participants being 50.58 years, mean crown height being 8.78mm, and mean MBL (Follow-up) being 1.14.

Table 1. Descriptive statistics including the frequencies and mean values

Variables	**Mean (SD)**
Age	50.48 (SD 11.54)
Crown height	8.78 (SD 2.21) range 3.75 to 13.57
Marginal Bone Loss (Follow-up)	1.14 (SD 1.10)
Variables	**Frequencies**
Gender	Males: 22%
	Females: 78%
Medical status	Non-diabetic: 80%
	Diabetic: 20%
Type of prosthesis	Single crown: 70%
	FPD: 30%
Type of opposing teeth	Natural: 40%

	Crown: 30%
	Mix: 26%
	No opposing: 4%
Guided Bone Regeneration	Yes: 42%
	No: 58%
Type of platforms	Straight: 60%
	Matched: 40%

Table 2 shows Pearson's correlation test findings between crown height and the follow-up MBL. It can be noted that Pearson's correlation value is .116, which indicates that there is a positive correlation between crown height and the follow-up MBL. However, this positive correlation is not statistically significant as the P-value was observed to be.422.

Table 2. Correlation between crown height and follow-up MBL.

Crown Height	**Actual MBL**
Pearson correlation value: .116	
Significance value (*P*): .422	

Table 3 shows Pearson's correlation between all the indicators used in this study with the follow-up marginal bone loss. It can be noted from the findings that medical status, type of opposing teeth, and platform are negatively correlated with the follow-up marginal bone loss. However, these negative correlations were not statistically significant. Moreover, a statistically significant positive correlation was found between the type of prosthesis and marginal bone loss.

Table 3. Correlation of indicators used in the study with the follow-up MBL

Indicators	**Pearson's correlation value**	**Significance value (*P*)**
Medical status	-.050	.729
Type of prosthesis	.394	.005*
Type of opposing teeth	-.070	.628
Guided Bone Regeneration	.184	.201
Type of platform	-.019	.895

This investigation aimed to measure the connection between implant crown height and marginal bone loss. The results showed that crown height was not significantly associated with MBL in subsequent years. Additional research revealed an inverse relationship between a medical condition and marginal bone loss. However, Galindo-Morena *et al*. found that molar bone loss was strongly impacted by factors such as bone substratum, periodontitis, smoking, and abutment height. They claim that the abutment height has a significant role in MBL [7].

As argued by Lee *et al*. marginal bone loss (MBL) is a critical factor in implant success, and determining the peri-implant biological width has been thought to affect MBL in that area. Statistical analysis of the relationship between abutment height and MBL showed that the incidence of MBL and the mean MBL decreased with increasing abutment height. They further claimed, contrary to our findings, that implants with a higher prosthetic abutment demonstrate less MBL and that the abutment height should not exceed 4 mm [8].

Evidence from Chen *et al*. also suggests that abutment height has a role in determining the first marginal bone loss rate surrounding implants placed at the bone level. More data was needed to decide how it affected late marginal bone loss around bone-level implants or early or late marginal bone loss around tissue-level implants. Our results were quite different from this. In addition, our results imply an inverse association between platform type and marginal bone loss [9]. But Iorio-Siciliano *et al*. assessed the soft and hard tissue alterations surrounding tapered, platform-switched, laser-microtextured implants 24 months after crown installation using clinical and radiographic evaluation. While previous research has found a correlation between platform type and marginal bone loss, our results show that tapered, platform-switched, laser-microtextured implants can keep

their margins bone-level (with less than 1 mm of radiographic bone loss) and have minimal mucosa recession after two years [10].

This study's tiny sample size is a significant drawback compared to the previous research. This might explain why the earlier research did not replicate our study's results. As a result, future results may change if the sample size is increased.

CONCLUSION

There is no evidence of implant crown height affecting marginal bone loss.

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CONFLICT OF INTEREST : None

FINANCIAL SUPPORT : None

ETHICS STATEMENT : This study fulfills the ethical requirements of Riyadh Elm University.

REFERENCES

1. Alshammari E. Routine prescription of calcium in immobile females receiving medroxyprogesterone to prevent osteoporosis/bone loss. J Adv Pharm Edu Res. 2020;10(3):155-9.
2. Mostafavi Z, Houshyar J, Aliasgarzadeh A, Aghamohammadzadeh N, Sadra V, Khani M, et al. Comparison of the Bone Mineral Density between Acromegaly Patients and Healthy Individuals. Arch Pharm Pract. 2019;10(4):15-21.
3. Son NT, Ha HT, Van Loi P, Phong LH. Bone Marrow, Peripheral Blood and Plasma For Quantitation Of Bcr-Abl Transcript In Chronic Myeloid Leukemia. Pharmacophore. 2021;12(3):49-53.
4. Spinato S, Stacchi C, Lombardi T, Bernardello F, Messina M, Dovigo S, et al. Influence of abutment height and vertical mucosal thickness on early marginal bone loss around implants: A randomised clinical trial with an 18-month post-loading clinical and radiographic evaluation. Int J Oral Implantol (Berl). 2020;13(3):279-90.
5. Pérez-Sayans M, Castelo-Baz P, Penarrocha-Oltra D, Seijas-Naya F, Conde-Amboage M, Somoza-Martín JM. Impact of abutment geometry on early implant marginal bone loss. A double-blind, randomized, 6-month clinical trial. Clin Oral Implants Res. 2022;33(10):1038-48.
6. Lombardi T, Berton F, Salgarello S, Barbalonga E, Rapani A, Piovesana F, et al. Factors Influencing Early Marginal Bone Loss around Dental Implants Positioned Subcrestally: A Multicenter Prospective Clinical Study. J Clin Med. 2019;8(8):1168.
7. Galindo-Moreno P, León-Cano A, Ortega-Oller I, Monje A, Suárez F, ÓValle F, et al. Prosthetic Abutment Height is a Key Factor in Peri-implant Marginal Bone Loss. J Dent Res. 2014;93(7 Suppl):80S-5S.
8. Lee BA, Kim BH, Kweon HHI, Kim YT. The prosthetic abutment height can affect marginal bone loss around dental implants. Clin Implant Dent Relat Res. 2018;20(5):799-805.
9. Chen Z, Lin CY, Li J, Wang HL, Yu H. Influence of abutment height on peri-implant marginal bone loss: A systematic review and meta-analysis. J Prosthet Dent. 2019;122(1):14-21.
10. Iorio-Siciliano V, Marenzi G, Blasi A, Mignogna J, Cafiero C, Wang HL, et al. Influence of Platform-Switched, Laser-Microtextured Implant on Marginal Bone Level: A 24-Month Case Series Study. Int J Oral Maxillofac Implants. 2016;31(1):162-6.